



Milestones Bibliography

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ACGME

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Introduction

This bibliography provides a list of peer-reviewed published articles, as well as commentaries, editorials, and opinion pieces that specifically address the topic of the Milestones.

This list is designed to be useful in tracking validity evidence for the Milestones, as well as in accessing links to educational theory and strategies for implementation of this framework in individual residency and fellowship programs.

Additionally, the list was envisioned to serve as a springboard for further research into the validity and use of the Milestones to help develop the best evidence for decisions around resident and fellows' progression within accredited programs and beyond.

This list will be updated approximately every year.

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Use of Bibliography

The bibliography is organized according to the categories below, and is presented by year of publication (in descending order) within each category. Note: some articles are coded in more than one category.

Audience:	Category	Number of Articles
Program Directors	<i>Assessment Tools/Processes for Collecting Milestones Data</i>	128
	<i>CCCs – Structure and Function</i>	26
	<i>How to Use Milestones Data to Improve your Program</i>	69
	<i>Using Milestones to Guide Curriculum</i>	70
	<i>Rationale for Milestones</i>	75
	<i>Trends in Milestones Data</i>	59
	<i>Content - Do the Milestones Represent my Specialty/Program?</i>	73
	<i>How Residents Can Use Milestones Data</i>	20
Policymakers	<i>Impact of Milestones</i>	227
	Total # of Articles	430

The breakdown by Year of Publication is as follows:

2021	32
2020	36
2019	88
2018	81
2017	69
2016	46
2015	37
2014	29
2013	10
2012	2

Keywords Used and Search Criteria:

- Date Range: January 1, 2012 – January 1, 2022
- Source Type: Academic Journals
- Database(s) used: EBSCO, PubMed
- Keywords:
 - EBSCO: (TI milestone* OR AB milestone*) AND (AB (resident* OR fellow*) AND SU (graduate AND medical AND education))
 - PubMed: (milestone*[Title/Abstract]) AND (resident* OR fellow* OR (graduate AND medical AND education))

Note: since the content that follows comes from a variety of sources, there may be significant variations in style and spelling with respect to terminology. For official ACGME terminology and terminology usage, refer to the ACGME Glossary of Terms.



Assessment Tools/Processes for Collecting Milestones Data

Natural Language Processing to Estimate Clinical Competency Committee Ratings

Abbott KL, George BC, Sandhu G, Harbaugh CM, Gauger PG, Ötleş E, Matusko N, Vu JV. J Surg Educ. 2021 Nov-Dec;78(6):2046-2051. doi: 10.1016/j.jsurg.2021.06.013. Epub 2021 Jul 12. PMID: 34266789.

OBJECTIVE:

Residency program faculty participate in clinical competency committee (CCC) meetings, which are designed to evaluate residents' performance and aid in the development of individualized learning plans. In preparation for the CCC meetings, faculty members synthesize performance information from a variety of sources. Natural language processing (NLP), a form of artificial intelligence, might facilitate these complex holistic reviews. However, there is little research involving the application of this technology to resident performance assessments. With this study, we examine whether NLP can be used to estimate CCC ratings.

DESIGN:

We analyzed end-of-rotation assessments and CCC assessments for all surgical residents who trained at one institution between 2014 and 2018. We created models of end-of-rotation assessment ratings and text to predict dichotomized CCC assessment ratings for 16 Accreditation Council for Graduate Medical Education (ACGME) Milestones. We compared the performance of models with and without predictors derived from NLP of end-of-rotation assessment text.

RESULTS:

We analyzed 594 end-of-rotation assessments and 97 CCC assessments for 24 general surgery residents. The mean (standard deviation) for area under the receiver operating characteristic curve (AUC) was 0.84 (0.05) for models with only non-NLP predictors, 0.83 (0.06) for models with only NLP predictors, and 0.87 (0.05) for models with both NLP and non-NLP predictors.

CONCLUSIONS:

NLP can identify language correlated with specific ACGME Milestone ratings. In preparation for CCC meetings, faculty could use information automatically extracted from text to focus attention on residents who might benefit from additional support and guide the development of educational interventions.

Current Milestones Assessment Practices, Needs, and Challenges of Program Directors: A Collective Case Study in a Pediatric Hospital Setting

Lewis KO, Hathaway SB, Bratcher D, Blowey D, Knapp JF. *Cureus*. 2021 Apr 20;13(4):e14585. doi: 10.7759/cureus.14585. PMID: 33898152; PMCID: PMC8059776.

ABSTRACT:

Introduction Accreditation Council for Graduate Medical Education's (ACGME's) Milestones assessment requirement has placed new demands on Program Directors (PDs), especially those with limited knowledge of assessment and evaluation activities. There is a lack of clarity on how Program Director (PDs)/Associate PDs (APDs) are effectively implementing milestones assessment and evaluation practices in the Graduate Medical Education programs. The purpose of this study was to investigate current assessment practices, needs, and challenges of PDs in implementing milestones assessment within their residency and fellowship programs in a pediatric hospital setting. Methods This study used a collective case study approach to obtain information from PDs, APDs, and Clinical Competency Committee (CCC) Chairs in 19 graduate programs at a pediatric hospital. We used structured meetings with planned agendas and a pre-formatted template to itemize program needs/difficulties/challenges in the milestone assessment. We used cross-case thematic content analysis to identify categories and themes to compare differences and commonalities across programs. Results A total of 38 PDs, APDs, and CCC Chairs from 19 different specialties/subspecialties participated in this study. Thirteen types of assessment and evaluation tools were consistently used across programs. Three categories emerged in relation to those assessment and evaluation types (direct, indirect, and multi-source). Rotation evaluation (84.2%), direct observation (73.2%), and 360-degree assessment (68.4%) were primarily used for measuring patient care among the six core competencies. Programs' needs varied from curriculum and assessment tool development to alignment of milestones items, and to creating a systematic assessment management plan. The most common challenges were difficulties related to logistics and tracking of evaluation in the survey management system (52.6%), challenges with time management (47.3%), and difficulty in determining and interpreting the milestones' numbers and levels (31.5%). Conclusions Milestones assessment and evaluation in medical education can be a challenge, but a priority for many training programs. Our study indicated that milestones assessment and evaluation in medical education are far more complex than we expect. Multiple assessment methods must be utilized to evaluate all essential competencies for accurate measurement of trainees' performance abilities. Our study uncovered several issues PDs faced during the implementation of milestones assessment and needs and challenges.

Simulation-Based Assessments and Graduating Neurology Residents' Milestones: Status Epilepticus Milestones

Mikhaeil-Demo Y, Holmboe E, Gerard EE, Wayne DB, Cohen ER, Yamazaki K, Templer JW, Bega D, Culler GW, Bhatt AB, Shafi N, Barsuk JH. *J Grad Med Educ.* 2021 Apr;13(2):223-230. doi: 10.4300/JGME-D-20-00832.1. Epub 2021 Apr 16. PMID: 33897956; PMCID: PMC8054597.

BACKGROUND:

The American Board of Psychiatry and Neurology and the Accreditation Council for Graduate Medical Education (ACGME) developed Milestones that provide a framework for residents' assessment. However, Milestones do not provide a description for how programs should perform assessments.

OBJECTIVES:

We evaluated graduating residents' status epilepticus (SE) identification and management skills and how they correlate with ACGME Milestones reported for epilepsy and management/treatment by their program's clinical competency committee (CCC).

METHODS:

We performed a cohort study of graduating neurology residents from 3 academic medical centers in Chicago in 2018. We evaluated residents' skills identifying and managing SE using a simulation-based assessment (26-item checklist). Simulation-based assessment scores were compared to experience (number of SE cases each resident reported identifying and managing during residency), self-confidence in identifying and managing these cases, and their end of residency Milestones assigned by a CCC based on end-of-rotation evaluations.

RESULTS:

Sixteen of 21 (76%) eligible residents participated in the study. Average SE checklist score was 15.6 of 26 checklist items correct (60%, SD 12.2%). There were no significant correlations between resident checklist performance and experience or self-confidence. The average participant's level of Milestone for epilepsy and management/treatment was high at 4.3 of 5 (SD 0.4) and 4.4 of 5 (SD 0.4), respectively. There were no significant associations between checklist skills performance and level of Milestone assigned.

CONCLUSIONS:

Simulated SE skills performance of graduating neurology residents was poor. Our study suggests that end-of-rotation evaluations alone are inadequate for assigning Milestones for high-stakes clinical skills such as identification and management of SE.

Communication Skills of Grandview/Southview Medical Center General Surgery Residents

Johnson W, Ngo NA, Elrod M. J Am Osteopath Assoc. 2020 Dec 1;120(12):865-870. doi: 10.7556/jaoa.2020.122. PMID: 33227127.

CONTEXT:

In the transition of osteopathic programs to the single-accreditation graduate medical education (GME) system, residents are required to demonstrate skill in a set of core competencies identified by the Accreditation Council of Graduate Medical Education (ACGME) prior to graduation. Included in those core competencies are interpersonal and communication skills along with professionalism.

OBJECTIVES:

To assess strengths and weaknesses of residents' interpersonal communication skills and professionalism in the Grandview/Southview Medical Center (Dayton, OH) osteopathic general surgery program using the validated Communication Assessment Tool (CAT).

METHODS:

From November 2014 to June 2018, all patients who presented for an appointment at the Cassano General Surgery Clinic were asked by a medical assistant to complete a CAT questionnaire following their encounter with a resident physician. Patients at Cassano, an outpatient office-based facility directed to the underserved local community, are seen first by an intern, then by a 4th or 5th year resident and later by an attending physician. Patients 18 years of age or older were included; patients were excluded if they were unable to understand or read English. Patient demographics were collected, including age, gender, race/ethnicity, and previous exposure to this resident physician. Each resident's name was replaced on the CAT with a number for data analysis. The resident variables collected for this study included year of training, gender, and native language.

RESULTS:

The mean response for all CAT items was 4.5 out of 5, indicating that responses to resident performance were largely positive. Patients responded to 4 of the 14 CAT items with only excellent, very good, or good responses and no fair or poor responses. Four items had only 1 fair or poor response. The remaining 6 items received more than 1 fair or poor response: "greeted me in a way that made me feel comfortable" (#1), "talked in terms I could understand" (#8), "encouraged me to ask questions" (#10), "involved me in decisions as much as I wanted" (#11), "showed care and concern" (#13), and "spent the right amount of time with me" (#14).

CONCLUSIONS:

Attending surgeons evaluate residents in multiple areas from a doctor's perspective, but there is a potential lack of correlation between that evaluation and a patient's experience, which is paramount in osteopathic medicine. Patient responses to the CAT questionnaire can be used by program directors to identify deficiencies in milestone/competency achievement and facilitate improvement both individually and programmatically for residents according to ACGME standards.

Association Between Entrustable Professional Activities and Milestones Evaluations: Real-time Assessments Correlate With Semiannual Reviews

Albright JB, Meier AH, Ruangvoravat L, VanderMeer TJ. *J Surg Educ.* 2020 Nov-Dec;77(6):e220-e228. doi: 10.1016/j.jsurg.2020.07.027. Epub 2020 Jul 31. PMID: 32747323.

OBJECTIVE:

Entrustable professional activities (EPAs) have been developed to refine competency-based education. The American Board of Surgery has initiated a 2-year pilot study to evaluate the impact of EPAs on the evaluation and feedback of surgical residents. The ACGME Milestones in Surgery is a semiannual competency-based evaluation program to measure resident progression through 16 professional attributes across 8 practice domains. The correlation between these 2 evaluation tools remains unclear. The purpose of this study is to evaluate this correlation through comparison of an EPA with the corresponding elements of the ACGME Milestones.

DESIGN:

From July, 2018 to October, 2019, all residents submitting EPA evaluations for gall bladder disease were evaluated for preoperative, intraoperative, and/or postoperative entrustability. The ratings were converted to a numerical rank from 0 to 4. Milestones scores from May 2019 and November 2019 were obtained for each resident, with scores ranging from 0 to 4. The gall bladder EPA incorporates the operative PC3 and MK2 and nonoperative PC1, PC2, and ICS3 components. Spearman rank correlation was conducted to evaluate the association between each resident's median EPA ranking and his/her milestones scores.

SETTING:

SUNY Upstate Medical University, Syracuse, NY, a university-based hospital.

PARTICIPANTS:

General surgery residents.

RESULTS:

Among 24 residents, 106 intraoperative EPA evaluations were. For both the May and November milestones, significant positive correlations were noted for PC3 (correlation coefficient $\rho = 0.690$, $p < 0.001$; $\rho = 0.876$, $p < 0.001$). Similarly, for MK2, a significant positive correlation was noted ($\rho = 0.882$, $p < 0.001$; $\rho = 0.759$, $p < 0.001$). Interestingly, significant positive correlations were also identified between the 3 nonoperative milestones and the intraoperative entrustability ranking.

CONCLUSIONS:

We observed significant correlations between EPAs for cholecystectomy and associated milestones evaluation scores. These findings indicate that EPAs may provide more timely and specific feedback than existing tools and, on aggregate, may improve upon existing formative feedback practices provided through the biannual evaluation of surgical residents.

Reported Pediatrics Milestones (Mostly) Measure Program, Not Learner Performance

Hu K, Hicks PJ, Margolis M, Carraccio C, Osta A, Winward ML, Schwartz A. Acad Med. 2020 Nov;95(11S Association of American Medical Colleges Learn Serve Lead: Proceedings of the 59th Annual Research in Medical Education Presentations):S89-S94. doi: 10.1097/ACM.0000000000003644. PMID: 32769468.

PURPOSE:

Semiannually, U.S. pediatrics residency programs report resident milestone levels to the Accreditation Council for Graduate Medical Education (ACGME). The Pediatrics Milestones Assessment Collaborative (PMAC, consisting of the National Board of Medical Examiners, American Board of Pediatrics, and Association of Pediatric Program Directors) developed workplace-based assessments of 2 inferences: readiness to serve as an intern with a supervisor present (D1) and readiness to care for patients with a supervisor nearby in the pediatric inpatient setting (D2). The authors compared learner and program variance in PMAC scores with ACGME milestones.

METHOD:

The authors examined sources of variance in PMAC scores and milestones between November 2015 and May 2017 of 181 interns at 8 U.S. pediatrics residency programs using random effects models with program, competency, learner, and program × competency components.

RESULTS:

Program-related milestone variance was substantial (54% D1, 68% D2), both in comparison to learner milestone variance (22% D1, 14% D2) and program variance in the PMAC scores (12% D1, 10% D2). In contrast, learner variance represented 44% (D1) or 26% (D2) of variance in PMAC scores. Within programs, PMAC scores were positively correlated with milestones for all but one competency.

CONCLUSIONS:

PMAC assessments provided scores with little program-specific variance and were more sensitive to differences in learners within programs compared with milestones. Milestones reflected greater differences by program than by learner. This may represent program-based differences in intern performance or in use of milestones as a reporting scale. Comparing individual learner milestones without adjusting for programs is problematic.

The OSPE

Belovarac BJ, Zabar SR, Warfield D, Bannan MA, Rapkiewicz AV. Am J Clin Pathol. 2020 Oct 13;aqaa143. doi: 10.1093/ajcp/aqaa143. Epub ahead of print. PMID: 33049036.

OBJECTIVES:

Resident assessment tends to consist of multiple-choice examinations, even in nuanced areas, such as quality assurance. Internal medicine and many other specialties use objective structured clinical examinations, or OSCEs, to evaluate residents. We adapted the OSCE for pathology, termed the Objective Structured Pathology Examination (OSPE).

METHODS:

The OSPE was used to evaluate first- and second-year residents over 2 years. The simulation included an anatomic pathology sign-out session, where the resident could be evaluated on diagnostic skills and knowledge of key information for cancer staging reports, as well as simulated frozen-section analysis, where the resident could be evaluated on communication skills with a "surgeon." The OSPE also included smaller cases with challenging quality issues, such as mismatched slides or gross description irregularities. All cases were scored based on the Pathology Milestones created by the Accreditation Council for Graduate Medical Education.

RESULTS:

Using this OSPE, we were able to demonstrate that simulated experiences can be an appropriate tool for standardized evaluation of pathology residents.

CONCLUSIONS:

Yearly evaluation using the OSPE could be used to track the progress of both individual residents and the residency program as a whole, identifying problem areas for which further educational content can be developed.

Using Multisource Feedback to Assess Resident Communication Skills: Adding a New Dimension to Milestone Data

Byrd A, Iheagwara K, McMahon P, Bolton M, Roy M, Ochsner J. 2020 Fall;20(3):255-260. doi: 10.31486/toj.19.0054. PMID: 33071656; PMCID: PMC7529137.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) requires evaluation of residents' communication skills. These evaluations should involve assessments from a variety of persons with different perspectives and opportunities to observe resident behavior. Our objectives with this study were to determine if parents, nurses, and physicians significantly differed in their ratings of residents' communication skills; to ascertain the degree of association between these evaluations and ACGME milestone data; and to elicit feedback from residents about the specificity and usefulness of this type of evaluation compared to the evaluations they were typically provided.

METHODS:

During the 2016-2017 academic year, parents of patients ready for discharge, nurses, and attending physicians completed evaluations of resident communication skills. A repeated measures multivariate analysis of variance compared communication skills scores across the 3 groups of raters. Resident ACGME milestone ratings for interpersonal and communication skills were correlated with the communication skills evaluations. Residents rated the specificity and usefulness of the 360-degree evaluations.

RESULTS:

Parents rated residents' communication skills significantly higher than nurses and physicians rated them. We found no significant difference between the nurse and physician ratings. A significant correlation was found between resident ratings by physicians and ACGME milestone data. Residents found the feedback from these evaluations to be more specific and useful in delineating their communication strengths and weaknesses than typical milestone feedback.

CONCLUSION:

Parents added a unique perspective about residents' communication and should be included in resident evaluation when feasible. Residents appreciated the specificity and usefulness of the evaluation instrument.

Best Approaches to Evaluation and Feedback in Post-Graduate Medical Education

Perkins SQ, Dabaja A, Atiemo H. Curr Urol Rep. 2020 Aug 13;21(10):36. doi: 10.1007/s11934-020-00991-2. PMID: 32789759.

PURPOSE OF REVIEW:

The objectives of this literature review are to appraise current approaches and assess new technologies that have been utilized for evaluation and feedback of residents, with focus on surgical trainees.

RECENT FINDINGS:

In 1999, the Accreditation Council for Graduate Medical Education introduced the Milestone system as a tool for summative evaluation. The organization allows individual program autonomy on how evaluation and feedback are performed. In the past, questionnaire evaluations and informal verbal feedback were employed. However, with the advent of technology, they have taken a different shape in the form of crowdsourcing, mobile platforms, and simulation. Limited data is available on new methods but studies show promise citing low cost and positive impact on resident education. No one "best approach" exists for evaluation and feedback. However, it is apparent that a multimodal approach that is based on the ACGME Milestones can be effective and aid in guiding programs.

Implementation and Initial Construct Validity Evidence of a Tool, myTIPreport, for Interactive Workplace Feedback on ACGME Milestones

Husk K, Learman L, Field C, Connolly A. J Surg Educ. 2020 Jun 13;S1931-7204(20)30137-9. doi: 10.1016/j.jsurg.2020.05.002.

OBJECTIVE:

To describe implementation of myTIPreport for milestone feedback and to initiate construct validity testing of myTIPreport for milestones.

DESIGN:

myTIPreport was used to provide workplace feedback on Accreditation Council for Graduate Medical Education required milestone sets. Performance of senior learners (postgraduate year [PGY]-4s) was compared to that of junior learners (PGY-1s) to begin the process of construct validity testing for myTIPreport.

SETTING:

A convenience-based site selection of Obstetrics and Gynecology (OBGYN) residency programs.

PARTICIPANTS:

OBGYN residents and faculty.

RESULTS:

Amongst the 12 participating OBGYN residency programs, there were 444 unique learners and 343 unique faculty teachers. A total of 5293 milestone feedback encounters were recorded. Mean PGY-4 performance was rated higher than mean PGY-1 performance on all 25 of the compared milestone sets, with statistically significant differences seen for 19 (76%) of these 25 milestone sets and nonsignificant differences in the predicted direction observed for the other 6 milestone sets.

CONCLUSIONS:

myTIPreport detected differences between senior and junior learners for the majority of compared feedback encounters for OBGYN residents. Findings support the emerging construct validity of myTIPreport for milestone feedback.

Improving Our Ability to Predict Resident Applicant Performance: Validity Evidence for a Situational Judgment Test

Cullen MJ, Zhang C, Marcus-Blank B, Braman JP, Tiryaki E, Konia M, Hunt MA, Lee MS, Heest AV, Englander R, Sackett PR, Andrews JS. Teach Learn Med. 2020 May 19;1-14. doi: 10.1080/10401334.2020.1760104.

CONSTRUCT:

We investigated whether a situational judgment test (SJT) designed to measure professionalism in physicians predicts residents' performance on (a) Accreditation Council for Graduate Medical Education (POACGME) competencies and (b) a multisource professionalism assessment (MPA).

BACKGROUND:

There is a consensus regarding the importance of assessing professionalism and interpersonal and communication skills in medical students, residents, and practicing physicians. Nonetheless, these noncognitive competencies are not well measured during medical education selection processes. One promising method for measuring these noncognitive competencies is the SJT. In a typical SJT, respondents are presented with written or video-based scenarios and asked to make choices from a set of alternative courses of action. Interpersonally oriented SJTs are commonly used for selection to medical schools in the United Kingdom and Belgium and for postgraduate selection of trainees to medical practice in Belgium, Singapore, Canada, and Australia. However, despite international evidence suggesting that SJTs are useful predictors of in-training performance, end-of-training performance, supervisory ratings of performance, and clinical skills licensing objective structured clinical examinations, the use of interpersonally oriented SJTs in residency settings in the United States has been infrequently investigated. The purpose of this study was to investigate whether residents' performance on an SJT designed to measure professionalism-related competencies—conscientiousness, integrity, accountability, aspiring to excellence, teamwork, stress tolerance, and patient-centered care—predicts both their current and future performance as residents on two important but conceptually distinct criteria: ACGME competencies and the MPA.

APPROACH:

We developed an SJT to measure seven dimensions of professionalism. During calendar year 2017, 21 residency programs from 2 institutions administered the SJT. We conducted analyses to determine the validity of SJT and USMLE scores in predicting milestone performance in ACGME core competency domains and the MPA in June 2017 and 3 months later in September 2017 for the MPA and 1 year later, in June 2018, for ACGME domains.

RESULTS:

At both periods, the SJT score predicted overall ACGME milestone performance ($r = .13$ and $.17$, respectively; $p < .05$) and MPA performance ($r = .19$ and $.21$, respectively; $p < .05$). In addition, the SJT predicted ACGME patient care, systems-based practice, practice-based learning and improvement, interpersonal and communication skills, and professionalism competencies ($r = .16$, $.15$, $.15$, $.17$, and $.16$, respectively; $p < .05$) 1 year later. The SJT score contributed incremental validity over USMLE scores in predicting overall ACGME milestone performance ($\Delta R = .07$) 1 year later and MPA performance ($\Delta R = .05$) 3 months later.

CONCLUSIONS:

SJTs show promise as a method for assessing noncognitive attributes in residency program applicants. The SJT's incremental validity to the USMLE series in this study underscores the importance of moving beyond these standardized tests to a more holistic review of candidates that includes both cognitive and noncognitive measures.

Linking Workplace-Based Assessment to ACGME Milestones: A Comparison of Mapping Strategies in Two Specialties

Kelleher M, Kinnear B, Wong SEP, O'Toole J, Warm E. Teach Learn Med. 2020 Apr-May;32(2):194-203. doi: 10.1080/10401334.2019.1653764.

CONSTRUCT:

The construct that is assessed is competency in Pediatrics and Internal Medicine residency training. Background: The Accreditation Council for Graduate Medical Education (ACGME) created milestones to measure learner progression toward competence over time but not as direct assessment tools. Ideal measurement of resident performance includes direct observation and assessment of patient care skills in the workplace. Residency programs have linked these concepts by mapping workplace-based assessments to the milestones of ACGME subcompetencies. Mapping is a subjective process, and little is known about specific techniques or the resulting consequences of mapping program-specific assessment data to larger frameworks of competency.

APPROACH:

In this article, the authors compare and contrast the techniques used to link workplace-based assessments called Observable Practice Activities (OPAs) to ACGME subcompetencies in two large academic residency programs from different specialties (Internal Medicine and Pediatrics). Descriptive analysis explored the similarities and differences in the assessment data generated by mapping assessment items to larger frameworks of competency.

RESULTS:

Each program assessed the core competencies with similar frequencies. The largest discrepancy between the two subspecialties was the assessment of Medical Knowledge, which Internal Medicine assessed twice as often. Pediatrics also assessed the core competency Systems-based Practice almost twice as often as Internal Medicine. Both programs had several subcompetencies that were assessed more or less often than what appeared to be emphasized by the blueprint of mapping. Despite using independent mapping processes, both programs mapped each OPA to approximately three subcompetencies.

CONCLUSIONS:

Mapping workplace-based assessments to the ACGME subcompetencies allowed each program to see the whole of their curricula in ways that were not possible before and to identify existing curricular and assessment gaps. Although each program used similar assessment tools, the assessment data generated were different. The lessons learned in this work could inform other programs attempting to link their own workplace-based assessment elements to ACGME subcompetencies.

Application Factors May Not Be Predictors of Success Among General Surgery Residents as Measured by ACGME Milestones

Hayek SA, Wickizer AP, Lane SM, Dove JT, Clifton MM, Ellison HB, Shabahang MM. J Surg Res. 2020 Apr 19;253:34-40. doi: 10.1016/j.jss.2020.03.029. [Epub ahead of print]

BACKGROUND:

Can factors within the Electronic Residency Application Service application be used to predict the success of general surgery residents as measured by the Accreditation Council for Graduate Medical Education (ACGME) general surgery milestones?

METHODS:

This is a retrospective study of 21 residents who completed training at a single general surgery residency program. Electronic Residency Application Service applications were reviewed for objective data, such as age, US Medical Licensing Examination scores, and authorship of academic publications as well as for letters of recommendation, which were scored using a standardized grading system. These factors were correlated to resident success as measured by ACGME general surgery milestone outcomes using univariate and multivariate analyses. This study was conducted at a single academic tertiary care and level 1 trauma facility. Residents who completed general surgery residency training from the years of 2012-2018 were included in the study.

RESULTS:

There were few correlations between application factors and resident success determined by the ACGME milestones.

CONCLUSIONS:

Application factors alone do not account for ongoing growth and development throughout residency. Unlike the results presented in the literature for other surgical subspecialties, predicting general surgery resident success based on application factors is not straightforward.

Development and Establishment of Initial Validity Evidence for a Novel Tool for Assessing Trainee Admission Notes

Weber D, Held J, Jandarov R, Kelleher M, Kinnear B, Sall D, O'Toole J. J Gen Intern Med. 2020 Apr;35(4):1078-1083. doi: 10.1007/s11606-020-05669-6. Epub 2020 Jan 28.

BACKGROUND:

Documentation is a key component of practice, yet few curricula have been published to teach trainees proper note construction. Additionally, a gold standard for assessing note quality does not exist, and no documentation assessment tools integrate with established competency-based frameworks.

OBJECTIVE:

To develop and establish initial validity evidence for a novel tool that assesses key components of trainee admission notes and maps to the Accreditation Council for Graduate Medical Education (ACGME) milestone framework.

DESIGN:

Using an iterative, consensus building process we developed the Admission Note Assessment Tool (ANAT). Pilot testing was performed with both the supervising attending and study team raters not involved in care of the patients. The finalized tool was piloted with attendings from other institutions.

PARTICIPANTS:

Local experts participated in tool development and pilot testing. Additional attending physicians participated in pilot testing.

MAIN MEASURES:

Content, response process, and internal structure validity evidence was gathered using Messick's framework. Inter-rater reliability was assessed using percent agreement.

KEY RESULTS:

The final tool consists of 16 checklist items and two global assessment items. Pilot testing demonstrated rater agreement of 72% to 100% for checklist items and 63% to 70% for global assessment items. Note assessment required an average of 12.3 min (SD 3.7). The study generated validity evidence in the domains of content, response process, and internal structure for use of the tool in rating admission notes.

CONCLUSIONS:

The ANAT assesses individual components of a note, incorporates billing criteria, targets note "bloat," allows for narrative feedback, and provides global assessments mapped to the ACGME milestone framework. The ANAT can be used to assess admission notes by any attending and at any time after note completion with minimal rater training. The ANAT allows programs to implement routine note assessment for multiple functions with the use of a single tool.

Developing a Novel Scoring System to Objectively Track Orthopaedic Resident Educational Performance and Progression

Krueger CA, Rivera JC, Bhullar PS, Osborn PM. J Surg Educ. 2020 Mar - Apr;77(2):454-460. doi: 10.1016/j.jsurg.2019.09.009. Epub 2019 Dec 27.

OBJECTIVE:

Objectively determining orthopedic resident competence remains difficult and lacks standardization across residency programs. We sought to develop a scoring system to measure resident educational activity to stratify participation and performance in particular aspects of training and the effect of these measures on board certification.

DESIGN:

A weighted scoring system (Average Resident Score, ARS) was developed using the number of logged cases, clinic notes dictated, OITE PGY percentile, case minimums met, and scholarly activity completed each academic year (AY), with clinical activity being more heavily weighted. The Resident Effectiveness Score (RES), a z-score showing the number of standard deviations from the mean, was determined using the ARS. The RES effect on the Accreditation Council for Graduate Medical Education (ACGME) Milestones and American Board of Orthopedic Surgery (ABOS) Part 1 percentile score was determined using a Spearman correlation.

SETTING:

Large academic orthopedic residency.

PARTICIPANTS:

Thirty one orthopedic residents graduating between 2011 and 2016 were included.

RESULTS:

The RES did not differ between classes in the same AY, nor change significantly for individual residents during their training. Milestone z-scores increased as residents progressed in their education. The RES correlated with each Milestone competency subscore. The PGY5 OITE score and achieving ACGME minimums correlated with passing ABOS Part 1 (28/31 1st time pass), but the RES did not predict passing the board examination.

CONCLUSIONS:

This study demonstrates a scoring system encompassing multiple facets of resident education to track resident activity and progress. The RES can be tailored to an individual program's goals and aims and help program directors identify residents not maximizing educational opportunities compared to their peers. Monitoring this score may allow tailoring of educational efforts to individual resident needs. This RES may also allow residents to measure their performance and educational accomplishments and adjust their focus to obtain competence and board certification.

Advancing Competency-Based Medical Education Through Assessment and Feedback in Breast Imaging

Anna I Holbrook , Claudia Kasales . 2020 Mar;27(3):442-446. doi: 10.1016/j.acra.2019.04.017. Epub 2019 May 27.

ABSTRACT:

Competency-based medical education (CBME) is a method of educating and assessing trainees that focuses on outcomes, rather than process. In this review, we inform radiologists involved in breast imaging training on the tenets of CBME and its relationship to the milestones, feedback and assessment. We also describe multiple methods for assessment specific to the breast imaging curriculum, and techniques for improving feedback to trainees in breast imaging.

Content Analysis of Family Medicine Resident Peer Observations

Page C, Reid A, Brown MM, Baker HM, Coe C, Myerholtz L. Fam Med. 2020 Jan;52(1):43-47. doi: 10.22454/FamMed.2020.855292

BACKGROUND AND OBJECTIVES:

Direct observation is a critical part of assessing learners' achievement of the Accreditation Council for Graduate Medical Education (ACGME) Milestones and subcompetencies. Little research exists identifying the content of peer feedback among residents; this study explored the content of residents' peer assessments as they relate to ACGME Milestone subcompetencies in a family medicine residency program.

METHODS:

Using content from a mobile app-based observation tool (M3App), we examined resident peer observations recorded between June 2014 and November 2017, tabulating frequency of observation for each ACGME subcompetency and calculating the proportion of observations categorized under each subcompetency, as well as for each postgraduate year (PGY) class. We also coded each observation on three separate dimensions: "positive," "constructive," and "actionable." We used the χ^2 test for independence, and estimated odds ratios and 95% confidence intervals for two-by-two comparisons to compare numbers of observations within each category.

RESULTS:

Our data include 886 peer observations made by 54 individual residents. The most frequently observed competencies were in patient care, communication, and professionalism (56%, 47%, and 38% of observations, respectively). Practice-based learning and improvement was observed least frequently (16% of observations). On average, 97.25% of the observations were positive, 85% were actionable, and 6% were constructive.

CONCLUSIONS:

When asked to review their peers, residents provide comments that are primarily positive and actionable. In addition, residents tend to provide more feedback on certain subcompetencies compared to others, suggesting that programs may rely on peer feedback for specific subcompetencies. Peers can provide perspective on the behaviors and skills of fellow residents.

Professionalism and Ethics: A Standardized Patient Observed Standardized Clinical Examination to Assess ACGME Pediatric Professionalism Milestones

Waltz M, Davis A, Cadigan RJ, Jaswaney R, Smith M, Joyner B. MedEdPORTAL. 2020 Jan 31;16:10873. doi: 10.15766/mep_2374-8265.10873.

INTRODUCTION:

The ethical skills fundamental to medical practice encompass a large portion of the Accreditation Council for Graduate Medical Education (ACGME) professionalism milestones. Yet many ethical practices are difficult to reduce to milestone frameworks given the variety of traditions of moral reasoning that clinician-trainees and their colleagues might properly employ.

METHODS:

We developed an observed standardized clinical examination (OSCE) simulation with standardized patients to assess the ethical skills captured in professionalism milestones in pediatrics. The OSCE included four vignettes based on actual cases that presented problems without a correct answer. Residents discussed ethically challenging issues with standardized patients and were evaluated on specific ethical tenets contained in the professionalism milestones. Our assessment guide for preceptors offered content for debriefing and assessment. We piloted this OSCE with seven preceptors and 17 pediatric residents in two different medical settings.

RESULTS:

Residents all agreed that the four cases were realistic. All but two residents agreed that OSCEs like this one are an appropriate or objective way of assessing the ACGME professionalism milestones. All preceptors reported that they strongly agreed the assessment improved their ability to assess the professionalism milestones.

DISCUSSION:

This OSCE offers a structured method to assess professionalism milestones and a forum to discuss ethical problem solving. It can also be used solely as a training exercise in ethical decision making and having difficult conversations.

Development of Subspecialty-Specific Reporting Milestones for Hospice and Palliative Medicine Fellowship Training in the US

Barnett M, Buckholz G, Christensen A, Hwang J, Johnston CB, Landzaat L, Lupu D, Morrison LJ, Okon T, Radwany S, Yang H, Edgar L, Gustin J. *J Pain Symptom Manage*. 2020 Jan 24. pii: S0885-3924(20)30060-9. doi: 10.1016/j.jpainsymman.2020.01.008. [Epub ahead of print]

ABSTRACT:

Continuing the transition to competency-based education, Hospice and Palliative Medicine (HPM) fellowship programs began using context-free reporting milestones (RMs) for Internal Medicine subspecialties in 2014 but quickly recognized they did not reflect the nuanced practice of the field. This article describes the development of 20 subspecialty-specific RMs through consensus group process and vetting by HPM educators. A workgroup of content experts employed an iterative consensus building process between December 2017 and February 2019 to draft new RMs and to create a Supplemental Guide that outlines the intent of each RM, examples of each developmental trajectory, assessment methods, and resources to guide educators. Program directors, program coordinators, and designated institutional officers were contacted directly to solicit feedback. The majority of respondents agreed or strongly agreed that each RM represented a realistic progression of knowledge, skills, and behaviors, and that the set of milestones adequately discriminated between meaningful levels of competency. Similarly, respondents felt that the Supplemental Guide was a useful resource. The result is a set of carefully developed and broadly vetted RMs that represent a progression of development for HPM physicians over one year of clinical fellowship training.

Mini-Clinical Evaluation Exercise in the Era of Milestones and Entrustable Professional Activities in Obstetrics and Gynaecology: Resume or Reform?

Johnson NR, Pelletier A, Berkowitz LR. J Obstet Gynaecol Can. 2019 Dec 24. pii: S1701-2163(19)30881-3. doi: 10.1016/j.jogc.2019.10.002.

OBJECTIVE:

The Accreditation Council for Graduate Medical Education (ACGME) milestones and the core Entrustable Professional Activities (EPAs) provide guiding frameworks and requirements for assessing residents' progress. The Mini-Clinical Evaluation Exercise (Mini-CEX) is a formative assessment tool used to provide direct observation after an ambulatory or clinical encounter. This study aimed to investigate the feasibility and reliability of the Mini-CEX in the authors' obstetrics and gynecology (OB/GYN) residency program and its ability to measure residents' progress and competencies in the frameworks of ACGME milestones and EPAs.

METHODS:

OB/GYN residents' 5-academic-year Mini-CEX performance was analyzed retrospectively to measure reliability and feasibility. Additionally, realistic evaluation was conducted to assess the usefulness of Mini-CEX in the frameworks of ACGME milestones and EPAs.

RESULTS:

A total of 395 Mini-CEX evaluations for 49 OB/GYN residents were analyzed. Mini-CEX evaluation data significantly discriminated among residents' training levels ($P < 0.003$). Residents had an average of 8.1 evaluations per resident completed; 10% of second-year residents and 28% of third-year residents were evaluated 10 or more times per year, whereas no post-graduate year 1 or post-graduate year 4 residents achieved this number. Mini-CEX data could contribute to all six primary measurement domains of OB/GYN milestones and eight of 10 EPAs required for first-year residents.

CONCLUSION:

The Mini-CEX demonstrated potential for measuring residents' clinical competencies in their ACGME milestones. Faculty time commitment was the main challenge. Reform is necessary for the current feedback structure in Mini-CEX, faculty development, and operational guidelines that help residency programs match residents' clinical competency ratings with ACGME milestones and EPAs.

Understanding Assessment Systems for Clinical Competency Committee Decisions: Evidence from a Multisite Study of Psychiatry Residency Training Programs

Lloyd RB, Park YS, Tekian A, Marvin R. Acad Psychiatry. 2019 Dec 23. doi: 10.1007/s40596-019-01168-x.

OBJECTIVE:

This multisite study examines how clinical competency committees in Psychiatry synthesize resident assessments to inform milestones decisions to provide guidelines that support their use.

METHODS:

The study convened training directors and associate training directors from three psychiatry residency programs to examine decision-making processes of clinical competency committees. Annual resident assessments for one second year and one third year resident were used in a mock clinical competency committee format to assign milestones for two consecutive reporting periods. The committees reflected on the process and rated how the assessment tools impacted the assessment of milestones and evaluated the overall process. The authors compared reliability of assessment between the mock committees and examined both reliability of end of rotation assessments and their composite scores when combined with clinical skills evaluations.

RESULTS:

End of rotation evaluations were the most informative tool for assigning milestones and clarifying discrepancies in performance. In particular, the patient care and medical knowledge competencies were the easiest to rate, while the systems-based practice and practice-based learning and improvement were the most difficult. Reliability between committees was low although higher number of available evaluations improved reliability in decision-making.

CONCLUSIONS:

The results indicate that the medical knowledge and patient care competencies are the easiest to rate and informed most by end of rotation evaluations and clinical skills examinations. Other evaluation tools may better capture performance on specific sub-competencies beyond workplace-based assessment, or it may be helpful to reconsider the utility of how individual sub-competencies are evaluated.

Which Emergency Medicine Milestone Sub-competencies are Identified Through Narrative Assessments?

Diller D, Cooper S, Jain A, Lam CN, Riddell J. West J Emerg Med. 2019 Dec 20;21(1):173-179. doi: 10.5811/westjem.2019.12.44468.

INTRODUCTION:

Evaluators use assessment data to make judgments on resident performance within the Accreditation Council for Graduate Medical Education (ACGME) milestones framework. While workplace-based narrative assessments (WBNA) offer advantages to rating scales, validity evidence for their use in assessing the milestone sub-competencies is lacking. This study aimed to determine the frequency of sub-competencies assessed through WBNA in an emergency medicine (EM) residency program.

METHODS:

We performed a retrospective analysis of WBNA of postgraduate year (PGY) 2-4 residents. A shared mental model was established by reading and discussing the milestones framework, and we created a guide for coding WBNA to the milestone sub-competencies in an iterative process. Once inter-rater reliability was satisfactory, raters coded each WBNA to the 23 EM milestone sub-competencies.

RESULTS:

We analyzed 2517 WBNA. An average of 2.04 sub-competencies were assessed per WBNA. The sub-competencies most frequently identified were multitasking, medical knowledge, practice-based performance improvement, patient-centered communication, and team management. The sub-competencies least frequently identified were pharmacotherapy, airway management, anesthesia and acute pain management, goal-directed focused ultrasound, wound management, and vascular access. Overall, the frequency with which WBNA assessed individual sub-competencies was low, with 14 of the 23 sub-competencies being assessed in less than 5% of WBNA.

CONCLUSION:

WBNA identify few milestone sub-competencies. Faculty assessed similar sub-competencies related to interpersonal and communication skills, practice-based learning and improvement, and medical knowledge, while neglecting sub-competencies related to patient care and procedural skills. These findings can help shape faculty development programs designed to improve assessments of specific workplace behaviors and provide more robust data for the summative assessment of residents.

A Systematic Review of the Use of Google Glass in Graduate Medical Education

Carrera JF, Wang CC, Clark W, Southerland AM. J Grad Med Educ. 2019 Dec;11(6):637-648. doi: 10.4300/JGME-D-19-00148.1.

BACKGROUND:

Graduate medical education (GME) has emphasized the assessment of trainee competencies and milestones; however, sufficient in-person assessment is often constrained. Using mobile hands-free devices, such as Google Glass (GG) for telemedicine, allows for remote supervision, education, and assessment of residents.

OBJECTIVE:

We reviewed available literature on the use of GG in GME in the clinical learning environment, its use for resident supervision and education, and its clinical utility and technical limitations.

METHODS:

We conducted a systematic review in accordance with 2009 PRISMA guidelines. Applicable studies were identified through a review of PubMed, MEDLINE, and Web of Science databases for articles published from January 2013 to August 2018. Two reviewers independently screened titles, abstracts, and full-text articles that reported using GG in GME and assessed the quality of the studies. A systematic review of these studies appraised the literature for descriptions of its utility in GME.

RESULTS:

Following our search and review process, 37 studies were included. The majority evaluated GG in surgical specialties (n = 23) for the purpose of surgical/procedural skills training or supervision. GG was predominantly used for video teleconferencing, and photo and video capture. Highlighted positive aspects of GG use included point-of-view broadcasting and capacity for 2-way communication. Most studies cited drawbacks that included suboptimal battery life and HIPAA concerns.

CONCLUSIONS:

GG shows some promise as a device capable of enhancing GME. Studies evaluating GG in GME are limited by small sample sizes and few quantitative data. Overall experience with use of GG in GME is generally positive.

Could Blockchain Technology Empower Patients, Improve Education, and Boost Research in Radiology Departments? An Open Question for Future Applications

Verde F, Stanzione A, Romeo V, Cuocolo R, Maurea S, Brunetti A. J Digit Imaging. 2019 Dec;32(6):1112-1115. doi: 10.1007/s10278-019-00246-8.

ABSTRACT

Blockchain can be considered as a digital database of cryptographically validated transactions stored as blocks of data. Copies of the database are distributed on a peer-to-peer network adhering to a consensus protocol for authentication of new blocks into the chain. While confined to financial applications in the past, this technology is quickly becoming a hot topic in healthcare and scientific research. Potential applications in radiology range from upgraded monitoring of training milestones achievement for residents to improved control of clinical imaging data and easier creation of secure shared databases.

Validation of Assessing Arthroscopic Skill using the ASSET Evaluation

Raja A, Thomas P, Harrison A, Tompkins M, Braman J. J Surg Educ. 2019 Nov - Dec;76(6):1640-1644. doi: 10.1016/j.jsurg.2019.05.010. Epub 2019 Aug 23.

BACKGROUND:

The Accreditation Council for Graduate Medical Education and the American Board of Orthopaedic Surgery have implemented "milestones" to evaluate residents during their progression in medical education. The purpose of this study was to determine whether a validated evaluation tool correlates with surgical experience, year in training, and progression over time.

DESIGN:

This was a retrospective study of already collected curriculum assessment data where 2 unbiased, blinded orthopedic surgeons evaluated resident performance on basic diagnostic knee arthroscopy using the Arthroscopic Surgical Skills Evaluation Tool (ASSET) over 3 years. Residents also gained arthroscopy experience through a structured arthroscopy curriculum and clinical experience.

SETTING:

The study was conducted at the TRIA Orthopaedic Center (Bloomington, Minnesota, USA), an institutional site for The University of Minnesota orthopedic surgery residency program.

PARTICIPANTS:

Eleven orthopedic surgery residents at postgraduate years 2 to 5 were evaluated using the ASSET.

RESULTS:

The Pearson's Correlation Coefficient was used to validate both the number of arthroscopic procedures performed by residents ($r = 0.946$) and their level in training ($r = 0.89$). Residents who were re-evaluated after undergoing the arthroscopy curriculum throughout the year displayed significant increases in total ASSET scores ($p < 0.01$).

CONCLUSION:

Resident performance on the ASSET correlated with arthroscopic experience based on year-in training. More importantly, performance improved with additional years of training, demonstrating validity over time. The data also demonstrates interobserver reliability. Due to these correlations between exposure to surgery and score on the ASSET, we believe the tool could serve as a suitable means for assessing residents' technical proficiency as required by The Accreditation Council for Graduate Medical Education program guidelines.

Using an Entrustable Professional Activity to Assess Consultation Requests Called on an Internal Medicine Teaching Service

Kang AJ, Gielissen K, Windish D. MedEdPORTAL. 2019 Nov 22;15:10854. doi: 10.15766/mep_2374-8265.10854.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education's milestones require internal medicine residents to have competency in calling consults. Based on a literature review, we developed an Entrustable Professional Activity (EPA) to delineate the knowledge, skills, and attitudes required for a consultation request and, building on the EPA, implemented an assessment instrument to provide feedback to interns calling consultation requests and assess the quality of their consult questions and the level of supervision required in performing this milestone.

METHODS:

Assessments were done on internal medicine inpatient teaching services. Consultation requests were performed by interns and observed by residents using the assessment instrument. Feedback was provided to the interns. Interns then completed a self-reflection instrument based on the feedback.

RESULTS:

Twenty-six paired observations were collected over three 1-month rotations. There was a moderate positive correlation ($r = .43$) comparing resident and intern responses to how they felt about the intern's ability to make a consultation request. There was a strong positive correlation ($r = .65$) comparing resident opinion of how strong the intern's ability in calling a consult to how well the consult question used the PICO (patient, intervention, comparators, outcomes of interest) framework. Twenty-five out of 28 interns (89%) said they would make a change during their next consultation request due to feedback from their resident.

DISCUSSION:

Our EPA-based assessment instrument provided an opportunity to give interns feedback and to assess the quality of the consultation requests they made.

Focused Teaching Improves Medical Student Professionalism and Data Gathering Skills in the Emergency Department

Smith C, Likourezos A, Schiller J. *Cureus*. 2019 Sep 25;11(9):e5765. doi: 10.7759/cureus.5765.

INTRODUCTION:

Leaders in medical education have developed milestones and core competencies in an attempt to ensure that relational skills, such as communication and professionalism, are emphasized in addition to the usual skills of medical knowledge, data gathering, and emergency stabilization during students' emergency medicine (EM) medical education. Providers facile in each of these areas have better patient outcomes, patient experiences, and decreased incidence of malpractice cases. The authors attempted to demonstrate that by deliberate teaching of these skills during an EM medical student clerkship, students could significantly improve their clinical performance.

METHODS:

This prospective, randomized, single-blinded cohort study was performed at an academic, tertiary, urban ED to investigate the effects of a one-on-one preceptor shift on the clinical performance of fourth-year medical students. Students were randomized into two groups and assessed by pre- and post-intervention objective structured clinical encounters (OSCEs) with standardized patients (SPs) at weeks one and three. A crossover design was employed so that students in the control group participated in a preceptor shift after their second OSCE. Measurements were based on a five-point Likert scale assessment linked to early EM milestones as defined by the Accreditation Council on Graduate Medical Education (ACGME).

RESULTS:

The mean improvement in total overall score was significantly greater in the intervention group: 4.31 versus 2.57 (Cohen's $d = 0.57$, $p = 0.029$). When each milestone was assessed individually, students in the intervention group improved significantly in data gathering (Cohen's $d = 0.47$, $p = 0.048$) and professionalism (Cohen's $d = 0.66$, $p = 0.011$). There was a nonstatistically significant improvement for the intervention compared to control group in emergency management and communication skills. There was no improvement for either group in medical knowledge.

CONCLUSION:

A one-on-one preceptor shift can result in a statistically significant improvement in data gathering and professionalism skills as measured by OSCEs.

'Intern Check-in Tool' to Improve Early Identification of Struggling Interns and Facilitate Feedback

Swick A, Allen D, Allen K, Malin, S, Goldman, M, Nabhan, Z, Rushton, J. Academic Pediatrics. Aug 2019;19(6):e21-e22. doi:10.1016/j.acap.2019.05.059.

BACKGROUND:

Our current system for evaluation relies on faculty and peer evaluation of intern performance relating to general ACGME milestones. However, a program may have insufficient data to accurately identify a struggling intern until several months into the academic year.

OBJECTIVE;

To develop a brief, objective, resident-based evaluation tool to facilitate earlier identification of struggling interns in pediatric and internal medicine programs.

METHODS:

The intern check-in tool (ICT) consists of 18 items with a variety of observable key skills expected for interns (refer to attached form). It is scored on a 22-point scale of objective behaviors. Chief residents meet half way through each rotation and review the tool with senior residents supervising each intern.

RESULTS:

We implemented the use of the ICT at the beginning of the academic year in July 2018. Mid-year data are still being analyzed. In January 2019, after completion of the clinical competency committee (CCC) meetings, we will perform statistical analysis to measure correlations between the ICT scores and the overall intern performance as assessed by the CCC. We will also calculate the sensitivity and specificity for a range of ICT scores and measure correlations between the ICT scores and the demographic data, including medical school quartile and USMLE scores, for each intern. The ICT allowed us to identify a struggling intern early on who had multiple high scores. Following focused feedback and mentoring from senior residents, the intern's performance improved significantly prior to the CCC. The use of the tool has also identified interns struggling with wellness, who we have been able to integrate into a counseling program.

CONCLUSIONS:

The pilot of the ICT may supplement more general milestone evaluations. Our data are preliminary but promising. This tool might be of benefit to other programs aiming to assess intern performance. It provides a forum for residents to learn the art of giving feedback and seek strategies to help their interns improve in real time.

Synthesizing and Reporting Milestones-Based Learner Analytics: Validity Evidence From a Longitudinal Cohort of Internal Medicine Residents

Park YS, Zar F, Tekian A. Acad Med. 2019 Aug 20. doi: 10.1097/ACM.0000000000002959.

PURPOSE:

Coordinating and operationalizing assessment systems that effectively streamline and measure fine-grained progression of residents at various stages of graduate medical training can be challenging. This article describes development, administration, and psychometric analyses of a learner analytics system to resolve challenges in implementation of milestones by introducing the Scoring Grid Model, operationalized in an internal medicine (IM) residency program.

METHOD:

A three-year longitudinal cohort of 34 residents at the University of Illinois at Chicago College of Medicine began using this learner analytics system, from entry (July 2013) to graduation (June 2016). Scores from 23 assessments used throughout the 3-year training were synthesized using the Scoring Grid Model learner analytics system, to generate scores corresponding to the 22 reportable IM subcompetencies. A consensus model was used to develop and pilot test the model using feedback from IM faculty members and residents. Scores from the scoring grid were used to inform promotion decisions and reporting of milestone levels. Descriptive statistics and mixed-effects regression were used to examine data trends and gather validity evidence.

RESULTS:

Initial validity evidence for content, internal structure, and relations to other variables that systematically integrate assessment scores aligned with the reportable milestones framework are presented, including composite score reliability of scores generated from the learner analytics system. The scoring grid provided fine-grained learner profiles and showed predictive utility in identifying low-performing residents.

CONCLUSIONS:

The Scoring Grid Model and associated learner analytics data platform may provide a practical, reasonable solution for generating fine-grained, milestones-based profiles supporting resident progress.

Ability of Ophthalmology Residents to Self-Assess Their Performance through Established Milestones

Srikumaran D, Tian J, Ramulu P, Boland MV, Woreta F, Wang KM, Mahoney N. *J Surg Educ.* 2019 Jul - Aug;76(4):1076-1087. doi: 10.1016/j.jsurg.2018.12.004. Epub 2019 Mar 5

OBJECTIVES:

Accurate self-assessment is an important aspect of practice-based learning and improvement and a critical skill for resident growth. The Accreditation Council for Graduate Medical Education mandates semiannual milestones assessments by a clinical competency committee (CCC) for all ophthalmology residents. There are six core competencies: patient care (PC), medical knowledge, systems-based practice, practice-based learning and improvement, professionalism, and interpersonal communication skills. These competencies are assessed by the milestones rubric, which has detailed behavioral anchors and are also used for trainee self-assessments. This study compares resident self-assessed (SA) and faculty CCC milestones scores.

DESIGN:

Residents completed milestones self-assessments prior to receiving individual score reports from the CCC. Correlation coefficients were calculated comparing the SA and CCC scores. In addition, statistical models were used to determine predictors of disparities and differences between the SA and CCC scores.

SETTING:

Wilmer Eye Institute, Johns Hopkins Hospital.

PARTICIPANTS:

Twenty-one residents in the Wilmer Ophthalmology Residency program from July 2014 to June 2016.

RESULTS:

Fifty-seven self-assessments were available for the analysis. For each resident's first assessment, SA and CCC scores were strongly correlated ($r \geq 0.6$ and $p < 0.05$) for four milestones, and not correlated for the remaining 20 milestones. In multivariable models, the SA and CCC scores are less disparate for medical knowledge and systems-based practice competencies compared to practice-based learning and improvement. Higher year of training, PC and professionalism competencies were predictive of statistically significant resident overestimation of scores relative to the CCC. In addition, higher CCC scores predicted statistically significant lower SA-CCC disparities and differences. SA-CCC differences did not lower to a significant extent with repeated assessments or modification to the end-of-rotation evaluation forms.

CONCLUSIONS:

Self-assessments by ophthalmology residents are not well-correlated with faculty assessments, emphasizing the need for improved and frequent timely feedback. Residents have the greatest difficulty self-assessing their professionalism and PC competency. In general, senior residents and underperforming residents have more inaccurate self-assessments.

Should Objective Structured Clinical Examinations Assist the Clinical Competency Committee in Assigning Anesthesiology Milestones Competency?

Rebel A, DiLorenzo A, Nguyen D, Horvath I, McEvoy MD, Fragneto RY, Dority JS, Rose GL, Schell RM. *Anesth Analg*. 2019 Jul;129(1):226-234. doi: 10.1213/ANE.0000000000004120.

BACKGROUND:

With the integration of Objective Structured Clinical Examinations into the Anesthesiology primary board certification process, residency programs may choose to implement Objective Structured Clinical Examinations for resident skill assessment. The aim of this study was to evaluate Objective Structured Clinical Examination-based milestone assessment and compare with Clinical Competency Committee milestone assessment that is based purely on clinical evaluations.

METHODS:

An annual Objective Structured Clinical Examination event was used to obtain milestone assessment of clinical anesthesia year 0-clinical anesthesia year 3 residents for selected milestones in patient care, professionalism, and interpersonal/communication skills. The Objective Structured Clinical Examination scenarios were different for each training level. The Clinical Competency Committee evaluated each resident semiannually based on clinical evaluations of resident performance. The Clinical Competency Committee milestone assessments from 2014 to 2016 that were recorded closest to the Objective Structured Clinical Examination event (± 3 months) were compared to the Objective Structured Clinical Examination milestone assessments. A total of 35 residents were included in this analysis in 3 different training cohorts: A (graduates 2016, $n = 12$); B (graduates 2017, $n = 10$); and C (graduates 2018, $n = 13$). All residents participated in Objective Structured Clinical Examinations because their clinical anesthesia year 0 year and Clinical Competency Committee milestone data had been reported since December 2014.

RESULTS:

Both assessment techniques indicated a competency growth proportional to the length in training. Despite limited cumulative statistics in this study, average trends in the Objective Structured Clinical Examination-Clinical Competency Committee relationship indicated: (1) a good proportionality in reflecting competency growth; (2) a grade enhancement associated with Clinical Competency Committee assessment, dominated by evaluations of junior residents (clinical anesthesia year 0-clinical anesthesia year 1); and (3) an expectation bias in Clinical Competency Committee assessment, dominated by evaluation of senior residents (clinical anesthesia year 2-clinical anesthesia year 3).

CONCLUSIONS:

Our analysis confirms the compatibility of the 2 evaluation methods in reflecting longitudinal growth. The deviation of Objective Structured Clinical Examination assessments versus Clinical Competency Committee assessments suggests that Objective Structured Clinical Examinations may be providing additional or different information on resident performance. Educators might consider using both assessment methods to provide the most reliable and valid competency assessments during residency.

An Emergency Medicine Milestone-Based Simulation Curriculum: Acute Ischemic Stroke

Turner-Lawrence D, Hang BS, Shah P, Levasseur K. MedEdPORTAL. 2019 Jun 18;15:10829. doi: 10.15766/mep_2374-8265.10829.

INTRODUCTION:

The emergency medicine (EM) resident's ability to make independent decisions in the setting of acute ischemic stroke has been reduced as a result of the involvement of multidisciplinary teams. This simulation was created to give EM residents the opportunity to independently manage the early stages of ischemic stroke and its complications.

METHODS:

A solo learner was presented with a 55-year-old male with complaints consistent with an acute stroke. The resident had to calculate stroke severity; coordinate hospital resources; discuss risks, benefits, and alternatives to thrombolysis; and deal with subsequent complications. The learner had to keep a broad differential for sudden change in mental status and consider alternative interventions. Strategies to decrease intracranial pressure needed to be implemented while obtaining neurosurgical consultation. Debriefing included discussion of expected actions in the context of the Accreditation Council for Graduate Medical Education (ACGME) milestones. Residents' review of their video performance added additional self-reflection.

RESULTS:

A total of 69 PGY 3 EM residents independently participated in this simulation over a 5-year period. Thirty-two completed a postsimulation evaluation. Nearly all learners felt that this case reflected an actual patient encounter and increased their confidence in managing stroke. The milestone-based feedback tool was completed with all learners. Anticipated actions linked to Level 1 and 2 milestones were regularly achieved while acquisition of Level 3 and 4 actions varied.

DISCUSSION:

Case actions were uniquely characterized by the ACGME milestones, which helped to delineate learners' knowledge gaps and provided concrete areas for improvement.

Development of a Simulation-Based Interprofessional Teamwork Assessment Tool

Bismilla Z, Boyle T, Mangold K, Van Ittersum W, White ML, Zaveri P, Mallory L. *J Grad Med Educ.* 2019 Apr;11(2):168-176. doi: 10.4300/JGME-D-18-00729.1.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) Milestone projects required each specialty to identify essential skills and develop means of assessment with supporting validity evidence for trainees. Several specialties rate trainees on a milestone subcompetency related to working in interprofessional teams. A tool to assess trainee competence in any role on an interprofessional team in a variety of scenarios would be valuable and suitable for simulation-based assessment.

OBJECTIVE:

We developed a tool for simulation settings that assesses interprofessional teamwork in trainees.

METHODS:

In 2015, existing tools that assess teamwork or interprofessionalism using direct observation were systematically reviewed for appropriateness, generalizability, adaptability, ease of use, and resources required. Items from these tools were included in a Delphi method with multidisciplinary pediatrics experts using an iterative process from June 2016 to January 2017 to develop an assessment tool.

RESULTS:

Thirty-one unique tools were identified. A 2-stage review narrowed this list to 5 tools, and 81 items were extracted. Twenty-two pediatrics experts participated in 4 rounds of Delphi surveys, with response rates ranging from 82% to 100%. Sixteen items reached consensus for inclusion in the final tool. A global 4-point rating scale from novice to proficient was developed.

CONCLUSIONS:

A novel tool to assess interprofessional teamwork for individual trainees in a simulated setting was developed using a systematic review and Delphi methodology. This is the first step to establish the validity evidence necessary to use this tool for competency-based assessment

Predicting Performance of First-Year Residents: Correlations between Structured Interview, Licensure Exam, and Competency Scores in a Multi-Institutional Study

Marcus-Blank B, Dahlke JA, Braman JP, Borman-Shoap E, Tiryaki E, Chipman J, Andrews JS, Sackett PR, Cullen MJ. *Acad Med.* 2019 Mar;94(3):378-387. doi: 10.1097/ACM.0000000000002429.

PURPOSE:

To determine whether scores on structured interview (SI) questions designed to measure noncognitive competencies in physicians (1) predict subsequent first-year resident performance on Accreditation Council for Graduate Medical Education (ACGME) milestones and (2) add incremental validity over United States Medical Licensing Examination (USMLE) Step 1 and Step 2 Clinical Knowledge (CK) scores in predicting performance.

METHOD:

The authors developed 18 behavioral description questions to measure key noncognitive competencies (e.g., teamwork). In 2013-2015, 14 programs (13 residency, 1 fellowship) from 6 institutions used subsets of these questions in their selection processes. The authors conducted analyses to determine the validity of SIs and USMLE scores in predicting first-year resident milestone performance in the ACGME's core competency domains and overall.

RESULTS:

SI scores predicted mid-year and year-end overall performance ($r = .18$ and $.19$, respectively, $P < .05$) and year-end performance on patient care, interpersonal and communication skills, and professionalism competencies ($r = .23$, $r = .22$, and $r = .20$, respectively, $p < .05$). SI scores contributed incremental validity over USMLE scores in predicting year-end performance on patient care ($\Delta R = .05$), interpersonal and communication skills ($\Delta R = .09$), and professionalism ($\Delta R = .09$; all $P < .05$). USMLE scores contributed incremental validity over SI scores in predicting year-end performance overall and on patient care and medical knowledge.

CONCLUSIONS:

SI scores predict first-year resident year-end performance in the interpersonal and communication skills, patient care, and professionalism competency domains. Future research should investigate whether SIs predict a range of clinically relevant outcomes.

Direct Observation Assessment of Ultrasound Competency Using a Mobile Standardized Direct Observation Tool Application With Comparison to Asynchronous Quality Assurance Evaluation

Boniface KS, Ogle K, Aalam A, LeSaux M, Pyle M, Mandoorah S, Shokoohi H. AEM Educ Train. 2019 Feb 19;3(2):172-178. doi: 10.1002/aet2.10324. eCollection 2019 Apr.

OBJECTIVES:

Competency assessment is a key component of point-of-care ultrasound (POCUS) training. The purpose of this study was to design a smartphone-based standardized direct observation tool (SDOT) and to compare a faculty-observed competency assessment at the bedside with a blinded reference standard assessment in the quality assurance (QA) review of ultrasound images.

METHODS:

In this prospective, observational study, an SDOT was created using SurveyMonkey containing specific scoring and evaluation items based on the Council of Emergency Medicine Residency-Academy of Emergency Ultrasound: Consensus Document for the Emergency Ultrasound Milestone Project. Ultrasound faculty used the mobile phone-based data collection tool as an SDOT at the bedside when students, residents, and fellows were performing one of eight core POCUS examinations. Data recorded included demographic data, examination-specific data, and overall quality measures (on a scale of 1-5, with 3 and above being defined as adequate for clinical decision making), as well as interpretation and clinical knowledge. The POCUS examination itself was recorded and uploaded to QPath, a HIPAA-compliant ultrasound archive. Each examination was later reviewed by another faculty blinded to the result of the bedside evaluation. The agreement of examinations scored adequate (3 and above) in the two evaluation methods was the primary outcome.

RESULTS:

A total of 163 direct observation evaluations were collected from 23 EM residents (93 SDOTs [57%]), 14 students (51 SDOTs [31%]), and four fellows (19 SDOTs [12%]). The trainees were evaluated on completing cardiac (54 [33%]), focused assessment with sonography for trauma (34 [21%]), biliary (25 [15%]), aorta (18 [11%]), renal (12 [7%]), pelvis (eight [5%]), deep vein thrombosis (seven [4%]), and lung scan (5 [3%]). Overall, the number of observed agreements between bedside and QA assessments was 81 (87.1% of the observations) for evaluating the quality of images (scores 1 and 2 vs. scores 3, 4, and 5). The strength of agreement is considered to be "fair" ($\kappa = 0.251$ and 95% confidence interval [CI] = 0.02-0.48). Further agreement assessment demonstrated a fair agreement for images taken by residents and students and a "perfect" agreement in images taken by fellows. Overall, a "moderate" inter-rater agreement was found in 79.1% for the accuracy of interpretation of POCUS scan (e.g., true positive, false negative) during QA and bedside evaluation ($\kappa = 0.48$, 95% CI = 0.34-0.63). Faculty at the bedside and QA assessment reached a moderate agreement on interpretations noted by residents and students and a "good" agreement on fellows' scans.

CONCLUSION:

Using a bedside SDOT through a mobile SurveyMonkey platform facilitates assessment of competency in emergency ultrasound learners and correlates well with traditional competency evaluation by asynchronous weekly image review QA.

Evaluation of a Modified Objective Structured Assessment of Technical Skills Tool for the Assessment of Pediatric Laceration Repair Performance

Uspal NG, Thomas AA, Burns R, Jones M, Gross IT, Kearney RD, Whitney RE, Uspal JE, Gove N, Reid J. *Cureus*. 2019 Feb 12;11(2):e4056. doi: 10.7759/cureus.4056.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education (ACGME) has developed milestones including procedural skills under the core competency of patient care. Progress in training is expected to be monitored by residency programs. To our knowledge, there exists no tool to evaluate pediatric resident laceration repair performance.

METHODS:

The Objective Structured Assessment of Technical Skills was adapted to evaluate resident laceration repair performance using two components: a global rating scale (GRS) and a checklist. Pediatric and family medicine residents at a tertiary care children's hospital were filmed performing a simulated laceration repair. Videos were evaluated by at least five physicians trained in laceration repair.

Concordance correlation coefficients (CCC) were calculated for the GRS and checklist scores. Scores for each resident were compared across levels of training and procedural experience. Spearman's rank order correlations were calculated to compare the checklist and GRS.

RESULTS:

Thirty residents were filmed performing laceration repair procedures. The CCC showed fair concordance across reviewers for the checklist (0.55, 95% CI: 0.38-0.69) and the GRS (0.53, 95% CI: 0.36-0.67). There was no significant difference in scores by self-reported experience or training level. There was correlation between the median GRS and checklist scores (Spearman $\rho = 0.730$, $p < .001$).

CONCLUSION:

A novel tool to evaluate resident laceration repair performance in a pediatric emergency department showed fair agreement across reviewers. The study tool is not precise enough for summative evaluation; however, it can be used to distinguish between trainees who have and have not attained competence in laceration repair for formative feedback.

Psychotherapy Competency Milestones: an Exploratory Pilot of CBT and Psychodynamic Psychotherapy Skills Acquisition in Junior Psychiatry Residents

Ravitz P, Lawson A, Fefergrad M, Rawkins S, Lancee W, Maunder R, Leszcz M, Kivlighan DM Jr. *Acad Psychiatry*. 2019 Feb;43(1):61-66. doi: 10.1007/s40596-018-0940-4. Epub 2018 Jun 1.

OBJECTIVE:

Psychiatry residents train in Psychodynamic Psychotherapy and Cognitive Behavioral Therapy (CBT), evidence-supported treatments used in mental health care that can facilitate clinical reasoning, foster therapeutic alliances, and improve clinical outcomes. However, empirically derived milestones are needed to evaluate competency. This exploratory pilot examined changes over 1 year of training in junior psychiatry residents' competency milestone elements in Psychodynamic Psychotherapy and CBT.

METHODS:

Seventy-nine randomly selected audio-recorded sessions from differing phases of Psychodynamic Psychotherapy and CBT with five junior residents and ten patients were rated using the Psychotherapy Process Q-sort (PQS).

RESULTS:

In both treatments, patient engagement with attention to in-session emotions improved. In CBT, residents were directive, supported patients' self-efficacy, emphasized patients' accepting responsibility for their problems, discussed homework such as thought records, and focused on termination in the concluding sessions. In Psychodynamic Psychotherapy, residents attended to emotional arousal and linked patients' feelings or perceptions to past situations or behavior. Growth and hierarchical linear modeling differentiated these treatments, with CBT v. Psychodynamic adherence to PQS modality-specific ideal elements being 52% v.19%.

CONCLUSION:

Teaching and observation using empirically derived observable psychotherapy practice behaviors is feasible and can be used to assess milestone elements for competency-based education of psychiatry trainees.

Milestones in Plastic Surgery: Attending Assessment versus Resident Assessment

Chow I, Nguyen VT, Losee JE, Goldstein JA, Spiess AM, Solari MG, Rubin JP, Gusenoff JA. *Plast Reconstr Surg*. 2019 Feb;143(2):425e-432e. doi: 10.1097/PRS.00000000000005214.

BACKGROUND:

The Plastic Surgery Milestones Project was jointly conceived by the ACGME and American Board of Plastic Surgery as a tool to improve granularity in resident feedback. Resident self- evaluations were compared to attending clinical competency committee evaluations to gauge resident self-perceptions and understanding of the milestones framework.

METHODS:

Semi-annual evaluations from June 2014-2017 were analyzed and compared with corresponding resident self-evaluations from the 2015-2017 academic year at the University of Pittsburgh Medical Center. Evaluations were analyzed for overall trends in performance. The Wilcoxon Rank-Sign test was used to identify any systematic differences between evaluations. Subgroup analysis using the chi-square test was performed to determine factors that may contribute to major assessment disparity (≥ 1).

RESULTS:

6,207 milestones across 187 faculty evaluations and 3,139 milestones across 106 resident self-evaluations were available for review. With the exception of PGY-2 residents, residents rated themselves at a significantly lower level in the competencies of medical education and patient care. Post-graduate year, academic year timing, and ACGME competency were associated with major assessment discrepancies.

CONCLUSIONS:

Overall, resident and faculty evaluations at our program were concordant which demonstrates that residents are capable of accurately assessing their own abilities and understanding the milestones framework. Areas of discordance between resident and faculty evaluations fostered discussion between residents and faculty and have led to multiple changes in our program. The introduction of self-evaluation tools at other programs may provide them with similar benefits.

Integration of Entrustable Professional Activities with the Milestones for Emergency Medicine Residents

Hart D, Franzen D, Beeson M, Bhat R, Kulkarni M, Thibodeau L, Weizberg M, Promes S. West J Emerg Med. 2019 Jan;20(1):35-42. doi: 10.5811/westjem.2018.11.38912. Epub 2018 Nov 30.

INTRODUCTION:

Medical education is moving toward a competency-based framework with a focus on assessment using the Accreditation Council for Graduate Medical Education Milestones. Assessment of individual competencies through milestones can be challenging. While competencies describe characteristics of the person, the entrustable professional activities (EPAs) concept refers to work-related activities. EPAs would not replace the milestones but would be linked to them, integrating these frameworks. Many core specialties have already defined EPAs for resident trainees, but EPAs have not yet been created for emergency medicine (EM). This paper describes the development of milestone-linked EPAs for EM.

METHODS:

Ten EM educators from across North America formed a consensus working group to draft EM EPAs, using a modified Glaser state-of-the-art approach. A reactor panel with EPA experts from the United States, Canada and the Netherlands was created, and an iterative process with multiple revisions was performed based on reactor panel input. Following this, the EPAs were sent to the Council of Residency Directors for EM (CORD-EM) listserv for additional feedback.

RESULTS:

The product was 11 core EPAs that every trainee from every EM program should be able to perform independently by the time of graduation. Each EPA has associated knowledge, skills, attitudes and behaviors (KSAB), which are either milestones themselves or KSABs linked to individual milestones. We recognize that individual programs may have additional focus areas or work-based activities they want their trainees to achieve by graduation; therefore, programs are also encouraged to create additional program-specific EPAs.

CONCLUSION:

This set of 11 core, EM-resident EPAs can be used as an assessment tool by EM residency programs, allowing supervising physicians to document the multiple entrustment decisions they are already making during clinical shifts with trainees. The KSAB list within each EPA could assist supervisors in giving specific, actionable feedback to trainees and allow trainees to use this list as an assessment-for-learning tool. Linking each KSAB to individual EM milestones allows EPAs to directly inform milestone assessment for clinical competency committees. These EPAs serve as another option for workplace-based assessment, and are linked to the milestones to create an integrated framework.

Assessment of Emergency Medicine Resident Performance in an Adult Simulation Using a Multisource Feedback Approach

Jong M, Elliott N, Nguyen M, Goyke T, Johnson S, Cook M, Lindauer L, Best K, Gerner D, Morolla L, Matuzsan Z, Kane B, West J. *Emerg Med*. 2019 Jan;20(1):64-70. doi: 10.5811/westjem.2018.12.39844. Epub 2018 Dec 17.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education (ACGME) specifically notes multisource feedback (MSF) as a recommended means of resident assessment in the emergency medicine (EM) Milestones. High-fidelity simulation is an environment wherein residents can receive MSF from various types of healthcare professionals. Previously, the Queen's Simulation Assessment Tool (QSAT) has been validated for faculty to assess residents in five categories: assessment; diagnostic actions; therapeutic actions; interpersonal communication, and overall assessment. We sought to determine whether the QSAT could be used to provide MSF using a standardized simulation case.

METHODS:

Prospectively after institutional review board approval, residents from a dual ACGME/ osteopathic-approved postgraduate years (PGY) 1-4 EM residency were consented for participation. We developed a standardized resuscitation after overdose case with specific 1-5 Likert anchors used by the QSAT. A PGY 2-4 resident participated in the role of team leader, who completed a QSAT as self-assessment. The team consisted of a PGY-1 peer, an emergency medical services (EMS) provider, and a nurse. Two core faculty were present to administer the simulation case and assess. Demographics were gathered from all participants completing QSATs. We analyzed QSATs by each category and on cumulative score. Hypothesis testing was performed using intra-class correlation coefficients (ICC), with 95% confidence intervals. Interpretation of ICC results was based on previously published definitions.

RESULTS:

We enrolled 34 team leader residents along with 34 nurses. A single PGY-1, a single EMS provider and two faculty were also enrolled. Faculty provided higher cumulative QSAT scores than the other sources of MSF. QSAT scores did not increase with team leader PGY level. ICC for inter-rater reliability for all sources of MSF was 0.754 (0.572-0.867). Removing the self-evaluation scores increased inter-rater reliability to 0.838 (0.733-0.910). There was lesser agreement between faculty and nurse evaluations than from the EMS or peer evaluation. Conclusion: In this single-site cohort using an internally developed simulation case, the QSAT provided MSF with excellent reliability. Self-assessment decreases the reliability of the MSF, and our data suggest self-assessment should not be a component of MSF. Use of the QSAT for MSF may be considered as a source of data for clinical competency committees.

Resident Case Volume Correlates with Clinical Performance: Finding the Sweet Spot

Agarwal V, Bump GM, Heller MT, Chen LW, Branstetter BF 4th, Amesur NB, Hughes MA. Acad Radiol. 2019 Jan;26(1):136-140. doi: 10.1016/j.acra.2018.06.023. Epub 2018 Aug 4.

RATIONALE AND OBJECTIVES:

To determine whether the total number of studies interpreted during radiology residency correlates with clinical performance as measured by objective criteria.

MATERIALS AND METHODS:

We performed a retrospective cohort study of three graduating classes of radiology residents from a single residency program between the years 2015-2017. The total number of studies interpreted by each resident during residency was tracked. Clinical performance was determined by tracking an individual resident's major discordance rate. A major discordance was recorded when there was a difference between the preliminary resident interpretation and final attending interpretation that could immediately impact patient care. Accreditation council for graduate medical education milestones at the completion of residency, Diagnostic radiology in- training scores in the third year, and score from the American board of radiology core exam were also tabulated. Pearson correlation coefficients and polynomial regression analysis were used to identify correlations between the total number of interpreted films and clinical, test, and milestone performance.

RESULTS:

Thirty-seven residents interpreted a mean of 12,709 studies (range 8898-19,818; standard deviation [SD] 2351.9) in residency with a mean major discordance rate of 1.1% (range 0.34%- 2.54%; stand dev 0.49%). There was a nonlinear correlation between total number of interpreted films and performance. As the number of interpreted films increased to approximately 16,000, clinical performance ($p = 0.004$) and test performance ($p = 0.01$) improved, but volumes over 16,000 correlated with worse performance.

CONCLUSION:

The total number of studies interpreted during radiology training correlates with performance. Residencies should endeavor to find the "sweet spot": the amount of work that maximizes clinical exposure and knowledge without overburdening trainees.

Does Orthopaedic Resident Efficiency Improve with Respect to Decreased Fluoroscopic Times in Tibial Intramedullary Nailing? A Measure of an ACGME Milestone

Bradburn K, Patel JH, Cannada LK. *Current Orthopaedic Practice*. 2019;(2):129. doi:10.1097/BCO.0000000000000733.

BACKGROUND:

Intramedullary nailing of tibial fractures is a surgical milestone from the Accreditation Council for Graduate Medical Education (ACGME). Our purpose was to evaluate if fluoroscopic time decreased with increasing resident experience and could be used as a measure of this milestone.

METHODS:

Current Procedural Terminology (CPT) codes were used to identify patients who underwent intramedullary nailing of tibial shaft fractures under the direction of fellowship-trained trauma attending staff. The data collected included patient demographics, fracture classification, fluoroscopic imaging total time, and the post-graduate years (PGY) of orthopaedic residency of the operating resident.

Exclusions of patients included concomitant fluoroscopic procedures, inadequate records, or surgeries involving primary assisting residents with less than PGY-2 experience. We compared overall groups between half years and looked at individual resident years for each of the continuous variables.

RESULTS:

When residents were grouped as senior (PGY-4 and PGY-5) or junior (PGY-2 and PGY-3), seniors used significantly less fluoroscopy than juniors (207.39asec vs. 258.30asec, $P=0.018$). In the first half of the academic year, PGY-2 residents completed tibial nailing slowest in terms of fluoroscopic usage ($P=0.003$). PGY-4 residents completed tibial nailing faster in terms of fluoroscopic usage than other years ($P=0.031$). In the second half of the academic year, PGY-5 residents used significantly less fluoroscopy than PGY-2 residents ($P=0.035$).

CONCLUSIONS:

As the ACGME currently has no measurement for resident progress and efficiency regarding tibial shaft intramedullary nailing, our data indicate that fluoroscopic measurements may be useful in assessing resident proficiency.

Information within Residency Monthly Evaluation Forms at Two Institutions

Cooper CJ, Wehner P, Dailey C, O'Connor N, Kleshinski J, Shapiro JI. *Medical Education Online*. 2019;24(1):1635844. doi:10.1080/10872981.2019.1635844.

ABSTRACT:

Periodic review of resident performance is an important aspect of residency training. Amongst allopathic residency programs, it is expected that the performance of resident physicians which can be grouped based on the ACGME core competencies, be assessed so as to allow for effective feedback and continuous improvement. Review of monthly evaluation forms for residents in the core ACGME programs at Marshall University and the University of Toledo demonstrated a wide spread in the number of Likert questions that faculty were asked to complete. This number ranged from a low of 7 in Surgery to a high of 65 in Psychiatry (both Marshall Programs). Correlation and network analysis were performed on these data. High degrees of correlations were noted between answers to questions (controlled for each resident) on these forms at both institutions. In other words, although evaluation scores varied tremendously amongst the different residents in all the programs studied, scores addressing different competencies tended to be very similar for the same resident, especially in some of the programs which were studied. Network analysis suggested that there were clusters of questions that produced essentially the same answer for a given resident, and these clusters were bigger in some of the different residency program assessment forms. This seemed to be more the rule in the residency programs with large numbers of Likert questions. The authors suggest that reducing the number of monthly questions used to address the core competencies in some programs may be possible without substantial loss of information.

Training, Education for Robotic Performance with Simulation (Terps): A Valuable Tool for Gynecologic Surgeons in Training

Helou C, Seal P, Sanses T, Morozov V, Roque D. Journal of Minimally Invasive Gynecology. 2019;26:S159.

ABSTRACT:

To evaluate the role of robotic simulation in training OBGYN residents by determining an optimal number of exercise repetitions prior to clinical debut; To assess whether clinical exposure accelerates proficiency by correlating laparoscopic/robotic experience with simulator skills acquisition

Prospective cohort study Urban academic center with active COEMIG designation 2017-2018 Gynecology residents (PGY1-4) Voluntary participants were instructed to complete 10 repetitions of 5 exercises (pegboard-1, energy dissection-1, energy switching-1, ring&rail-2, tubes) on the dV-Trainer® robotic simulator. After a 4-month hiatus, residents were asked to repeat the protocol. Residents were surveyed regarding prior surgical experience and perceptions regarding simulation utility. 25 of 28 (89%) residents participated. Performance was captured using M-scores® (aggregate quality, efficiency, risk, and safety measure). With all exercises, M-scores® increased with repetitions among all levels (mean±SD 58.9±19.1 repetition 1 versus 82.0±13.6 repetition 10, $p<0.001$); however, after one round, many trainees failed to attain the pre-determined passing score of 80%. Across all participants, mean scores by exercise were 82.5±15.6, 78.0±15.8, 72.6±17.9, 62.7±19.4, 60.1±22.1 ($p<0.001$). Neither PGY level nor prior surgical experience correlated with higher scores: repetition-1 scores were 61±12.8, 54.0±11.2, 59.4±19.7, and 59.8±10.6 for PGY-1 through -4 participants, $p=0.51$; repetition-10 scores were 80±3.9, 82±9.3, 86.5±9.3, and 84.9±9.0, $p=0.79$, respectively. Self-reported prior surgical experience reflected graduated responsibility: only PGY-4 participants reported console exposure, with most describing 1-5 cases performed. Retention of skills at 4 months negatively correlated with difficulty, suggesting challenging skills require more repetitions to master. Poor compliance hindered data interpretation. The majority of trainees believed simulation is valuable. Robotic simulation may be useful for development/maintenance of robotic skills in Gynecology trainees. M-score® may be insufficiently sensitive; additional metrics should be explored. Robotic simulation is valued by trainees, however, not a milestone established by the ACGME. Protected time with incorporation into curricula would be needed to maximize utility.

Examining the Effects of Narrative Commentary on Evaluators' Summative Assessments of Resident Performance

Lefebvre C, Hiestand B, Glass C, Masneri D, Hosmer K, Hunt M, Hartman N. *Eval Health Prof.* 2018 Dec 26;163278718820415. doi: 10.1177/0163278718820415.

ABSTRACT:

Anchor-based, end-of-shift ratings are commonly used to conduct performance assessments of resident physicians. These performance evaluations often include narrative assessments, such as solicited or "free-text" commentary. Although narrative commentary can help to create a more detailed and specific assessment of performance, there are limited data describing the effects of narrative commentary on the global assessment process. This single-group, observational study examined the effect of narrative comments on global performance assessments. A subgroup of the clinical competency committee, blinded to resident identity, assigned a single, consensus-based performance score (1-6) to each resident based solely on end-of-shift milestone scores. De-identified narrative comments from end-of-shift evaluations were then included and the process was repeated. We compared milestone-only scores to milestone plus narrative commentary scores using a nonparametric sign test. During the study period, 953 end-of-shift evaluations were submitted on 41 residents. Of these, 535 evaluations included free-text narrative comments. In 17 of the 41 observations, performance scores changed after the addition of narrative comments. In two cases, scores decreased with the addition of free-text commentary. In 15 cases, scores increased. The frequency of net positive change was significant ($p = .0023$). The addition of narrative commentary to anchor-based ratings significantly influenced the global performance assessment of Emergency Medicine residents by a committee of educators. Descriptive commentary collected at the end of shift may inform more meaningful appraisal of a resident's progress in a milestone-based paradigm. The authors recommend clinical training programs collect unstructured narrative impressions of residents' performance from supervising faculty.

Assessment Methods and Resource Requirements for Milestone Reporting by an Emergency Medicine Clinical Competency Committee

Goyal N, Folt J, Jaskulka B, Baliga S, Slezak M, Schultz LR, Vallee P. Med Educ Online. 2018 Dec;23(1):1538925.
doi: 10.1080/10872981.2018.1538925.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) introduced milestones for Emergency Medicine (EM) in 2012. Clinical Competency Committees (CCC) are tasked with assessing residents on milestones and reporting them to the ACGME. Appropriate workflows for CCCs are not well defined.

OBJECTIVE:

Our objective was to compare different approaches to milestone assessment by a CCC, quantify resource requirements for each and to identify the most efficient workflow.

DESIGN:

Three distinct processes for rendering milestone assessments were compared: Full milestone assessments (FMA) utilizing all available resident assessment data, Ad-hoc milestone assessments (AMA) created by multiple expert educators using their personal assessment of resident performance, Self-assessments (SMA) completed by residents. FMA were selected as the theoretical gold standard. Intraclass correlation coefficients were used to analyze for agreement between different assessment methods. Kendall's coefficient was used to assess the inter-rater agreement for the AMA.

RESULTS:

All 13 second-year residents and 7 educational faculty of an urban EM Residency Program participated in the study in 2013. Substantial or better agreement between FMA and AMA was seen for 8 of the 23 total subcompetencies (PC4, PC8, PC9, PC11, MK, PROF2, ICS2, SBP2), and for 1 subcompetency (SBP1) between FMA and SMA. Multiple AMA for individual residents demonstrated substantial or better interobserver agreement in 3 subcompetencies (PC1, PC2, and PROF2). FMA took longer to complete compared to AMA (80.9 vs. 5.3 min, $p < 0.001$).

CONCLUSIONS:

Using AMA to evaluate residents on the milestones takes significantly less time than FMA. However, AMA and SMA agree with FMA on only 8 and 1 subcompetencies, respectively. An estimated 23.5 h of faculty time are required each month to fulfill the requirement for semiannual reporting for a residency with 42 trainees.

Using Operating Room Turnover Time by Anesthesia Trainee Level to Assess Improving Systems-Based Practice Milestones

Hoffman CR, Green MS, Liu J, Iqbal U, Voralu K. BMC Med Educ. 2018 Dec 5;18(1):295. doi: 10.1186/s12909-018-1409-6.

BACKGROUND:

Operating room (OR) metrics are frequently cited when optimizing cost efficacy and quality of care (Weiss et al, Characteristics of operating room procedures in U.S. hospitals, 2011: Statistical brief #170, 2013; Macario A, Anesthesiology 105:237-240, 2006; Childers et al, JAMA Surg 153:e176233, 2018). Little has been reported to evaluate how anesthesia trainees change anesthesia-related efficiencies in the OR. Statistical correlation may demonstrate awareness and implementation of efficient systems-based practice.

METHODS:

Utilizing computerized OR information systems, specific data regarding anesthesia controlled turnover times were collected (546 data points) over the course of 4 months. The type of surgery performed, patient's American Society of Anesthesiologists (ASA) physical status and OR turnover times were compared for clinical anesthesia (CA) trainee levels CA1, CA2, CA3 and CRNAs. Standard descriptive statistics were computed. Analysis of variance (ANOVA) was performed to compare the average turnover time.

RESULTS:

Average OR turnover time was 31 min ranging from 8 to 60 min. There was a significant difference between the OR turnover time of CA-1 (32 min) compared to CA-3 (29 min) ($p = 0.017$) and CA-1 compared to CRNA (30 min) ($p = 0.016$). OR turnover time was significantly shorter in CA-3 and CRNA. The analysis showed no differences between OR turnover time of ASA categories.

CONCLUSIONS:

These findings posit that trainees improve efficiency over time, but that education may for a time come at the expense of productivity. This trend may demonstrate a more profound understanding and mastery of a learner progressing in the graduate medical education system. This interplay plays a key role in clinical and academic shared success.

Standardized Patients to Assess Resident Interpersonal Communication Skills and Professional Values Milestones

Vora S, Lineberry M, Dobiesz VA. West J Emerg Med. 2018 Nov;19(6):1019-1023. doi: 10.5811/westjem.2018.8.37204. Epub 2018 Oct 18.

ABSTRACT:

It has been a challenge to assess communication and professional values Milestones in emergency medicine (EM) residents using standardized methods, as mandated by the Accreditation Council for Graduate Medical Education (ACGME). This paper outlines an innovative method of assessing these Milestones using an established instructional method. EM faculty mapped the communication and professional values Milestones to an existing communication and interpersonal skills scale. We identified six communication-focused scenarios: death notification; informed consent; medical non-compliance; medical error; treatment refusal; and advanced directives. In a pilot, 18 EM residents completed these six standardized patient (SP) encounters. Our experience suggests SP encounters can support standardized direct observation of residents' achievement of ACGME Milestones. Further effort can be made to create a tailored, behaviorally-anchored tool that uses the Milestones as the conceptual framework.

Four-Year Analysis of a Novel Milestone-Based Assessment of Faculty by General Surgical Residents

Schoen J, Birch A, Adolph V, Smith T, Brown R, Rivere A, Fuhrman G. J Surg Educ. 2018 Nov;75(6):e126-e133. doi: 10.1016/j.jsurg.2018.08.008. Epub 2018 Sep 15.

OBJECTIVE:

In response to our faculty's concerns about the quality and reliability of feedback from general surgery residents, we developed a novel faculty assessment tool. This study was designed as an interim analysis of the tool's effectiveness and discriminatory ability.

METHODS:

Our department's educational leadership developed milestones in 7 domains that were scored from 1 to 4, with each level representing an educational approach that ranged from ineffective (1) to ideal (4). Each postgraduate year (PGY) class meets annually to develop a consensus regarding each faculty member's effectiveness in each of the 7 domains: (1) operative supervision, (2) operative teaching, (3) clinic and/or hospital supervision, (4) clinic and/or hospital teaching, (5) conference participation, (6) availability, and (7) overall contribution to the training program. We reviewed the results from the initial 4 years of this project. We also analyzed the annual national faculty survey administered by the Accreditation Council for Graduate Medical Education (ACGME) to evaluate faculty satisfaction regarding feedback during the same study period. Data were assessed using the Levene test for homogeneity, analysis of variance, and Wilcoxon-Mann-Whitney tests.

RESULTS:

Forty-two faculty members were annually evaluated by 29 to 32 residents. Each resident PGY class assigned faculty milestone scores that varied across the 7 domains, demonstrating that faculty scores reflected variable opinions about each specific domain, while avoiding labeling an effective faculty member with all high scores and a less effective member with all poor scores. ($p < 0.0001$). Milestone scores for a given faculty member differed across PGY classes, indicating that junior residents might evaluate a specific faculty member differently than senior residents ($p < 0.0001$). Eleven faculty members received low scores of 1 or 2 on the overall contribution to training domain and 8/11 (73%) improved to 3 or 4, the following year. Twenty core faculty members were included on the annual ACGME survey. The results from the study period on the ACGME anonymous faculty survey reflected enhanced satisfaction with resident feedback during the study period, improving from 68% to 88% compliance with ACGME standards and our mean program score improved from 4.1 to 4.4 compared to the national mean of 4.3 ($p = 0.02$).

CONCLUSIONS:

This milestone-based faculty assessment tool improves the quality of the feedback from surgical residents when evaluating faculty. When residents assign a negative statement to describe faculty educational effectiveness in a specific domain, performance improves. A milestone-based faculty assessment strategy should be explored on a national level.

Can Deficiencies in Performance Be Identified Earlier in Surgical Residency? An Initial Report of a Surgical Trainee Assessment of Readiness Exam

Dauphine C, Neville AL, Moazzez A, Kim DY, Simms ER, Singer G, de Virgilio C. *J Surg Educ.* 2018 Nov;75(6): e91-e96. doi: 10.1016/j.jsurg.2018.07.030. Epub 2018 Aug 19.

OBJECTIVE:

Identifying gaps in medical knowledge, patient management, and procedural competence is difficult early in surgical residency. We designed and implemented an end-of-year examination for our postgraduate year 1 residents, entitled Surgical Trainee Assessment of Readiness (STAR). Our objective in this study was to determine whether STAR scores correlated with other available indicators of resident performance, such as the American Board of Surgery in-training exam (ABSITE) and Milestone scores, and if they provided evidence of additional discriminatory value.

STUDY DESIGN:

Overall and component scores of the STAR exam were compared to the ABSITE and Milestone assessment scores for the 17 categorical residents that took the exam in 2016 and 2017.

SETTING:

Harbor-UCLA Medical Center, a university-affiliated academic medical center.

PARTICIPANTS:

Seventeen categorical general surgery residents.

RESULTS:

The STAR Total Test Score ($\beta = 2.77$, $p = 0.006$) was an independent predictor of the ABSITE taken the same year, and components of the STAR were independent predictors of ABSITE taken the following year. The STAR Total Test Score was lowest in the 3 residents who had at least 1 low Milestone score assessed in the same year; and 2 of these 3 residents had at least 1 low Milestone score assigned the next year after STAR. Lastly, the Patient Care 1 and 2 Milestones assessed in the same year as STAR were uniformly scored as appropriate for level of training, yet the corresponding STAR component for those milestones demonstrated 3 residents as having deficiencies.

CONCLUSIONS:

We have created a multifaceted standardized STAR exam, which correlates with performance on the ABSITE and early milestone scores. It also appears to discriminate resident performance where milestone assessments do not. Further evaluation of the STAR exam with longer term follow-up is needed to confirm these initial findings.

Resident-Specific Morbidity Reduced Following ACS NSQIP Data-Driven Quality Program

Turrentine FE, Hanks JB, Tracci MC, Jones RS, Schirmer BD, Smith PW. *J Surg Educ.* 2018 Nov;75(6):1558-1565. doi: 10.1016/j.jsurg.2018.04.001. Epub 2018 Apr 16.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Milestone Project for general surgery provided a more robust method for developing and tracking residents' competence. This framework enhanced systematic and progressive development of residents' competencies in surgical quality improvement.

STUDY DESIGN:

A 22-month interactive, educational program based on resident-specific surgical outcomes data culminated in a quality improvement project for postgraduate year 4 surgery residents. Self-assessment, quality knowledge test, and resident-specific American College of Surgeons National Surgical Quality Improvement Program Quality In-Training Initiative morbidity were compared before and after the intervention.

RESULTS:

Quality in-training initiative morbidity decreased from 25% (82/325) to 18% (93/517), $p = 0.015$ despite residents performing more complex cases. All participants achieved level 4 competency (4/4) within the general surgery milestones improvement of care, practice-based learning and improvement competency. Institutional American College of Surgeons National Surgical Quality Improvement Program general surgery morbidity improved from the ninth to the sixth decile. Quality assessment and improvement self-assessment postintervention scores ($M = 23.80$, $SD = 4.97$) were not significantly higher than preintervention scores ($M = 19.20$, $SD = 5.26$), $p = 0.061$. Quality Improvement Knowledge Application Tool postintervention test scores ($M = 17.4$, $SD = 4.88$), were not significantly higher than pretest scores ($M = 13.2$, $SD = 1.92$), $p = 0.12$.

CONCLUSION:

Sharing validated resident-specific clinical data with participants was associated with improved surgical outcomes. Participating fourth year surgical residents achieved the highest score, a level 4, in the practice based learning and improvement competency of the improvement of care practice domain and observed significantly reduced surgical morbidity for cases in which they participated.

Predictability of Clinical Knowledge Through Mobile App-based Simulation for the Treatment of Pediatric Septic Arthritis: A Pilot Study

Shore BJ, Miller PE, Noonan KJ, Bae DS. J Pediatr Orthop. 2018 Oct;38(9):e541-e545. doi: 10.1097/BPO.0000000000001228.

BACKGROUND:

Recently the American Board of Orthopaedic Surgery and the Accreditation Council of Graduate Medical Education have identified the treatment of septic arthritis of the hip in children as a milestone skill for all US orthopaedic residents. The purpose of this study was to test correlation between clinical knowledge and examination score on a mobile app-based training module for the treatment of pediatric septic hip arthritis.

METHODS:

A 4-part simulation model on surgical decision-making associated with the treatment of pediatric septic arthritis was developed through expert consensus. Orthopaedic trainees participating in the "Top Gun" program of the 2015 and 2016 International Pediatric Orthopaedic Symposia were recruited to participate in this pilot study. Trainees completed a presimulation quiz on their knowledge of diagnosis, arthrocentesis, and surgical irrigation and debridement on a pediatric patient presenting with septic arthritis of the hip. Trainees then completed the 4-part simulation on the mobile app. Pearson correlation analysis was used to assess the relationship between the quiz and the simulation.

RESULTS:

A total of 53 orthopaedic residents and fellows participated in the simulation. Median quiz score was 87 points [interquartile range (IQR), 81 to 94] before the intervention and 100 points (IQR, 94 to 100) postintervention. The median simulation test score was 89 (IQR, 81 to 92) which demonstrated a positive correlation with the postintervention quiz ($r=0.44$, $P<0.001$). The preintervention metrics demonstrated a positive correlation with postintervention metrics ($r=0.53$, $P<0.001$).

CONCLUSIONS:

This study revealed a statistically significant positive correlation between the mobile app simulation and the clinical knowledge of the participants, as well as the ability to improve knowledge about a procedure during the testing period. These findings support the ability for the mobile app to test clinical knowledge. In the current environment of decreased work hours and patient exposure for orthopaedic trainees, mobile app-based simulation has the potential to safely aid in assessment of orthopaedic residents and fellows.

A Multicenter Collaboration for Simulation-Based Assessment of ACGME Milestones in Emergency Medicine

Salzman DH, Watts H, Williamson K, Sergel M, Dobiesz V, DeGarmo N, Vora S, Sharp LJ, Wang EE, Gisondi MA. *Simul Healthc*. 2018 Oct;13(5):348-355. doi: 10.1097/SIH.0000000000000291.

ABSTRACT:

In 2014, the six allopathic emergency medicine (EM) residency programs in Chicago established an annual, citywide, simulation-based assessment of all postgraduate year 2 EM residents. The cases and corresponding assessment tools were designed by the simulation directors from each of the participating sites. All assessment tools include critical actions that map directly to numerous EM milestones in 11 different subcompetencies. The 2-hour assessments provide opportunities for residents to lead resuscitations of critically ill patients and demonstrate procedural skills, using mannequins and task trainers respectively. More than 80 residents participate annually and their assessment experiences are essentially identical across testing sites. The assessments are completed electronically and comparative performance data are immediately available to program directors.

Radiology Resident Assessment and Feedback Dashboard

Durojaiye AB, Snyder E, Cohen M, Nagy P, Hong K, Johnson PT. Radiographics. 2018 Sep-Oct;38 (5): 1443-1453. doi: 10.1148/rg.2018170117. Epub 2018 Aug 10.

ABSTRACT:

Assessment of residents is optimally performed through processes and platforms that provide daily feedback, which can be immediately acted on. Given the documentation required by the Accreditation Council for Graduate Medical Education (ACGME), effective data management, integration, and presentation are crucial to ease the burden of manual documentation and increase the timeliness of actionable information. To this end, the authors modeled the learning activities of residents using the Experience Application Programming Interface (xAPI) framework, which is a standard framework for the learning community. On the basis of the xAPI framework and using open-source software to extend their existing infrastructure, the authors developed a Web-based dashboard that provides residents with a more holistic view of their educational experience. The dashboard was designed around the ACGME radiology milestones and provides real-time feedback to residents using various assessment metrics derived from multiple data sources. The purpose of this article is to describe the dashboard's architecture and components, the design and technical considerations, and the lessons learned in implementing the dashboard.

Individualized Learning Plan (ILP) Is an Effective Tool in Assessing Achievement of Otolaryngology-related Subcompetency Milestones

Svrakic M, Bent JP 3rd. Otol Neurotol. 2018 Aug;39(7):816-822. doi: 10.1097/MAO.0000000000001855.

OBJECTIVE:

To investigate the individualized learning plan (ILP) as a tool in assessment of residents' milestone achievements as they pertain to Otolaryngology subcompetencies: Chronic Ear Disease, Pediatric Otitis Media, and Hearing Loss.

STUDY DESIGN:

Prospective study.

METHODS:

Twenty otolaryngology residents were instructed to use an ILP and identify six milestones from three otolaryngology-related subcompetencies to focus on during the course of a 3-month rotation. They were also asked to plan out specific activities which would help them achieve these milestones, to specify whether or not they successfully achieved them, by what instructional or learning methods and to identify any barriers. The completed ILPs were reviewed by a faculty member.

MAIN OUTCOME MEASURES:

The effectiveness of the ILP was assessed by response compliance rate, corroboration of self-reported milestone achievement with faculty evaluations and the ability to set attainable milestones.

RESULTS:

There was 95% compliance in using an ILP to achieve milestones. Self-reported milestone scores corresponded to the faculty evaluations in a large majority (89.6%) of patients, and tended to be underestimated by the residents. Out of 114 total milestones identified, 44 (38.6%) were not achieved, with particular overestimation in the use of independent study as a learning method.

CONCLUSION:

The ILP is an effective tool in measuring residents' achievement of otolaryngology-related milestones, and could possibly be used to supplement or replace faculty assessment. The ILP provides valuable information on barriers to achieving milestones and informs trainees on how to set attainable goals as they pertain to patient care and medical knowledge in otolaryngology.

Validity of Simulation-Based Assessment for Accreditation Council for Graduate Medical Education Milestone Achievement

Isaak RS, Chen F, Martinelli SM, Arora H, Zvara DA, Hobbs G, Stiegler MP. *Simul Healthc.* 2018 Jun;13(3): 201-210. doi: 10.1097/SIH.0000000000000285.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education requires biannual evaluation of anesthesiology residents on 25 subcompetency milestones. Some milestone domains are particularly challenging to repeatedly and reliably observe during clinical care. Simulation-Based Milestones Assessment (SBMA) may help overcome these challenges. However, few studies have examined the external validation of simulation assessment scores (ie, the relationships between simulation-based assessment scores and other standard measures of ability) for milestones. This study analyzed whether SBMA scores (1) discriminate by postgraduate year, (2) improve over time, and (3) correlate with traditional measures of performance.

METHODS:

This is a retrospective analysis of 55 residents' SBMA data from 30 scenarios for two academic years. Each scenario was evaluated for time-in-training discrimination. Scenarios were then analyzed for SBMA scoring trends over time, and SBMA scores were compared with residents' clinical evaluations.

RESULTS:

Twenty-four SBMA scenarios discriminated by postgraduate year. Repeated measure analysis of variance showed statistically significant between-session score improvements ($F(3, 54) = 17.79, P < 0.001$). Pearson correlation coefficients demonstrated moderate to strong correlation between SBMA and clinical evaluations: January 2015 $r = 0.67, P < 0.01$ ($n = 27$); May 2015 $r = 0.43, P = 0.09$ ($n = 17$); November 2015 $r = 0.70, P < 0.01$ ($n = 24$); and April 2016 $r = 0.70, P < 0.01$ ($n = 27$).

CONCLUSIONS:

The associations between SBMA scores and experience level, time-in-training, and clinical performance evaluations provide evidence that SBMA may be used as metrics of residents' Accreditation Council for Graduate Medical Education milestone competencies.

Preliminary Validity Evidence for a Milestones-Based Rating Scale for Chart-Stimulated Recall

Reddy ST, Tekian A, Durning SJ, Gupta S, Endo J, Affinati B, Park YS. J Grad Med Educ. 2018 Jun;10(3): 269-275. doi: 10.4300/JGME-D-17-00435.1.

BACKGROUND:

Minimally anchored Standard Rating Scales (SRSs), which are widely used in medical education, are hampered by suboptimal interrater reliability. Expert-derived frameworks, such as the Accreditation Council for Graduate Medical Education (ACGME) Milestones, may be helpful in defining level-specific anchors to use on rating scales.

OBJECTIVE:

We examined validity evidence for a Milestones-Based Rating Scale (MBRS) for scoring chart-stimulated recall (CSR).

METHODS:

Two 11-item scoring forms with either an MBRS or SRS were developed. Items and anchors for the MBRS were adapted from the ACGME Internal Medicine Milestones. Six CSR standardized videos were developed. Clinical faculty scored videos using either the MBRS or SRS and following a randomized crossover design. Reliability of the MBRS versus the SRS was compared using intraclass correlation.

RESULTS:

Twenty-two faculty were recruited for instrument testing. Some participants did not complete scoring, leaving a response rate of 15 faculty (7 in the MBRS group and 8 in the SRS group). A total of 529 ratings (number of items × number of scores) using SRSs and 540 using MBRSs were available. Percent agreement was higher for MBRSs for only 2 of 11 items-use of consultants (92 versus 75, $P = .019$) and unique characteristics of patients (96 versus 79, $P = .011$)-and the overall score (89 versus 82, $P < .001$). Interrater agreement was 0.61 for MBRSs and 0.51 for SRSs.

CONCLUSIONS:

Adding milestones to our rating form resulted in significant, but not substantial, improvement in intraclass correlation coefficient. Improvement was inconsistent across items.

Use of a Clinical Pathologic Conference to Demonstrate Residents' ACGME Emergency Medicine Milestones, Aid in Faculty Development, and Increase Academic Output

Kane K, Weaver K, Barr G, Quinn S, Goyke T, Smith A, Yenser D, Kane B. J Am Osteopath Assoc. 2018 Jun 1;118(6):410-415. doi: 10.7556/jaoa.2018.085.

ABSTRACT:

The Emergency Medicine Milestones Project, developed by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Emergency Medicine, includes competence targets for residents to attain and, ultimately, to exceed American Osteopathic Association and ACGME expectations for residents. The authors sought to use the clinical pathologic conference (CPC) format in their institutions' Emergency Medicine Milestones Project to provide measurable residency academic and faculty development outcomes. The CPC is an event in which a resident presents an unknown case to a discussant in advance of a didactic session to demonstrate an organized approach and decision-making rationale to a differential diagnosis. Feedback forms included the assessment of resident discussants from the perspective of level-5 Milestone achievements in particular. Developing an internal CPC competition with a dedicated core faculty coordinator who provides skill development for both resident and faculty presentation has proven successful. Such a competition can document the level-5 achievements for senior residents, be a source of faculty development, and increase peer-reviewed academic output.

Evaluating Surgical Residents' Patient-Centered Communication Skills: Practical Alternatives to the "Apprenticeship Model"

Newcomb A, Trickey AW, Lita E, Dort J. J Surg Educ. 2018 May-Jun;75(3):613-621. doi: 10.1016/j.jsurg.2017.09.011. Epub 2017 Oct 7.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) requires residency programs to assess communication skills and provide feedback to residents. We aimed to develop a feasible data collection process that generates objective clinical performance information to guide training activities, inform ACGME milestone evaluations, and validate assessment instruments.

DESIGN:

Residents care for patients in the surgical clinic and in the hospital, and participate in a communication curriculum providing practice with standardized patients (SPs). We measured perception of resident communication using the 14-item Communication Assessment Tool (CAT), collecting data from patients at the surgery clinic and surgical wards in the hospital, and from SP encounters during simulated training scenarios. We developed a handout of CAT example behaviors to guide patients completing the communication assessment.

SETTING:

Independent academic medical center.

PARTICIPANTS:

General surgery residents.

RESULTS:

The primary outcome is the percentage of total items patients rated "excellent;" we collected data on 24 of 25 residents. Outpatient evaluations resulted in significantly higher scores (mean 84.5% vs. 68.6%, $p < 0.001$), and female patients provided nearly statistically significantly higher ratings (mean 85.2% vs. 76.7%, $p = 0.084$). In multivariate analysis, after controlling for patient gender, visit reason, and race, (1) residents' CAT scores from SPs in simulation were independently associated with communication assessments in their concurrent patient population ($p = 0.017$), and (2) receiving CAT example instructions was associated with a lower percentage of excellent ratings by 9.3% ($p = 0.047$).

CONCLUSIONS:

Our data collection process provides a model for obtaining meaningful information about resident communication proficiency. CAT evaluations of surgical residents by the inpatient population had not previously been described in the literature; our results provide important insight into relationships between the evaluations provided by inpatients, clinic patients, and SPs in simulation. Our example behaviors guide shows promise for addressing a common concern, minimizing ceiling effects when measuring physician-patient communication.

Teaching and Assessing Professionalism in Radiology: Resources and Scholarly Opportunities to Contribute to Required Expectations

Kelly AM, Mullan PB. *Acad Radiol*. 2018 May;25(5):599-609. doi: 10.1016/j.acra.2018.01.008. Epub 2018 Mar 1.

ABSTRACT:

Teaching and assessing trainees' professionalism now represents an explicit expectation for Accreditation Council Graduate Medical Education-accredited radiology programs. Challenges to meeting this expectation include variability in defining the construct of professionalism; limits of traditional teaching and assessment methods, used for competencies historically more prominent in medical education, for professionalism; and emerging expectations for credible and feasible professionalism teaching and assessment practices in the current context of health care training and practice. This article identifies promising teaching resources and methods that can be used strategically to augment traditional teaching of the cognitive basis for professionalism, including role modeling, case-based scenarios, debriefing, simulations, narrative medicine (storytelling), guided discussions, peer-assisted learning, and reflective practice. This article also summarizes assessment practices intended to promote learning, as well as to inform how and when to assess trainees as their professional identities develop over time, settings, and autonomous practice, particularly in terms of measurable behaviors. This includes assessment tools (including mini observations, critical incident reports, and appreciative inquiry) for authentic assessment in the workplace; engaging multiple sources (self-peer, other health professionals, and patients) in assessment; and intentional practices for trainees to take responsibility for seeking our actionable feedback and reflection. This article examines the emerging evidence of the feasibility and value added of assessment of medical competency milestones, including professionalism, coordinated by the Accreditation Council Graduate Medical Education in radiology and other medical specialties. Radiology has a strategic opportunity to contribute to scholarship and inform policies in professionalism teaching and assessment practices.

Resident and Program Director's Perceptions of Milestone-Based Feedback in Obstetrics and Gynecology

Hariton E, Bortoletto P, Barnes KL, Kaimal AJ, Stagg AR. J Med Educ Curric Dev. 2018 May 20;5:2382120518774794. doi: 10.1177/2382120518774794. eCollection 2018 Jan-Dec.

INTRODUCTION:

In July 2014, US residency programs fully implemented the Next Accreditation System including the use of milestone evaluation and reporting. Currently, there has been little investigation into the result of implementation of this new system. Therefore, this study sought to evaluate perceptions of Obstetrics and Gynecology residents and program directors regarding the use of milestone-based feedback and identify areas of deficiency.

METHODS:

A Web-based survey was sent to US-based Obstetrics and Gynecology residents and program directors regarding milestone-based assessment implementation.

RESULTS:

Out of 245 program directors, 84 responded to our survey (34.3% response rate). Of responding program directors, most reported that milestone-based feedback was useful (74.7%), fair (83.0%), and accurate (76.5%); however, they found it administratively burdensome (78.1%). Residents felt that milestone-based feedback was useful (62.7%) and fair (70.0%). About 64.3% of residents and 74.7% of program directors stated that milestone-based feedback is an effective tool to track resident progression; however, a sizable minority of both groups believe that it does not capture surgical aptitude. Qualitative analysis of free response comments was largely negative and highlighted the administrative burden and lack of accuracy of milestone-based feedback.

CONCLUSION:

Overall, both Obstetrics and Gynecology program directors and residents report that milestone-based feedback is useful and fair. Issues of administrative burden, timeliness, evaluation of surgical aptitude, and ability to act on assigned milestone levels were identified. Although this study is limited to one specialty, such issues are likely important to all residents, faculty, and program directors who have implemented the Next Accreditation System requirements.

Shadowing Emergency Medicine Residents by Medical Education Specialists to Provide Feedback on Non-Medical Knowledge-Based ACGME Sub-Competencies

Waterbrook AL, Spear Ellinwood KC, Pritchard TG, Bertels K, Johnson AC, Min A, Stoneking LR. *Adv Med Educ Pract.* 2018 May 4;9:307-315. doi: 10.2147/AMEP.S151216. eCollection 2018.

OBJECTIVE:

Non-medical knowledge-based sub-competencies (multitasking, professionalism, accountability, patient-centered communication, and team management) are challenging for a supervising emergency medicine (EM) physician to evaluate in real-time on shift while also managing a busy emergency department (ED). This study examines residents' perceptions of having a medical education specialist shadow and evaluate their nonmedical knowledge skills.

METHODS:

Medical education specialists shadowed postgraduate year 1 and postgraduate year 2 EM residents during an ED shift once per academic year. In an attempt to increase meaningful feedback to the residents, these specialists evaluated resident performance in selected non- medical knowledge-based Accreditation Council of Graduate Medical Education (ACGME) sub- competencies and provided residents with direct, real-time feedback, followed by a written evaluation sent via email. Evaluations provided specific references to examples of behaviors observed during the shift and connected these back to ACGME competencies and milestones.

RESULTS:

Twelve residents participated in this shadow experience (six post graduate year 1 and six postgraduate year 2). Two residents emailed the medical education specialists ahead of the scheduled shadow shift requesting specific feedback. When queried, five residents voluntarily requested their feedback to be included in their formal biannual review. Residents received milestone scores and narrative feedback on the non-medical knowledge-based ACGME sub- competencies and indicated the shadow experience and subsequent feedback were valuable.

CONCLUSION:

Medical education specialists who observe residents over the course of an entire shift and evaluate non-medical knowledge-based skills are perceived by EM residents to provide meaningful feedback and add valuable information for the biannual review process.

**Patient-Centered Medical Home Status and Preparedness to Assess Resident Milestones:
A CERA Study**

Wilkins T, Yoo W, Gillies RA, Dahl-Smith J, Dubose J, Hobbs J, Smith S, Seehusen DA. PRiMER. 2018 May;2. pii: 11. doi: 10.22454/PRiMER.2018.710280.

PURPOSE:

The patient-centered medical home (PCMH) model has been proposed as the ideal model for delivering primary care and is focused on improving patient safety and quality, reducing costs, and enhancing patient satisfaction. The mandated Accreditation Council for Graduate Medical Education educational milestones for evaluation of resident competency represent the skills graduates will utilize after graduation. Many of these skills are reflected in the PCMH model. We sought to determine if residency programs whose main family medicine (FM) practice sites have achieved PCMH recognition are therefore more prepared to evaluate milestones.

METHOD:

A national Council of Academic Family Medicine Educational Research Alliance (CERA) survey of family medicine program directors (PDs) was conducted during June and July 2015 to determine if PCMH recognition influences PDs' ability to evaluate training methods and their level of preparedness to evaluate milestones.

RESULTS:

The response rate for the survey was 53.3% (252/473). Nearly two-thirds of the PDs (62.7%) reported that their main FM practice site had earned PCMH recognition. There was no statistical difference between non-PCMH-recognized vs PCMH-recognized programs in how PDs perceived that their program was prepared to assess residents' milestone levels overall ($P=0.414$). Residents of PCMH-recognized programs were more likely to receive training for team-based care ($P=0.009$), system improvement plans ($P<0.001$), root-cause analysis ($P=0.002$), and health behavior change ($P=0.003$).

CONCLUSIONS:

PCMH recognition itself did not improve preparedness of FM residency programs to assess milestones. Residents from programs whose main FM practice site is PCMH-recognized are more likely to be trained in the key concepts and tasks associated with the PCMH model, tools that they are expected to utilize extensively after graduation.

Comparing Real-Time versus Delayed Video Assessments for Evaluating ACGME Sub-Competency Milestones in Simulated Patient Care Environments

Isaak R, Stiegler M, Hobbs G, Martinelli SM, Zvara D, Arora H, Chen F. *Cureus*. 2018 Mar 4;10(3): e2267. doi: 10.7759/cureus.2267.

BACKGROUND:

Background Simulation is an effective method for creating objective summative assessments of resident trainees. Real-time assessment (RTA) in simulated patient care environments is logistically challenging, especially when evaluating a large group of residents in multiple simulation scenarios. To date, there is very little data comparing RTA with delayed (hours, days, or weeks later) video-based assessment (DA) for simulation-based assessments of Accreditation Council for Graduate Medical Education (ACGME) sub-competency milestones. We hypothesized that sub-competency milestone evaluation scores obtained from DA, via audio-video recordings, are equivalent to the scores obtained from RTA.

METHODS:

Forty-one anesthesiology residents were evaluated in three separate simulated scenarios, representing different ACGME sub-competency milestones. All scenarios had one faculty member perform RTA and two additional faculty members perform DA. Subsequently, the scores generated by RTA were compared with the average scores generated by DA. Variance component analysis was conducted to assess the amount of variation in scores attributable to residents and raters.

RESULTS:

Paired t-tests showed no significant difference in scores between RTA and averaged DA for all cases. Cases 1, 2, and 3 showed an intraclass correlation coefficient (ICC) of 0.67, 0.85, and 0.50 for agreement between RTA scores and averaged DA scores, respectively. Analysis of variance of the scores assigned by the three raters showed a small proportion of variance attributable to raters (4% to 15%).

CONCLUSIONS:

The results demonstrate that video-based delayed assessment is as reliable as real-time assessment, as both assessment methods yielded comparable scores. Based on a department's needs or logistical constraints, our findings support the use of either real-time or delayed video evaluation for assessing milestones in a simulated patient care environment.

Simulation for Assessment of Milestones in Emergency Medicine Residents

Hart D, Bond W, Siegelman JN, Miller D, Cassara M, Barker L, Anders S, Ahn J, Huang H, Strother C, Hui J. Acad Emerg Med. 2018 Feb;25(2):205-220. doi: 10.1111/acem.13296. Epub 2017 Nov 9.

OBJECTIVES:

All residency programs in the United States are required to report their residents' progress on the milestones to the Accreditation Council for Graduate Medical Education (ACGME) biannually. Since the development and institution of this competency-based assessment framework, residency programs have been attempting to ascertain the best ways to assess resident performance on these metrics. Simulation was recommended by the ACGME as one method of assessment for many of the milestone subcompetencies. We developed three simulation scenarios with scenario-specific milestone-based assessment tools. We aimed to gather validity evidence for this tool.

METHODS:

We conducted a prospective observational study to investigate the validity evidence for three mannequin-based simulation scenarios for assessing individual residents on emergency medicine (EM) milestones. The subcompetencies (i.e., patient care [PC]1, PC2, PC3) included were identified via a modified Delphi technique using a group of experienced EM simulationists. The scenario-specific checklist (CL) items were designed based on the individual milestone items within each EM subcompetency chosen for assessment and reviewed by experienced EM simulationists. Two independent live raters who were EM faculty at the respective study sites scored each scenario following brief rater training. The inter-rater reliability (IRR) of the assessment tool was determined by measuring intraclass correlation coefficient (ICC) for the sum of the CL items as well as the global rating scales (GRSs) for each scenario. Comparing GRS and CL scores between various postgraduate year (PGY) levels was performed with analysis of variance.

RESULTS:

Eight subcompetencies were chosen to assess with three simulation cases, using 118 subjects. Evidence of test content, internal structure, response process, and relations with other variables were found. The ICCs for the sum of the CL items and the GRSs were >0.8 for all cases, with one exception (clinical management GRS = 0.74 in sepsis case). The sum of CL items and GRSs ($p < 0.05$) discriminated between PGY levels on all cases. However, when the specific CL items were mapped back to milestones in various proficiency levels, the milestones in the higher proficiency levels (level 3 [L3] and 4 [L4]) did not often discriminate between various PGY levels. L3 milestone items discriminated between PGY levels on five of 12 occasions they were assessed, and L4 items discriminated only two of 12 times they were assessed.

CONCLUSION:

Three simulation cases with scenario-specific assessment tools allowed evaluation of EM residents on proficiency L1 to L4 within eight of the EM milestone subcompetencies. Evidence of test content, internal structure, response process, and relations with other variables were found. Good to excellent IRR and the ability to discriminate between various PGY levels was found for both the sum of CL items and the GRSs. However, there was a lack of a positive relationship between advancing PGY level and the completion of higher-level milestone items (L3 and L4).

myTIPreport and Training for Independent Practice: A Tool for Real-Time Workplace Feedback for Milestones and Procedural Skills

Connolly A, Goepfert A, Blanchard A, Buys E, Donnellan N, Amundsen CL, Galvin SL, Kenton K. J Grad Med Educ. 2018 Feb;10(1):70-77. doi: 10.4300/JGME-D-17-00137.1.

BACKGROUND:

Few tools currently exist for effective, accessible delivery of real-time, workplace feedback in the clinical setting.

OBJECTIVE:

We developed and implemented a real-time, web-based tool for performance-based feedback in the clinical environment.

METHODS:

The tool (myTIPreport) was designed for performance-based feedback to learners on the Accreditation Council for Graduate Medical Education (ACGME) Milestones and procedural skills. "TIP" stands for "Training for Independent Practice." We implemented myTIPreport in obstetrics and gynecology (Ob-Gyn) and female pelvic medicine and reconstructive surgery (FPMRS) programs between November 2014 and May 2015. Residents, fellows, teachers, and program directors completed preimplementation and postimplementation surveys on their perceptions of feedback.

RESULTS:

Preimplementation surveys were completed by 656 participants of a total of 980 learners and teachers in 19 programs (12 Ob-Gyn and 7 FPMRS). This represented 72% (273 of 378) of learners and 64% (383 of 602) of teachers. Seventy percent of participants (381 of 546) reported having their own *individual processes* for real-time feedback; the majority (79%, 340 of 430) described these processes as *informal discussions*. Over 6 months, one-third of teachers and two-thirds of learners used the myTIPreport tool a total of 4311 times. Milestone feedback was recorded 944 times, and procedural feedback was recorded 3367 times. Feedback addressed all ACGME Milestones and procedures programmed into myTIPreport. Most program directors reported that tool implementation was successful.

CONCLUSIONS:

The majority of learners successfully received workplace feedback using myTIPreport. This web-based tool, incorporating procedures and ACGME Milestones, may be an important transition from other feedback formats.

Programmatic Assessment in Emergency Medicine: Implementation of Best Practices

Perry M, Linn A, Munzer BW, Hopson L, Amlong A, Cole M, Santen SA. J Grad Med Educ. 2018 Feb;10(1):84-90. doi: 10.4300/JGME-D-17-00094.1.

BACKGROUND:

Programmatic assessment is the intentional collection of key data from multiple sources for both *assessment of learning* and *assessment for learning*.

OBJECTIVE:

We developed a system of programmatic assessment (PA) to identify competency progression (summative) and assessment for learning to assist residents in their formative development.

METHODS:

The programmatic assessment was designed iteratively from 2014 through 2016. All assessments were first categorized by competency domain and source of assessment. The number of assessment modalities for each competency domain was collected. These multisource assessments were then mapped by program leadership to the milestones to develop a master PA blueprint. A resident learning management system provided the platform for aggregating formative and summative data, allowing residents and faculty ongoing access to guide learning and assessment. A key component of programmatic assessment was to support resident integration of assessment information through feedback by faculty after shifts and during monthly formal assessments, semiannual resident reviews, and summative judgments by the Clinical Competency Committee.

RESULTS:

Through the PA, the 6 competency domains are assessed through multiple modalities: patient care (22 different assessments), professionalism (18), systems-based practice (17), interprofessional and communication skills (16), medical knowledge (11), and practice-based learning and improvement (6). Each assessment provides feedback to the resident in various formats. Our programmatic assessment has been utilized for more than 2 years with iterative improvements.

CONCLUSIONS:

The implementation of programmatic assessment allowed our program to organize diverse, multisourced feedback to drive both formative and summative assessments.

Do End-of-Rotation and End-of-Shift Assessments Inform Clinical Competency Committees' (CCC) Decisions?

Regan L, Cope L, Omron R, Bright L, Bayram JD. West J Emerg Med. 2018 Jan;19(1):121-127. doi: 10.5811/westjem.2017.10.35290. Epub 2017 Dec 13.

INTRODUCTION:

Clinical Competency Committees (CCC) require reliable, objective data to inform decisions regarding assignment of milestone proficiency levels, which must be reported to the Accreditation Council for Graduate Medical Education. After the development of two new assessment methods, the end-of-shift (EOS) assessment and the end-of-rotation (EOR) assessment, we sought to evaluate their performance. We report data on the concordance between these assessments, as well as how each informs the final proficiency level determined in biannual CCC meetings. We hypothesized that there would be a high concordance level between the two assessment methods, including concordance of both the EOS and EOR with the final proficiency level designation by the CCC.

METHODS:

The residency program is an urban academic four-year emergency medicine residency with 48 residents. After their shifts in the emergency department (ED), residents handed out EOS assessment forms asking about individual milestones from 15 subcompetencies to supervising physicians, as well as triggered electronic EOR-doctor (EORd) assessments to supervising doctors and EOR-nurse (EORn) to nurses they had worked with after each two-week ED block. EORd assessments contained the full proficiency level scale from 16 subcompetencies, while EORn assessments contained four subcompetencies. Data reports were generated after each six-month assessment period and data was aggregated. We calculated Spearman's rank order correlations for correlations between assessment types and between assessments and final CCC proficiency levels.

RESULTS:

Over 24 months, 5,234 assessments were completed. The strongest correlations with CCC proficiency levels were the EORd for the immediate six-month assessment period prior (r_s 0.71- 0.84), and the CCC proficiency levels from the previous six-months (r_s 0.83-0.92). EOS assessments had weaker correlations (r_s 0.49 to 0.62), as did EORn (r_s 0.4 to 0.73).

CONCLUSION:

End-of-rotation assessments completed by supervising doctors are most highly correlated with final CCC proficiency level designations, while end-of-shift assessments and end-of-rotation assessments by nurses did not correlate strongly with final CCC proficiency levels, both with overestimation of levels noted. Every level of proficiency the CCC assigned appears to be highly correlated with the designated level in the immediate six-month period, perhaps implying CCC members are biased by previous level assignments.

Straight Line Scoring by Clinical Competency Committees Using Emergency Medicine Milestones

Beeson MS, Hamstra SJ, Barton MA, Yamazaki K, Counselman FL, Shayne PH, Holmboe ES, Muelleman RL, Reisdorff EJ. J Grad Med Educ. 2017 Dec;9(6):716-720. doi: 10.4300/JGME-D-17-00304.1.

BACKGROUND:

In 2013, milestone ratings became a reporting requirement for emergency medicine (EM) residency programs. Programs rate each resident in the fall and spring on 23 milestone subcompetencies.

OBJECTIVE:

This study examined the incidence of straight line scoring (SLS) for EM Milestone ratings, defined as a resident being assessed the same score across the milestone subcompetencies.

METHODS:

This descriptive analysis measured the frequencies of SLS for all Accreditation Council for Graduate Medical Education (ACGME)-accredited EM programs during the 2015-2016 academic year. Outcomes were the frequency of SLS in the fall and spring milestone assessments, changes in the number of SLS reports, and reporting trends. Chi-square analysis compared nominal variables.

RESULTS:

There were 6257 residents in the fall and 6588 in the spring. Milestone scores were reported for 6173 EM residents in the fall (99% of 6257) and spring (94% of 6588). In the fall, 93% (5753 residents) did not receive SLS ratings and 420 (7%) did, with no significant difference compared with the spring (5776 [94%] versus 397 [6%]). Subgroup analysis showed higher SLS results for residents' first ratings (183 of 2136 versus 237 of 4220, $P < .0001$) and for their final ratings (200 of 2019 versus 197 of 4354, $P < .0001$). Twenty percent of programs submitted 10% or more SLS ratings, and a small percentage submitted more than 50% of ratings as SLS.

CONCLUSIONS:

Most programs did not submit SLS ratings. Because of the statistical improbability of SLS, any SLS ratings reduce the validity assertions of the milestone assessments.

Comprehensive Assessment of Struggling Learners Referred to a Graduate Medical Education Remediation Program

Warburton KM, Goren E, Dine CJ. J Grad Med Educ. 2017 Dec;9(6):763-767.
doi: 10.4300/JGME-D-17-00175.1.

BACKGROUND:

Implementation of the Next Accreditation System has provided a standardized framework for identifying learners not meeting milestones, but there is as yet no corresponding framework for remediation.

OBJECTIVE:

We developed a comprehensive assessment process that allows correct diagnosis of a struggling learner's deficit(s) to promote successful remediation.

METHODS:

At the University of Pennsylvania, resident learners within the Department of Medicine who are not meeting milestones are referred to the Early Intervention Remediation Committee (EIRC). The EIRC, composed of 14 faculty members with expertise in remediation, uses a standardized process to assess learners' deficits. These faculty members categorize primary deficits as follows: medical knowledge, clinical reasoning, organization and efficiency, professionalism, and communication skills. The standardized process of assessment includes an analysis of the learner's file, direct communication with evaluators, an interview focused on learner perception of the problem, screening for underlying medical or psychosocial issues, and a review of systems for deficits in the 6 core competencies. Participants were surveyed after participating in this process.

RESULTS:

Over a 2-year period, the EIRC assessed and developed remediation plans for 4% of learners (14 of a total 342). Following remediation and reassessment, the identified problems were satisfactorily resolved in all cases with no disciplinary action. While the process was time intensive, an average of 45 hours per learner, the majority of faculty and residents rated it as positive and beneficial.

CONCLUSIONS:

This structured assessment process identifies targeted areas for remediation and adds to the tools available to Clinical Competency Committees.

Competency Assessment in Family Medicine Residency: Observations, Knowledge-Based Examinations, and Advancement

Mainous AG 3rd, Fang B, Peterson LE. J Grad Med Educ. 2017 Dec;9(6):730-734. doi: 10.4300/JGME-D-17-00212.1.

BACKGROUND:

The Family Medicine (FM) Milestones are competency-based assessments of residents in key dimensions relevant to practice in the specialty. Residency programs use the milestones in semiannual reviews of resident performance from the time of entry into the program to graduation.

OBJECTIVE:

Using a national sample, we investigated the relationship of FM competency-based assessments to resident progress and the complementarity of milestones with knowledge-based assessments in FM residencies.

METHODS:

We used midyear and end-of-year milestone ratings for all FM residents in Accreditation Council for Graduate Medical Education-accredited programs during academic years 2014-2015 and 2015-2016. The milestones contain 22 items across 6 competencies. We created a summative index across the milestones. The American Board of Family Medicine database provided resident demographics and in-training examination (ITE) scores. We linked information to the milestone data.

RESULTS:

The sample encompassed 6630 FM residents. The summative milestone index increased, on average, for each cohort (postgraduate year 1 [PGY-1] to PGY-2 and PGY-2 to PGY-3) at each assessment. The correlation between the milestone index that excluded the medical knowledge milestone and ITE scores was $r = .195$ ($P < .001$) for PGY-1 to PGY-2 cohort and $r = .254$ ($P < .001$) for PGY-2 to PGY-3 cohort. For both cohorts, ITE scores and composite milestone assessments were higher for residents who advanced than for those who did not.

CONCLUSIONS:

Competency-based assessment using the milestones for FM residents seems to be a viable multidimensional tool to assess the successful progression of residents.

Two-Year Experience Implementing a Curriculum to Improve Residents' Patient-Centered Communication Skills

Trickey AW, Newcomb AB, Porrey M, Piscitani F, Wright J, Graling P, Dort J. *J Surg Educ.* 2017 Nov - Dec;74(6):e124-e132. doi: 10.1016/j.jsurg.2017.07.014. Epub 2017 Jul 26.

OBJECTIVES:

Surgery milestones from The Accreditation Council for Graduate Medical Education have encouraged a focus on training and assessment of residents' nontechnical skills, including communication. We describe our 2-year experience implementing a simulation-based curriculum, results of annual communication performance assessments, and resident evaluations.

DESIGN:

Eight quarterly modules were conducted on various communication topics. Former patient volunteers served as simulation participants (SP) who completed annual assessments using the Communication Assessment Tool (CAT). During these 2 modules, communication skills were assessed in the following standardized scenarios: (1) delivering bad news to a caregiver of a patient with postoperative intracerebral hemorrhage and (2) primary care gallstone referral with contraindications for cholecystectomy. SP-CAT ratings were evaluated for correlations by individual and associations with trainee and SP characteristics. Surgical patient experience surveys are evaluated during the curriculum.

SETTING:

Independent academic medical center surgical simulation center.

PARTICIPANTS:

Twenty-five surgery residents per year in 2015 to 2017.

RESULTS:

Residents have practiced skills in a variety of scenarios including bad news delivery, medical error disclosure, empathic communication, and end-of-life conversations. Residents report positive learning experiences from the curriculum (90% graded all modules A/A+). Confidence ratings rose following each module ($p < 0.001$) and in the second year ($p < 0.001$). Annual assessments yielded insights into skills level, and relationships to resident confidence levels and traits. Communication scores were not associated with resident gender or postgraduate year. Over the course of the curriculum implementation, surgical patients have reported that doctors provided explanations with improved clarity ($p = 0.042$).

CONCLUSIONS:

The simulation-based SP-CAT has shown initial evidence of usability, content validity, relationships to observed communication behaviors and residents' skills confidence. Evaluations of different scenarios may not be correlated for individuals over time. The communication curriculum paralleled improvements in patient experience concerning surgeons' clear explanations. An ongoing surgery resident communication curriculum has numerous educational, assessment, and institutional benefits.

Impact of an Event Reporting System on Resident Complication Reporting in Plastic Surgery Training: Addressing an ACGME and Plastic Surgery Milestone Project Core Competency

Parikh RP, Snyder-Warwick A, Naidoo S, Skolnick GB, Patel KB. *Plast Reconstr Surg*. 2017 Nov;140(5):736e-745e. doi: 10.1097/PRS.0000000000003771.

BACKGROUND:

The Accreditation Council for Graduate Medical Education and Plastic Surgery Milestone Project has identified practice-based learning and improvement, which involves systematically analyzing current practices and implementing changes, as a core competency in residency education. In surgical care, complication reporting is an essential component of practice-based learning and improvement as complications are analyzed in morbidity and mortality conference for quality improvement. Unfortunately, current methods for capturing a comprehensive profile of complications may significantly underestimate the true occurrence of complications. Therefore, the objectives of this study are to evaluate an intervention for complication reporting and compare this to current practice, in a plastic surgery training program.

METHODS:

This is a preintervention and postintervention study evaluating resident reporting of complications on a plastic surgery service. The intervention was an online event reporting system developed by department leadership and patient safety experts. The cohorts consisted of all patients undergoing surgery during two separate 3-month blocks bridged by an implementation period. A trained reviewer recorded complications, and this served as the reference standard. Fisher's exact test was used for binary comparisons.

RESULTS:

There were 32 complications detected in 219 patients from June to August of 2015 and 35 complications in 202 patients from October to December of 2015. The proportion of complications reported in the preintervention group was nine of 32 (28.1 percent). After the intervention, this significantly increased to 32 of 35 (91.4 percent) ($p < 0.001$).

CONCLUSION:

An intervention using an event reporting system, supported by departmental leadership, led to significant improvements in complication reporting by plastic surgery residents.

Implementation of a Service-Specific Template Integrating Objective Structured Clinical Examination and Accreditation Council for Graduate Medical Education Milestones: One Institution's Experience

Ruta DJ, Morris MS, Pigott MT, Sybil Biermann J, Irwin TA, Holmes JR. J Surg Orthop Adv. 2017 WINTER;26(4):257-261.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) orthopaedic milestones require detailed, frequent resident evaluations. This institution desired a cost-effective objective structured clinical examination (OSCE) to facilitate these evaluations. Data were collected as a prospective, uncontrolled observational study. The OSCE was completed by residents entering and exiting the foot and ankle rotation during postgraduate years 2 and 4. Physician assistants functioned as standardized patients. Statistical analyses were performed using paired and independent t tests. The OSCE was implemented using reliable, low-cost modalities and has facilitated milestones evaluations. Preliminary data show 4th-year residents performed higher in prerotation global assessment with a standardized patient and written exam ($p < .03$). Second-year residents showed improvement in the written exam on rotation completion ($p = .03$). Using this methodology, institutions may establish similar cost-effective OSCEs as feasible evaluative solutions to satisfy milestone requirements. The authors believe this tool may be modified for any specialty. (Journal of Surgical Orthopaedic Advances 26(4):257-261, 2017).

A Checklist to Help Faculty Assess ACGME Milestones in a Video-Recorded OSCE

Easdown LJ, Wakefield ML, Shotwell MS, Sandison MR. J Grad Med Educ. 2017 Oct;9(5):605- 610. doi: 10.4300/JGME-D-17-00112.1.

BACKGROUND:

Faculty members need to assess resident performance using the Accreditation Council for Graduate Medical Education Milestones.

OBJECTIVE:

In this randomized study we used an objective structured clinical examination (OSCE) around the disclosure of an adverse event to determine whether use of a checklist improved the quality of milestone assessments by faculty.

METHODS:

In 2013, a total of 20 anesthesiology faculty members from 3 institutions were randomized to 2 groups to assess 5 videos of trainees demonstrating advancing levels of competency on the OSCE. One group used milestones alone, and the other used milestones plus a 13-item checklist with behavioral anchors based on ideal performance. We classified faculty ratings as either correct or incorrect with regard to the competency level demonstrated in each video, and then used logistic regression analysis to assess the effect of checklist use on the odds of correct classification.

RESULTS:

Thirteen of 20 faculty members rated assessing performance using milestones alone as *difficult* or *very difficult*. Checklist use was associated with significantly greater odds of correct classification at entry level (odds ratio [OR] = 9.2, 95% confidence interval [CI] 4.0-21.2) and at junior level (OR = 2.7, 95% CI 1.3-5.7) performance. For performance at other competency levels checklist use did not affect the odds of correct classification.

CONCLUSIONS:

A majority of anesthesiology faculty members reported difficulty with assessing a videotaped OSCE of error disclosure using milestones as primary assessment tools. Use of the checklist assisted in correct assessments at the entry and junior levels.

Development of a Global Health Milestones Tool for Learners in Emergency Medicine: A Pilot Project

Douglass KA, Jacquet GA, Hayward AS, Dreifuss BA, Tupesis JP, Acerra J, Bloem C, Brenner J, DeVos E, Douglass K, Dreifuss B, Hayward AS, Hilbert SL, Jacquet GA, Lin J, Muck A, Nasser S, Oteng R, Powell NN, Rybarczyk MM, Schmidt J, Svenson J, Tupesis JP, Yoder K. AEM Educ Train. 2017 Sep 11;1(4):269-279. doi: 10.1002/aet2.10046. eCollection 2017 Oct.

OBJECTIVES:

In medical education and training, increasing numbers of institutions and learners are participating in global health experiences. Within the context of competency-based education and assessment methodologies, a standardized assessment tool may prove valuable to all of the aforementioned stakeholders. Milestones are now used as the standard for trainee assessment in graduate medical education. Thus, the development of a similar, milestone-based tool was undertaken, with learners in emergency medicine (EM) and global health in mind.

METHODS:

The Global Emergency Medicine Think Tank Education Working Group convened at the 2016 Society for Academic Medicine Annual Meeting in New Orleans, Louisiana. Using the Interprofessional Global Health Competencies published by the Consortium of Universities for Global Health's Education Committee as a foundation, the working group developed individual milestones based on the 11 stated domains. An iterative review process was implemented by teams focused on each domain to develop a final product.

RESULTS:

Milestones were developed in each of the 11 domains, with five competency levels for each domain. Specific learning resources were identified for each competency level and assessment methodologies were aligned with the milestones framework. The Global Health Milestones Tool for learners in EM is designed for continuous usage by learners and mentors across a career.

CONCLUSIONS:

This Global Health Milestones Tool for learners in EM may prove valuable to numerous stakeholders. The next steps include a formalized pilot program for testing the tool's validity and usability across training programs, as well as an assessment of perceived utility and applicability by collaborating colleagues working in training sites abroad.

Mapping Residency Global Health Experiences to the ACGME Family Medicine Milestones

Grissom MO, Iroku-Malize T, Peila R, Perez M, Philippe N. *Fam Med*. 2017 Jul;49(7):553-557.

BACKGROUND AND OBJECTIVES:

Global health (GH) experiences are a unique part of family medicine (FM) training that offer an opportunity for residents to demonstrate development across a multitude of the milestones recently implemented by the Accreditation Council for Graduate Medical Education (ACGME). The GH experience presents an opportunity for resident development, and including a component of written reflection can provide tangible evidence of development in areas that can be difficult to assess.

METHODS:

A mixed methods approach was used to integrate quantitative (frequency) data with qualitative content from the written reflections of 12 of our FM residents who participated in GH experiences.

RESULTS:

Written reflections touched on each of the 22 milestones, although some milestones were noted more frequently than others. The most commonly identified milestones fell within the competency areas of systems-based practice, professionalism, and practice-based learning and improvement. Our qualitative approach allowed us to gain an appreciation of the unique experiences that demonstrated growth across the various milestones.

CONCLUSIONS:

We conclude that any program that offers GH experiences should incorporate some form of written reflection to maximize resident growth and offer evaluative faculty a window into that development.

The Impact of Using Mean versus Mode When Assessing Resident Competency

Barlow PB, Thoma KD, Ferguson KJ. J Grad Med Educ. 2017 Jun;9(3):302-309. doi: 10.4300/JGME-D-16-00571.1.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Milestone Project was implemented in 2014 to standardize assessments and progression of residents. While it is recommended that milestones not be used as tools for direct assessments of resident competency, many programs have used or adapted milestone tools for this purpose.

OBJECTIVE:

We sought to explore use of the most frequent milestone level at which a resident was evaluated (ie, the mode), and compared this to the standard practice of using the arithmetic mean for summarizing performance.

METHODS:

We reviewed all Family Medicine Milestone evaluations from 1 program for the first 2 academic years of milestone implementation. Mean and mode scores were calculated across 24 unique residents, 841 evaluation forms, and 5897 measurements. The proportion of overestimation errors (where the mean is at least 0.5 larger than the mode) and underestimation errors (where the mean is at least 0.5 less than the mode) were then compared across resident training year and subcompetency.

RESULTS:

For the 24 residents, an estimation error occurred in 175 of 792 of the comparisons (22%). Of these errors, 118 (67%) were overestimation errors. First-year residents accounted for 55% (96 of 175) of all estimation errors. All subcompetencies had some estimation errors, with 6 having greater than 5%.

CONCLUSIONS:

If the trend for using the milestones as stand-alone assessment tools is to continue, aggregating data by using frequency distributions and mode would be a more stable and appropriate approach given their nominal or, at best, ordinal nature.

Rapid Web-Based Platform for Assessment of Orthopedic Surgery Patient Care Milestones: A 2-Year Validation

Gundle KR, Mickelson DT, Cheronas A, Black J, Hanel DP. J Surg Educ. 2017 May 18. pii: S1931-7204(16) 30242-2. doi: 10.1016/j.jsurg.2017.05.001.

OBJECTIVE:

To determine the validity, feasibility, and responsiveness of a new web-based platform for rapid milestone-based evaluations of orthopedic surgery residents.

SETTING:

Single academic medical center, including a trauma center and pediatrics tertiary hospital.

PARTICIPANTS:

Forty residents (PG1-5) in an orthopedic residency program and their faculty evaluators.

METHODS:

Residents and faculty were trained and supported in the use of a novel trainee-initiated web-based evaluation system. Residents were encouraged to use the system to track progress on patient care subcompetencies. Two years of prospectively collected data were reviewed from residents at an academic program. The primary outcome was Spearman's rank correlation between postgraduate year (PGY) and competency level achieved as a measure of validity. Secondary outcomes assessed feasibility, resident self-evaluation versus faculty evaluation, the distributions among subcompetencies, and responsiveness over time.

RESULTS:

Between February 2014 and February 2016, 856 orthopedic surgery patient care subcompetency evaluations were completed (1.2 evaluations per day). Residents promptly requested feedback after a procedure (median = 0 days, interquartile range: 0-2), and faculty responded within 2 days in 51% (median = 2 days, interquartile range: 0-13). Primary outcome showed a correlation between PGY and competency level ($r = 0.78$, $p < 0.001$), with significant differences in competency among PGYs ($p < 0.001$ by Kruskal-Wallis rank sum test). Self-evaluations by residents substantially agreed with faculty-assigned competency level (weighted Cohen's $K = 0.72$, $p < 0.001$). Resident classes beginning the study as PGY1, 2, and 3 separately demonstrated gains in competency over time (Spearman's rank correlation 0.39, 0.60, 0.59, respectively, each $p < 0.001$). There was significant variance in the number of evaluations submitted per subcompetency (median = 43, range: 6-113) and competency level assigned ($p < 0.01$).

CONCLUSIONS:

Rapid tracking of trainee competency with milestone-based evaluations in a learner-centered mobile platform demonstrated validity, feasibility, and responsiveness. Next Accreditation System-mandated data may be efficiently collected and used for trainee and program self-study.

Comparison of Male vs Female Resident Milestone Evaluations by Faculty during Emergency Medicine Residency Training

Dayal A, O'Connor DM, Qadri U, Arora VM. JAMA Intern Med. 2017 May 1;177(5):651-657.

IMPORTANCE:

Although implicit bias in medical training has long been suspected, it has been difficult to study using objective measures, and the influence of sex and gender in the evaluation of medical trainees is unknown. The emergency medicine (EM) milestones provide a standardized framework for longitudinal resident assessment, allowing for analysis of resident performance across all years and programs at a scope and level of detail never previously possible.

OBJECTIVE:

To compare faculty-observed training milestone attainment of male vs female residency training.

DESIGN, SETTING, AND PARTICIPANTS:

This multicenter, longitudinal, retrospective cohort study took place at 8 community and academic EM training programs across the United States from July 1, 2013, to July 1, 2015, using a real-time, mobile-based, direct-observation evaluation tool. The study examined 33 456 direct-observation subcompetency evaluations of 359 EM residents by 285 faculty members.

MAIN OUTCOMES AND MEASURES:

Milestone attainment for male and female EM residents as observed by male and female faculty throughout residency and analyzed using multilevel mixed-effects linear regression modeling.

RESULTS:

A total of 33 456 direct-observation evaluations were collected from 359 EM residents (237 men [66.0%] and 122 women [34.0%]) by 285 faculty members (194 men [68.1%] and 91 women [31.9%]) during the study period. Female and male residents achieved similar milestone levels during the first year of residency. However, the rate of milestone attainment was 12.7% (0.07 levels per year) higher for male residents through all of residency (95% CI, 0.04-0.09). By graduation, men scored approximately 0.15 milestone levels higher than women, which is equivalent to 3 to 4 months of additional training, given that the average resident gains approximately 0.52 levels per year using our model (95% CI, 0.49-0.54). No statistically significant differences in scores were found based on faculty evaluator gender (effect size difference, 0.02 milestone levels; 95% CI for males, -0.09 to 0.11) or evaluator-evaluated gender pairing (effect size difference, -0.02 milestone levels; 95% CI for interaction, -0.05 to 0.01).

CONCLUSIONS AND RELEVANCE:

Although male and female residents receive similar evaluations at the beginning of residency, the rate of milestone attainment throughout training was higher for male than female residents across all EM subcompetencies, leading to a gender gap in evaluations that continues until graduation. Faculty should be cognizant of possible gender bias when evaluating medical trainees.

Does One Size Fit All? Examining the Application of Neurosurgery Residency Milestones Developed in the USA to a Taiwanese Culture

Lee CY, Lai HY, Lee CH, Lee ST. *World Neurosurg.* 2017 Apr 28. pii: S1878-8750(17)30637-X. doi: 10.1016/j.wneu.2017.04.129.

BACKGROUND:

The Milestone Project was launched in 2009, charging specialties to develop specific educational accomplishments required to establish clinical competency. The milestone assessment method was first introduced to Taiwan in 2013 and prior to applying milestone assessments to our medical education system, the validity and reliability of these questionnaires needed to be evaluated.

METHOD:

Twenty neurosurgical faculty members representing 3 clinical divisions and all 4 branch institutes completed milestone questionnaires for 26 residents semiannually resulting in 435 resident assessments being collected and analyzed.

RESULTS:

Cronbach's α , KR-20, and Kendall's W were used to show acceptable reliability and validity. Rater consistencies for non-skilled parts found that rater consistency progressively improved over time. Not all raters were able to assess the residents for the skilled parts resulting in non-assessable rates ranging from 9.5% to 89.4%. For both non-skilled and skilled items, milestone level as assessed by the staff improved as the resident progressed from R3 to R6 in the residency program and showed that the milestone achievement level for an R3 was lower than that of an R6.

CONCLUSION:

Milestone assessments have high reliability and may be a helpful assessment tool. Although milestone assessment can provide thorough feedback concerning performance and the content of the training program, they may not perfectly suit all residency-training programs, especially in different countries or different cultures. Modifications should be done before applying milestones to different areas so that the results can truly reflect the progress and condition of the training and learning process.

Evaluating Surgical Residents Quickly and Easily against the Milestones Using Electronic Formative Feedback

Hartranft TH, Yandle K, Graham T, Holden C, Chambers LW. J Surg Educ. 2017 Mar-Apr;74(2):237-242. doi: 10.1016/j.jsurg.2016.09.006. Epub 2016 Oct 13.

OBJECTIVE:

This study was conducted to assess the effectiveness of a newly implemented electronic web-based review system created at our institution for evaluating resident performance relative to established milestones.

DESIGN:

Retrospective review of data collected from a survey of general surgery faculty and residents.

SETTING:

Tertiary care teaching hospital system and independent academic medical center.

PARTICIPANTS:

A total of 12 general surgery faculty and 17 general surgery residents participated in this study. The survey queried the level of satisfaction before and after the adoption of QuickNotes using several statements scored on a 5-point scale, with 1 being the lowest rating as "not satisfied," and 5 being the highest rating as "completely satisfied."

RESULTS:

The weighted average improvements from pre- to post-QuickNotes implementation for the faculty responding to the survey ranged from 10% to 40%; weighted average improvements for the residents responding to the survey ranged from 5% to 73%. For the survey of faculty, both sets of weighted averages tended to be higher than the weighted average for the resident's survey responses. The highest rated topic was the faculty's level of satisfaction with the "frequency to provide feedback" with a post-QuickNotes implementation weighted average of 4.25, closely followed by the residents' level of satisfaction with the "evaluation includes positive feedback" with a post-QuickNotes implementation weighted average of 4.24. The most notable increases in weighted averages from preimplementation to postimplementation were noted for "overall satisfaction" (20% increase for faculty, 37% for residents), "reflects actual criteria that matter" (36% increase for faculty, 73% for residents), faculty "opportunity for follow-up" (increase of 40%), resident "reflects overall trends" (increase of 37%), and resident "provides new information about my performance" (increase of 37%).

CONCLUSIONS:

Our institutional adoption of QuickNotes into the resident evaluation process has been associated with an overall increased level of satisfaction in the evaluation process by both faculty and residents. The design of QuickNotes facilitates its integration into the resident training environment, as it is web based, easy to use, and has no additional cost over the standard New Innovations subscription. Although it is designed to capture snapshots of trainee behavior and performance, monthly reports through QuickNotes can be used effectively in conjunction with the more traditional end-of-rotation evaluations to show trends, identify areas of strength that should be reinforced, demonstrate areas needing improvement, allow for a more tailored individual education plan to be developed, and permit a more accurate determination of milestone progression.

Implementation of a Needs-Based, Online Feedback Tool for Anesthesia Residents With Subsequent Mapping of the Feedback to the ACGME Milestones

Tanaka P, Bereknyei Merrell S, Walker K, Zocca J, Scotto L, Bogetz AL, Macario A. *Anesth Analg.* 2017 Feb;124(2):627-635. doi: 10.1213/ANE.0000000000001647.

BACKGROUND:

Optimizing feedback that residents receive from faculty is important for learning. The goals of this study were to (1) conduct focus groups of anesthesia residents to define what constitutes optimal feedback; (2) develop, test, and implement a web-based feedback tool; and (3) then map the contents of the written comments collected on the feedback tool to the Accreditation Council for Graduate Medical Education (ACGME) anesthesiology milestones.

METHODS:

All 72 anesthesia residents in the program were invited to participate in 1 of 5 focus groups scheduled over a 2-month period. Thirty-seven (51%) participated in the focus groups and completed a written survey on previous feedback experiences. On the basis of the focus group input, an initial online feedback tool was pilot-tested with 20 residents and 62 feedback sessions, and then a final feedback tool was deployed to the entire residency to facilitate the feedback process. The completed feedback written entries were mapped onto the 25 ACGME anesthesiology milestones.

RESULTS:

Focus groups revealed 3 major barriers to good feedback: (1) too late such as, for example, at the end of month-long clinical rotations, which was not useful because the feedback was delayed; (2) too general and not specific enough to immediately remedy behavior; and (3) too many in that the large number of evaluations that existed that were unhelpful such as those with unclear behavioral anchors compromised the overall feedback culture. Thirty residents (42% of 72 residents in the program) used the final online feedback tool with 121 feedback sessions with 61 attendings on 15 rotations at 3 hospital sites. The number of feedback tool uses per resident averaged 4.03 (standard deviation 5.08, median 2, range 1-21, 25th-75th % quartile 1-4). Feedback tool uses per faculty averaged 1.98 (standard deviation 3.2, median 1, range 1-25, 25th-75th % quartile 1-2). For the feedback question item "specific learning objective demonstrated well by the resident," this yielded 296 milestone-specific responses. The majority (71.3%) were related to the patient care competency, most commonly the anesthetic plan and conduct (35.8%) and airway management (11.1%) milestones; 10.5% were related to the interpersonal and communication skills competency, most commonly the milestones communication with other professionals (4.4%) or with patients and families (4.4%); and 8.4% were related to the practice-based learning and improvement competency, most commonly self-directed learning (6.1%). For the feedback tool item "specific learning objective that resident may improve," 67.0% were related to patient care, most commonly anesthetic plan and conduct (33.5%) followed by use/interpretation of monitoring and equipment (8.5%) and airway management (8.5%); 10.2% were related to practice-based learning and improvement, most commonly self-directed learning (6.8%); and 9.7% were related to the systems-based practice competency.

CONCLUSIONS:

Resident focus groups recommended that feedback be timely and specific and be structured around a tool. A customized online feedback tool was developed and implemented. Mapping of the free-text feedback comments may assist in assessing milestones. Use of the feedback tool was lower than expected, which may indicate that it is just 1 of many implementation steps required for behavioral and culture change to support a learning environment with frequent and useful feedback.

Number of Weeks Rotating in the Emergency Department Has a Greater Effect on Ultrasound Milestone Competency than a Dedicated Ultrasound Rotation

Smalley CM, Thiessen M, Bynny R, Dorey A, McNair B, Kendall JL. J Ultrasound Med. 2017 Feb; 36(2):335-343. doi: 10.7863/ultra.15.12044. Epub 2016 Dec 10.

OBJECTIVES:

Ultrasound (US) is vital to modern emergency medicine (EM). Across residencies, there is marked variability in US training. The "goal-directed focused US" part of the Milestones Project states that trainees must correctly acquire and interpret images to achieve a level 3 milestone. Standardized methods by which programs teach these skills have not been established. Our goal was to determine whether residents could achieve level 3 with or without a dedicated US rotation.

METHODS:

Thirty-three first- and second-year residents were assigned to control (no rotation) and intervention (US rotation) groups. The intervention group underwent a 2-week curriculum in vascular access, the aorta, echocardiography, focused assessment with sonography for trauma, and pregnancy. To test acquisition, US-trained emergency medicine physicians administered an objective structured clinical examination. To test interpretation, residents had to identify normal versus abnormal findings. Mixed-model logistic regression tested the association of a US rotation while controlling for confounders: weeks in the emergency department (ED) as a resident, medical school US rotation, and postgraduate years.

RESULTS:

For image acquisition, medical school US rotation and weeks in the ED as a resident were significant ($P = .03$; $P = .04$) whereas completion of a US rotation and postgraduate years were not significant. For image interpretation, weeks in the ED as a resident was the only significant predictor of performance ($P = .002$) whereas completion of a US rotation and medical school US rotation were not significant.

CONCLUSIONS:

To achieve a level 3 milestone, weeks in the ED as a resident were significant for mastering image acquisition and interpretation. A dedicated US rotation did not have a significant effect. A medical school US rotation had a significant effect on image acquisition but not interpretation. Further studies are needed to best assess methods to meet US milestones.

How Effective are New Milestones Assessments at Demonstrating Resident Growth? 1 Year of Data

Goldman RH, Tuomala RE, Bengtson JM, Stagg AR. J Surg Educ. 2017 Jan - Feb;74(1):68-73. doi: 10.1016/j.jsurg.2016.06.009. Epub 2016 Jul 6.

OBJECTIVE:

Assessment tools that accrue data for the Accreditation Council for Graduate Medical Education Milestones must evaluate residents across multiple dimensions, including medical knowledge, procedural skills, teaching, and professionalism. Our objectives were to: (1) develop an assessment tool to evaluate resident performance in accordance with the Milestones and (2) review trends in resident achievements during the inaugural year of Milestone implementation.

DESIGN:

A novel venue and postgraduate year (PGY) specific assessment tool was built, tested, and implemented for both operating room and labor and delivery "venues." Resident development of competence and independence was captured over time. To account for variable rotation schedules, the year was divided into thirds and compared using two-tailed Fisher's exact test.

SETTING:

Brigham and Women's and Massachusetts General Hospitals, Boston MA.

PARTICIPANTS:

Faculty evaluators and obstetrics and gynecology residents.

RESULTS:

A total of 822 assessments of 44 residents were completed between 9/2014 and 6/2015. The percentage of labor and delivery tasks completed "independently" increased monotonically across the start of all years: 8.4% for PGY-1, 60.3% for PGY-2, 73.7% for PGY-3, and 87.5% for PGY-4. Assessments of PGY-1 residents demonstrated a significant shift toward "with minimal supervision" and "independent" for the management of normal labor ($p = 0.03$). PGY-3 residents demonstrated an increase in "able to be primary surgeon" in the operating room, from 36% of the time in the first 2/3 of the year, to 62.3% in the last 1/3 ($p < 0.01$).

CONCLUSION:

Assessment tools developed to assist with Milestone assignments capture the growth of residents over time and demonstrate quantifiable differences in achievements between PGY classes. These tools will allow for targeted teaching opportunities for both individual residents and residency programs.

Piloting the Mobile Medical Milestones Application (M3App®): A Multi-Institution Evaluation

Page C, Reid A, Coe CL, Beste J, Fagan B, Steinbacher E, Newton WP. Fam Med. 2017 Jan;49 (1): 35-41.

BACKGROUND AND OBJECTIVES:

Competency-based evaluation of the Accreditation Council for Graduate Medical Education (ACGME) Milestones requires the development of new evaluation tools that can better capture learners' behavior. This study describes the implementation and initial assessment of an innovative point-of-care mobile application, the M3App®, linked to the Family Medicine Milestones.

METHODS:

Seven family medicine residency programs in North Carolina implemented the M3App.® Program faculty and residents were surveyed prior to implementation regarding current evaluation methods and their quality and use and acceptability of electronic evaluation tools. Surveys were repeated after implementation for comparison.

RESULTS:

All seven programs successfully implemented the M3App. Most faculty members found the tool well designed, easy to use, beneficial to the quality and efficiency of feedback they provide, and to their knowledge of Milestones. Residents reported significant increases in the volume and quality of written feedback they receive.

CONCLUSIONS:

The M3App provides an efficient, convenient tool for assessing Milestones that can improve the quantity and quality of feedback residents receive from faculty. Improved faculty perception of knowledge of Milestones after M3App implementation suggests that the tool is also effective for faculty development.

Connecting Milestones to Observable Clinical Performance through Standardized Pediatric Cardiology Rotation Evaluations: Report and Reflections on a Novel Pilot Project

Frank LH, Koenig PR, Srivastava S. Progress in Pediatric Cardiology. 44:11-15.
doi:10.1016/j.ppedcard.2016.12.005.

ABSTRACT:

Uniform evaluations were designed and implemented by pediatric cardiology program directors. The evaluation forms incorporated ACGME/ABP subcompetencies into clinical observations. Fellow milestone assessment was achievable through the use of the evaluation forms. Early survey results suggest that these were an improvement over existing tools.

Using the ACGME Milestones for Resident Self-Evaluation and Faculty Engagement

Meier AH, Gruessner A, Cooney RN. J Surg Educ. 2016 Nov - Dec;73(6):e150-e157. doi: 10.1016/j.jsurg.2016.09.001.

BACKGROUND:

Since July 2014 General Surgery residency programs have been required to use the Accreditation Council for Graduate Medical Education milestones twice annually to assess the progress of their trainees. We felt this change was a great opportunity to use this new evaluation tool for resident self-assessment and to furthermore engage the faculty in the educational efforts of the program.

METHODS:

We piloted the milestones with postgraduate year (PGY) II and IV residents during the 2013/2014 academic year to get faculty and residents acquainted with the instrument. In July 2014, we implemented the same protocol for all residents. Residents meet with their advisers quarterly. Two of these meetings are used for milestones assessment. The residents perform an independent self-evaluation and the adviser grades them independently. They discuss the evaluations focusing mainly on areas of greatest disagreement. The faculty member then presents the resident to the clinical competency committee (CCC) and the committee decides on the final scores and submits them to the Accreditation Council for Graduate Medical Education website. We stored all records anonymously in a MySQL database. We used Anova with Tukey post hoc analysis to evaluate differences between groups. We used intraclass correlation coefficients and Krippendorff's α to assess interrater reliability.

RESULTS:

We analyzed evaluations for 44 residents. We created scale scores across all Likert items for each evaluation. We compared score differences by PGY level and raters (self, adviser, and CCC). We found highly significant increases of scores between most PGY levels ($p < 0.05$). There were no significant score differences per PGY level between the raters. The interrater reliability for the total score and 6 competency domains was very high (ICC: 0.87-0.98 and α : 0.84-0.97). Even though this milestone evaluation process added additional work for residents and faculty we had very good participation (93.9% by residents and 92.9% by faculty) and feedback was generally positive.

CONCLUSION:

Even though implementation of the milestones has added additional work for general surgery residency programs, it has also opened opportunities to furthermore engage the residents in reflection and self-evaluation and to create additional venues for faculty to get involved with the educational process within the residency program. Using the adviser as the initial rater seems to correlate closely with the final CCC assessment. Self-evaluation by the resident is a requirement by the RRC and the milestones seem to be a good instrument to use for this purpose. Our early assessment suggests the milestones provide a useful instrument to track trainee progression through their residency.

A Multi-Source Feedback Tool for Measuring a Subset of Pediatrics Milestones

Schwartz A, Margolis MJ, Multerer S, Haftel HM, Schumacher DJ; APPD LEARN–NBME Pediatrics Milestones Assessment Group. *Med Teach*. 2016 Oct;38(10):995-1002. Epub 2016 Mar 30.

BACKGROUND:

The Pediatrics Milestones Assessment Pilot employed a new multisource feedback (MSF) instrument to assess nine Pediatrics Milestones among interns and subinterns in the inpatient context.

OBJECTIVE:

To report validity evidence for the MSF tool for informing milestone classification decisions.

METHODS:

We obtained MSF instruments by different raters per learner per rotation. We present evidence for validity based on the unified validity framework.

RESULTS:

One hundred and ninety two interns and 41 subinterns at 18 Pediatrics residency programs received a total of 1084 MSF forms from faculty (40%), senior residents (34%), nurses (22%), and other staff (4%). Variance in ratings was associated primarily with rater (32%) and learner (22%). The milestone factor structure fit data better than simpler structures. In domains except professionalism, ratings by nurses were significantly lower than those by faculty and ratings by other staff were significantly higher. Ratings were higher when the rater observed the learner for longer periods and had a positive global opinion of the learner. Ratings of interns and subinterns did not differ, except for ratings by senior residents. MSF-based scales correlated with summative milestone scores.

CONCLUSION:

We obtain moderately reliable MSF ratings of interns and subinterns in the inpatient context to inform some milestone assignments.

Entrusting Observable Practice Activities and Milestones over the 36 Months of an Internal Medicine Residency

Warm EJ, Held JD, Hellmann M, Kelleher M, Kinnear B, Lee C, O'Toole JK, Mathis B, Mueller C, Sall D, Tolentino J, Schauer DP. Acad Med. 2016 Oct;91(10):1398-1405.

PURPOSE:

Competency-based medical education and milestone reporting have led to increased interest in work-based assessments using entrustment over time as an assessment framework. Little is known about data collected from these assessments during residency. This study describes the results of entrustment of discrete work-based skills over 36 months in the University of Cincinnati internal medicine (IM) residency program.

METHOD:

Attending physician and peer/allied health assessors provided entrustment ratings of resident performance on work-based observable practice activities (OPAs) mapped to Accreditation Council for Graduate Medicine Education/American Board of Internal Medicine reporting milestones for IM. These data were translated into milestones data and tracked longitudinally. The authors analyzed data from this new entrustment system's first 36 months (July 2012-June 2015).

RESULTS:

During the 36-month period, assessors made 364,728 milestone assessments (mapped from OPAs) of 189 residents. Residents received an annualized average of 83 assessment encounters, producing means of 3,987 milestone assessments and 4,325 words of narrative assessment. Mean entrustment ratings (range 1-5) from all assessors for all milestones rose from 2.46 for first-month residents to 3.92 for 36th-month residents ($r = 0.9252$, $P < .001$). Attending physicians' entrustment ratings were lower than peer/allied health assessors' ratings. Medical knowledge and patient care milestones were rated lower than professionalism and interpersonal and communication skills milestones.

CONCLUSIONS:

Entrustment of milestones appears to rise progressively over time, with differences by assessor type, competency, milestone, and resident. Further research is needed to elucidate the validity of these data in promotion, remediation, and reporting decisions.

Patients, Nurses, and Physicians Working Together to Develop a Discharge Entrustable Professional Activity Assessment Tool

Meade LB, Suddarth KH, Jones RR, Zaas AK, Albanese T, Yamazaki K, O'Malley CW. Acad Med. 2016 Oct;91(10):1388-1391.

PROBLEM:

The Accreditation Council for Graduate Medical Education milestones were written by physicians and thus may not reflect all the behaviors necessary for physicians to optimize their performance as a key member of an interprofessional team.

APPROACH:

From April to May 2013, the authors, Educational Research Outcomes Collaborative leaders, assembled interprofessional team discussion groups, including patients or family members, nurses, physician trainees, physician educators, and other staff (optional), at 11 internal medicine (IM) programs. Led by the site's principal investigator, the groups generated a list of physician behaviors related to the entrustable professional activity (EPA) of a safe and effective discharge of a patient from the hospital, and prioritized those behaviors.

OUTCOMES:

A total of 182 behaviors were listed, with lists consisting of between 10 and 29 behaviors. Overall, the site principal investigators described all participants as emerging from the activity with a new understanding of the complexity of training physicians for the discharge EPA. The authors batched behaviors into six components of a safe and effective discharge: medication reconciliation, discharge summary, patient/caregiver communication, team communication, active collaboration, and anticipation of posthospital needs. Specific, high-priority behavior examples for each component were identified, and an assessment tool for direct observation was developed for the discharge EPA.

NEXT STEPS:

The authors are currently evaluating trainee and educator perceptions of the assessment tool after implementation in 15 IM programs. Additional next steps include developing tools for other EPAs, as well as a broader evaluation of patient outcomes in the era of milestone-based assessment.

Learnings from the Pilot Implementation of Mobile Medical Milestones Application

Page CP, Reid A, Coe CL, Carlough M, Rosenbaum D, Beste J, Fagan B, Steinbacher E, Jones G, Newton WP. J Grad Med Educ. 2016 Oct;8(4):569-575.

BACKGROUND:

Implementation of the educational milestones benefits from mobile technology that facilitates ready assessments in the clinical environment. We developed a point-of-care resident evaluation tool, the Mobile Medical Milestones Application (M3App), and piloted it in 8 North Carolina family medicine residency programs.

OBJECTIVE:

We sought to examine variations we found in the use of the tool across programs and explored the experiences of program directors, faculty, and residents to better understand the perceived benefits and challenges of implementing the new tool.

METHODS:

Residents and faculty completed presurveys and postsurveys about the tool and the evaluation process in their program. Program directors were interviewed individually. Interviews and open-ended survey responses were analyzed and coded using the constant comparative method, and responses were tabulated under themes.

RESULTS:

Common perceptions included increased data collection, enhanced efficiency, and increased perceived quality of the information gathered with the M3App. Residents appreciated the timely, high-quality feedback they received. Faculty reported becoming more comfortable with the tool over time, and a more favorable evaluation of the tool was associated with higher utilization. Program directors reported improvements in faculty knowledge of the milestones and resident satisfaction with feedback.

CONCLUSIONS:

Faculty and residents credited the M3App with improving the quality and efficiency of resident feedback. Residents appreciated the frequency, proximity, and specificity of feedback, and faculty reported the app improved their familiarity with the milestones. Implementation challenges included lack of a physician champion and competing demands on faculty time.

Using Milestones as Evaluation Metrics during an Emergency Medicine Clerkship

Quinn SM, WorriLOW CC, Jayant DA, Bailey B, Eustice E, Kohlhepp J, Rogers R, Kane BG. J Emerg Med. 2016 Oct;51(4):426-431.

BACKGROUND:

The Accreditation Council for Graduate Medical Education's (ACGME) Milestones presumes graduating medical students will enter residency proficient at Milestone level 1 for 23 skills. The Next Accreditation System now includes Milestones for each postgraduate specialty, and it is unlikely that schools will document every emergency medicine (EM) applicant's EM-specific skills in their performance evaluation.

OBJECTIVES:

The goals of this research were to determine if assessment of the Milestones was feasible during a medical student clerkship and examine the proportion of medical students performing at Milestone level 1.

METHODS:

This study was conducted at a center with Liaison Committee on Medical Education-approved medical training and a 4-year EM residency. Using traditional clerkship, we studied the feasibility of an ACGME EM Milestones-based clerkship assessment. Data led to redesign of the clerkship and its evaluation process, including all level 1 anchor(s) to add "occasionally" (>60%), "usually" (>80%), and "always" (100%) on a Likert scale to on-shift assessment forms.

RESULTS:

During the feasibility phase (2013-14), 75 students rotated through the clerkship; 55 evaluations were issued and 50 contained the Milestone summary. Eight deficiencies were noted in Milestone 12 and three in Milestone 14. After changes, 49 students rotated under the new evaluation rubric. Of 575 completed on-shift evaluations, 16 Milestone deficiencies were noted. Of 41 institutional evaluations issued, only one student had deficiencies noted, all of which pertained to patient care. All evaluations in this second cohort contained each student's Milestone proficiency.

CONCLUSIONS:

Assessment of the Milestones is feasible. Communication of ACGME EM Milestone proficiency may identify students who require early observation or remediation. The majority of students meet the anchors for the Milestones, suggesting that clerkship assessment with the ACGME EM Milestones does not adequately differentiate students.

Shortening the Miles to the Milestones: Connecting EPA-Based Evaluations to ACGME Milestone Reports for Internal Medicine Residency Programs

Choe JH, Knight CL, Stiling R, Corning K, Lock K, Steinberg KP. Acad Med. 2016 Jul;91(7):943- 50. doi: 10.1097/ACM.0000000000001161.

ABSTRACT:

The Next Accreditation System requires internal medicine training programs to provide the Accreditation Council for Graduate Medical Education (ACGME) with semiannual information about each resident's progress in 22 subcompetency domains. Evaluation of resident "trustworthiness" in performing entrustable professional activities (EPAs) may offer a more tangible assessment construct than evaluations based on expectations of usual progression toward competence. However, translating results from EPA-based evaluations into ACGME milestone progress reports has proven to be challenging because the constructs that underlay these two systems differ. The authors describe a process to bridge the gap between rotation-specific EPA-based evaluations and ACGME milestone reporting. Developed at the University of Washington in 2012 and 2013, this method involves mapping EPA-based evaluation responses to "milestone elements," the narrative descriptions within the columns of each of the 22 internal medicine subcompetencies. As faculty members complete EPA-based evaluations, the mapped milestone elements are automatically marked as "confirmed." Programs can maintain a database that tallies the number of times each milestone element is confirmed for a resident; these data can be used to produce graphical displays of resident progress along the internal medicine milestones. Using this count of milestone elements allows programs to bridge the gap between faculty assessments of residents based on rotation-specific observed activities and semiannual ACGME reports based on the internal medicine milestones. Although potentially useful for all programs, this method is especially beneficial to large programs where clinical competency committee members may not have the opportunity for direct observation of all residents.

Mapping Direct Observations from Objective Structured Clinical Examinations to the Milestones across Specialties

Baker-Genaw K, Kokas MS, Ahsan SF, Darnley-Fisch D, Drake S, Goyal N, Inamdar K, Moutzouros V, Prabhakar D, Rolland L, Sangha R, Shreve M, Woodward A. *J Grad Med Educ.* 2016 Jul;8(3):429-34. doi: 10.4300/JGME-D-15-00385.1.

BACKGROUND:

Little is known about residents' performance on the milestones at the institutional level. Our institution formed a work group to explore this using an institutional-level curriculum and residents' evaluation of the milestones.

OBJECTIVE:

We assessed whether beginner-level milestones for interpersonal and communication skills (ICS) related to observable behaviors in ICS-focused objective structured clinical examinations (OSCEs) for postgraduate year (PGY) 1 residents across specialties.

METHODS:

The work group compared ICS subcompetencies across 12 programs to identify common beginner-level physician-patient communication milestones. The selected ICS milestone sets were compared for common language with the ICS-OSCE assessment tool-the Kalamazoo Essential Elements of Communication Checklist-Adapted (KEECC-A). To assess whether OSCE scores related to ICS milestone scores, all PGY-1 residents from programs that were part of Next Accreditation System Phase 1 were identified; their OSCE scores from July 2013 to June 2014 and ICS subcompetency scores from December 2014 were compared.

RESULTS:

The milestones for 10 specialties and the transitional year had at least 1 ICS subcompetency that related to physician-patient communication. The language of the ICS beginner-level milestones appears similar to behaviors outlined in the KEECC-A. All 60 residents with complete data received at least a beginner-level ICS subcompetency score and at least a satisfactory score on all 3 OSCEs.

CONCLUSIONS:

The ICS-OSCE scores for PGY-1 residents appear to relate to beginner-level milestones for physician-patient communication across multiple specialties.

Rating the Quality of Entrustable Professional Activities: Content Validation and Associations with the Clinical Context

Post JA, Wittich CM, Thomas KG, Dupras DM, Halvorsen AJ, Mandrekar JN, Oxentenko AS, Beckman TJ. J Gen Intern Med. 2016 May;31(5):518-23. doi: 10.1007/s11606-016-3611-8. Epub 2016 Feb 22.

BACKGROUND:

Entrustable professional activities (EPAs) have been developed to assess resident physicians with respect to Accreditation Council for Graduate Medical Education (ACGME) competencies and milestones. Although the feasibility of using EPAs has been reported, we are unaware of previous validation studies on EPAs and potential associations between EPA quality scores and characteristics of educational programs.

OBJECTIVES:

Our aim was to validate an instrument for assessing the quality of EPAs for assessment of internal medicine residents, and to examine associations between EPA quality scores and features of rotations.

DESIGN:

This was a prospective content validation study to design an instrument to measure the quality of EPAs that were written for assessing internal medicine residents.

PARTICIPANTS:

Residency leadership at Mayo Clinic, Rochester participated in this study. This included the Program Director, Associate program directors and individual rotation directors.

INTERVENTIONS:

The authors reviewed salient literature. Items were developed to reflect domains of EPAs useful for assessment. The instrument underwent further testing and refinement. Each participating rotation director created EPAs that they felt would be meaningful to assess learner performance in their area. These 229 EPAs were then assessed with the QUEPA instrument to rate the quality of each EPA.

MAIN MEASURES:

Performance characteristics of the QUEPA are reported. Quality ratings of EPAs were compared to the primary ACGME competency, inpatient versus outpatient setting and specialty type.

KEY RESULTS:

QUEPA tool scores demonstrated excellent reliability (ICC range 0.72 to 0.94). Higher ratings were given to inpatient versus outpatient (3.88, 3.66; $p = 0.03$) focused EPAs. Medical knowledge EPAs scored significantly lower than EPAs assessing other competencies (3.34, 4.00; $p < 0.0001$).

CONCLUSIONS:

The QUEPA tool is supported by good validity evidence and may help in rating the quality of EPAs developed by individual programs. Programs should take care when writing EPAs for the outpatient setting or to assess medical knowledge, as these tended to be rated lower.

Reflections in a Time of Transition: Orthopaedic Faculty and Resident Understanding of Accreditation Schemes and Opinions on Surgical Skills Feedback

Gundle KR, Mickelson DT, Hanel DP. Med Educ Online. 2016 Apr 12;21:30584. doi: 10.3402/meo.v21.30584. eCollection 2016.

INTRODUCTION:

Orthopaedic surgery is one of the first seven specialties that began collecting Milestone data as part of the Accreditation Council for Graduate Medical Education's Next Accreditation System (NAS) rollout. This transition from process-based advancement to outcome-based education is an opportunity to assess resident and faculty understanding of changing paradigms, and opinions about technical skill evaluation.

METHODS:

In a large academic orthopaedic surgery residency program, residents and faculty were anonymously surveyed. A total of 31/32 (97%) residents and 29/53 (55%) faculty responded to Likert scale assessments and provided open-ended responses. An internal end-of-rotation audit was conducted to assess timeliness of evaluations. A mixed-method analysis was utilized, with nonparametric statistical testing and a constant-comparative qualitative method.

RESULTS:

There was greater familiarity with the six core competencies than with Milestones or the NAS ($p < 0.05$). A majority of faculty and residents felt that end-of-rotation evaluations were not adequate for surgical skills feedback. Fifty-eight per cent of residents reported that end-of-rotation evaluations were rarely or never filled out in a timely fashion. An internal audit demonstrated that more than 30% of evaluations were completed over a month after rotation end. Qualitative analysis included themes of resident desire for more face-to-face feedback on technical skills after operative cases, and several barriers to more frequent feedback.

DISCUSSION:

The NAS and outcome-based education have arrived. Residents and faculty need to be educated on this changing paradigm. This transition period is also a window of opportunity to address methods of evaluation and feedback. In our orthopaedic residency, trainees were significantly less satisfied than faculty with the amount of technical and surgical skills feedback being provided to trainees. The quantitative and qualitative analyses converge on one theme: a desire for frequent, explicit, timely feedback after operative cases. To overcome the time-limited clinical environment, feedback tools need to be easily integrated and efficient. Creative solutions may be needed to truly achieve outcome-based graduate medical education.

Entrustable Professional Activities: Ten Things Radiologists Do

Deitte LA, Gordon LL, Zimmerman RD, Stern EJ, McLoud TC, Diaz-Marchan PJ, Mullins ME. Acad Radiol. 2016 Mar;23(3):374-81. doi: 10.1016/j.acra.2015.11.010. Epub 2016 Jan 15.

RATIONALE AND OBJECTIVES:

Learner assessment in medical education has undergone tremendous change over the past two decades. During this time frame, the concept of Entrustable Professional Activities (EPAs) was introduced to guide the faculty when making competency-based decisions on the level of supervision required by trainees. EPAs are gaining momentum in medical education as a basis for decisions related to transitioning from residency training to clinical practice. The purpose of this article is twofold: (1) define EPAs for radiology (EPA-R) and (2) illustrate radiology-specific examples of these EPAs.

MATERIALS AND METHODS:

A multi-institutional work group composed of members of the Alliance of Directors and Vice Chairs of Education in Radiology convened at the 2015 Association of University Radiologists annual meeting to discuss radiology EPAs. The EPAs initially developed by the Accreditation Council for Graduate Medical Education (ACGME) Radiology milestone work group and the resultant ACGME Radiology milestones formed the basis for this discussion.

RESULTS:

A total of 10 radiology EPAs and illustrative vignettes were developed to help radiology educators and trainees better understand milestone assessment and how this translates to the necessary skills and responsibilities of practicing radiologists. Examples of EPA mapping to the ACGME subcompetencies and methods of assessment were included.

CONCLUSIONS:

EPAs offer an opportunity to improve our approach to training by increasing our focus on how we provide appropriate supervision to our residents and assess their progress. In this work, through suggested lists and vignettes, we have attempted to establish the framework for further discussion and development of EPA-Rs.

Comprehensive Observations of Resident Evolution: A Novel Method for Assessing Procedure-Based Residency Training

Cooney CM, Cooney DS, Bello RJ, Bojovic B, Redett RJ, Lifchez SD. *Plast Reconstr Surg*. 2016 Feb;137(2): 673-8. doi: 10.1097/01.prs.0000475797.69478.0e.

BACKGROUND:

Assessment of surgical skills in the operating room remains a challenge. Increasing documentation requirements of the Accreditation Council for Graduate Medical Education are necessitating mechanisms to document trainee competence without hindering operative turnover. The authors created a comprehensive electronic resource to facilitate plastic surgery training program compliance with changes mandated by Next Accreditation System Milestones and the ACGME.

METHODS:

In 2013, the authors implemented the Comprehensive Observations of Resident Evolution, or CORE, a Web-based tool to assess plastic surgery residents. It comprises a rapid electronic assessment of resident operating room performance completed after each surgery; a data dashboard displaying graphical summaries of resident progress by case, Milestone, or current procedural terminology code; and an electronic Milestones tracker (MileMarker), which enables ongoing trainee assessments.

RESULTS:

From January through October of 2014, 24 residents completed nearly 1300 Operative Entrustability Assessments. Thirty-eight percent of residents reported more immediate feedback regarding operative performance. The assessment demonstrates construct validity, which distinguishes novice residents from experienced residents. Individual case data identify resident-specific operative strengths and weaknesses. Using assessment data, the first two Clinical Competency Committee reviews were 81 percent and 87 percent shorter than Milestones pilot test site reports (average, 11.5 and 8 minutes versus 60 minutes per resident, respectively).

CONCLUSIONS:

Comprehensive Observations of Resident Evolution is capable of capturing operative performance data on all operating room cases by primary current procedural terminology code. It increases immediate attending/trainee feedback and assessment transparency, enables trainee self-monitoring, and informs end-of-rotation reviews, program-wide assessments, and tailoring of training to address specific needs. It is a valuable resource for tracking resident progress in real-time while maintaining compliance with evolving ACGME requirements.

Driving Care Quality: Aligning Trainee Assessment and Supervision through Practical Application of Entrustable Professional Activities, Competencies, and Milestones

Carraccio C, Englander R, Holmboe ES, Kogan JR. Acad Med. 2016 Feb;91(2):199-203. doi: 10.1097/ACM.0000000000000985.

ABSTRACT:

To address the long-standing challenge of meaningful trainee assessment, the authors reviewed and expanded on the Accountable Assessment for Quality Care and Supervision (AAQCS) equation. The equation proposes that care quality is the product of the interaction between trainee performance (measured by workplace assessment) and supervision (required level of intervention to ensure care quality) in the context of the environment where the care occurs: Trainee performance \times Appropriate supervision = Safe, effective patient-centered care. Assessing trainee performance and matching that performance to "appropriate" supervision, however, is fraught with challenges. The authors suggest a unifying framework that integrates entrustable professional activities (EPAs), competencies, and milestones to inform trainee assessment and supervision, thereby enabling the practical application of the AAQCS equation in the workplace. Because the unit of measure for an EPA is the outcome of whether the trainee can safely and effectively perform the professional activity without supervision, the proposed unifying framework directly aligns with the dependent variable in the AAQCS equation: care quality. The value of applying a unifying framework that integrates EPAs, competencies, and milestones to the AAQCS equation in the clinical learning environment lies in its ability to provide supervisors with a shared mental model of performance expectations for trainees, reducing unwanted variability and improving assessment accuracy; guidance for aligning performance milestones of trainees with the needed level of supervisor intervention to ensure care quality; and substrate for specific feedback to improve the trainee's professional development as a way to ensure future care quality.

A Pilot Study of Orthopaedic Resident Self-Assessment Using a Milestones' Survey Just Prior to Milestones Implementation

Bradley KE, Andolsek KM. Int J Med Educ. 2016 Jan 11;7:11-8. doi: 10.5116/ijme.5682.6dfd.

OBJECTIVE:

To pilot test if Orthopaedic Surgery residents could self-assess their performance using newly created milestones, as defined by the Accreditation Council on Graduate Medical Education.

METHODS:

In June 2012, an email was sent to Program Directors and administrative coordinators of the 154 accredited Orthopaedic Surgery Programs, asking them to send their residents a link to an online survey. The survey was adapted from the Orthopaedic Surgery Milestone Project. Completed surveys were aggregated in an anonymous, confidential database. SAS 9.3 was used to perform the analyses.

RESULTS:

Responses from 71 residents were analyzed. First and second year residents indicated through self-assessment that they had substantially achieved Level 1 and Level 2 milestones. Third year residents reported they had substantially achieved 30/41, and fourth year residents, all Level 3 milestones. Fifth year, graduating residents, reported they had substantially achieved 17 Level 4 milestones, and were extremely close on another 15. No milestone was rated at Level 5, the maximum possible. Earlier in training, Patient Care and Medical Knowledge milestones were rated lower than the milestones reflecting the other four competencies of Practice Based Learning and Improvement, Systems Based Practice, Professionalism, and Interpersonal Communication. The gap was closed by the fourth year.

CONCLUSIONS:

Residents were able to successfully self-assess using the 41 Orthopaedic Surgery milestones. Respondents' rate improved proficiency over time. Graduating residents report they have substantially, or close to substantially, achieved all Level 4 milestones. Milestone self-assessment may be a useful tool as one component of a program's overall performance assessment strategy.

Competency Evaluations in the Next Accreditation System: Contributing to Guidelines and Implications

Park YS, Zar FA, Norcini JJ, Tekian A. Teach Learn Med. 2016;28(2):135-45. doi: 10.1080/10401334.2016.1146607.

CONSTRUCT:

This study examines validity evidence of end-of-rotation evaluation scores used to measure competencies and milestones as part of the Next Accreditation System (NAS) of the Accreditation Council for Graduate Medical Education (ACGME).

BACKGROUND:

Since the implementation of the milestones, end-of-rotation evaluations have surfaced as a potentially useful assessment method. However, validity evidence on the use of rotation evaluation scores as part of the NAS has not been studied. This article examines validity evidence for end-of-rotation evaluations that can contribute to developing guidelines that support the NAS.

APPROACH:

Data from 2,701 end-of-rotation evaluations measuring 21 out of 22 Internal Medicine milestones for 142 residents were analyzed (July 2013-June 2014). Descriptive statistics were used to measure the distribution of ratings by evaluators (faculty, $n = 116$; fellows, $n = 59$; peer-residents, $n = 131$), by postgraduate years. Generalizability analysis and higher order confirmatory factor analysis were used to examine the internal structure of ratings. Psychometric implications for combining evaluation scores using composite score reliability were examined.

RESULTS:

Milestone ratings were significantly higher for each subsequent year of training (15/21 milestones). Faculty evaluators had greater variability in ratings across milestones, compared to fellows and residents; faculty ratings were generally correlated with milestone ratings from fellows ($r = .45$) and residents ($r = .25$), but lower correlations were found for Professionalism and Interpersonal and Communication Skills. The ϕ -coefficient was .71, indicating good reliability. Internal structure supported a 6-factor solution, corresponding to the hierarchical relationship between the milestones and the 6 core competencies. Evaluation scores corresponding to Patient Care, Medical Knowledge, and Practice-Based Learning and Improvement had higher correlations to milestones reported to the ACGME. Mean evaluation ratings predicted problem residents (odds ratio = 5.82, $p < .001$).

CONCLUSIONS:

Guidelines for rotation evaluations proposed in this study provide useful solutions that can help program directors make decisions on resident progress and contribute to assessment systems in graduate medical education.

Use of a Formal Assessment Instrument for Evaluation of Resident Operative Skills in Pediatric Neurosurgery

Hadley C, Lam SK, Briceño V, Luerssen TG, Jea A. *J Neurosurg Pediatr.* 2015 Nov;16(5):497- 504. doi: 10.3171/2015.1.PEDS14511. Epub 2015 Aug 28.

OBJECT:

Currently there is no standardized tool for assessment of neurosurgical resident performance in the operating room. In light of enhanced requirements issued by the Accreditation Council for Graduate Medical Education's Milestone Project and the Matrix Curriculum Project from the Society of Neurological Surgeons, the implementation of such a tool seems essential for objective evaluation of resident competence. Beyond compliance with governing body guidelines, objective assessment tools may be useful to direct early intervention for trainees performing below the level of their peers so that they may be given more hands-on teaching, while strong residents can be encouraged by faculty members to progress to conducting operations more independently with passive supervision. The aims of this study were to implement a validated assessment tool for evaluation of operative skills in pediatric neurosurgery and determine its feasibility and reliability.

METHODS:

All neurosurgery residents completing their pediatric rotation over a 6-month period from January 1, 2014, to June 30, 2014, at the authors' institution were enrolled in this study. For each procedure, residents were evaluated by means of a form, with one copy being completed by the resident and a separate copy being completed by the attending surgeon. The evaluation form was based on the validated Objective Structured Assessment of Technical Skills for Surgery (OSATS) and used a 5-point Likert-type scale with 7 categories: respect for tissue; time and motion; instrument handling; knowledge of instruments; flow of operation; use of assistants; and knowledge of specific procedure. Data were then stratified by faculty versus resident (self-) assessment; postgraduate year level; and difficulty of procedure. Descriptive statistics (means and SDs) were calculated, and the results were compared using the Wilcoxon signed-rank test and Student t- test. A p value < 0.05 was considered statistically significant. **RESULTS** Six faculty members, 1 fellow, and 8 residents completed evaluations for 299 procedures, including 32 ventriculoperitoneal (VP) shunt revisions, 23 VP shunt placements, 19 endoscopic third ventriculostomies, and 18 craniotomies for tumor resection. There was no significant difference between faculty and resident self-assessment scores overall or in any of the 7 domains scores for each of the involved residents. On self-assessment, senior residents scored themselves significantly higher ($p < 0.02$) than junior residents overall and in all domains except for "time and motion." Faculty members scored senior residents significantly higher than junior residents only for the "knowledge of instruments" domain ($p = 0.05$). When procedure difficulty was considered, senior residents' scores from faculty members were significantly higher ($p = 0.04$) than the scores given to junior residents for expert procedures only. Senior residents' self- evaluation scores were significantly higher than those of junior residents for both expert ($p = 0.03$) and novice ($p = 0.006$) procedures.

CONCLUSIONS:

OSATS is a feasible and reliable assessment tool for the comprehensive evaluation of neurosurgery resident performance in the operating room. The authors plan to use this tool to assess resident operative skill development and to improve direct resident feedback.

Assessing EM Patient Safety and Quality Improvement Milestones Using a Novel Debate Format

Mamtani M, Scott KR, DeRoos FJ, Conlon LW. West J Emerg Med. 2015 Nov;16(6):943-6. doi: 10.5811/westjem.2015.9.27269. Epub 2015 Nov 12.

ABSTRACT

Graduate medical education is increasingly focused on patient safety and quality improvement; training programs must adapt their curriculum to address these changes. We propose a novel curriculum for emergency medicine (EM) residency training programs specifically addressing patient safety, systems-based management, and practice-based performance improvement, called "EM Debates." Following implementation of this educational curriculum, we performed a cross-sectional study to evaluate the curriculum through resident self-assessment. Additionally, a cross-sectional study to determine the ED clinical competency committee's (CCC) ability to assess residents on specific competencies was performed. Residents were overall very positive towards the implementation of the debates. Of those participating in a debate, 71% felt that it improved their individual performance within a specific topic, and 100% of those that led a debate felt that they could propose an evidence-based approach to a specific topic. The CCC found that it was easier to assess milestones in patient safety, systems-based management, and practice-based performance improvement (sub-competencies 16, 17, and 19) compared to prior to the implementation of the debates. The debates have been a helpful venue to teach EM residents about patient safety concepts, identifying medical errors, and process improvement.

Gearing Up for Milestones in Surgery: Will Simulation Play a Role?

Gardner AK, Scott DJ, Hebert JC, Mellinger JD, Frey-Vogel A, Ten Eyck RP, Davis BR, Sillin LF 3rd, Sachdeva AK. *Surgery*. 2015 Nov;158(5):1421-7. doi: 10.1016/j.surg.2015.03.039. Epub 2015 May 23.

BACKGROUND:

The Consortium of American College of Surgeons-Accredited Education Institutes was created to promote patient safety through the use of simulation, develop new education and technologies, identify best practices, and encourage research and collaboration.

METHODS:

During the 7th Annual Meeting of the Consortium, leaders from a variety of specialties discussed how simulation is playing a role in the assessment of resident performance within the context of the Milestones of the Accreditation Council for Graduate Medical Education as part of the Next Accreditation System.

CONCLUSION:

This report presents experiences from several viewpoints and supports the utility of simulation for this purpose.

Direct Observation Assessment of Milestones: Problems with Reliability

Schott M, Kedia R, Promes SB, Swoboda T, O'Rourke K, Green W, Liu R, Stansfield B, Santen SA. West J Emerg Med. 2015 Nov;16(6):871-6. doi: 10.5811/westjem.2015.9.27270. Epub 2015 Oct 22.

INTRODUCTION:

Emergency medicine (EM) milestones are used to assess residents' progress. While some milestone validity evidence exists, there is a lack of standardized tools available to reliably assess residents.

Inherent to this is a concern that we may not be truly measuring what we intend to assess. The purpose of this study was to design a direct observation milestone assessment instrument supported by validity and reliability evidence. In addition, such a tool would further lend validity evidence to the EM milestones by demonstrating their accurate measurement.

METHODS:

This was a multi-center, prospective, observational validity study conducted at eight institutions. The Critical Care Direct Observation Tool (CDOT) was created to assess EM residents during resuscitations. This tool was designed using a modified Delphi method focused on content, response process, and internal structure validity. Paying special attention to content validity, the CDOT was developed by an expert panel, maintaining the use of the EM milestone wording. We built response process and internal consistency by piloting and revising the instrument. Raters were faculty who routinely assess residents on the milestones. A brief training video on utilization of the instrument was completed by all. Raters used the CDOT to assess simulated videos of three residents at different stages of training in a critical care scenario. We measured reliability using Fleiss' kappa and interclass correlations.

RESULTS:

Two versions of the CDOT were used: one used the milestone levels as global rating scales with anchors, and the second reflected a current trend of a checklist response system. Although the raters who used the CDOT routinely rate residents in their practice, they did not score the residents' performances in the videos comparably, which led to poor reliability. The Fleiss' kappa of each of the items measured on both versions of the CDOT was near zero.

CONCLUSION:

The validity and reliability of the current EM milestone assessment tools have yet to be determined. This study is a rigorous attempt to collect validity evidence in the development of a direct observation assessment instrument. However, despite strict attention to validity evidence, inter-rater reliability was low. The potential sources of reducible variance include rater- and instrument-based error. Based on this study, there may be concerns for the reliability of other EM milestone assessment tools that are currently in use.

Pathology Milestones: Assessing Clinical Competency by Committee

Klutts JS, Guerin LA, Bruch LA, Firchau DJ, Knudson CM, Rosenthal NS, Samuelson MI, Jensen CS, Delwiche JL, Krasowski MD. Acad Pathol. 2015 Oct 29;2(4):2374289515614003. doi: 10.1177/2374289515614003. eCollection 2015 Oct-Dec.

ABSTRACT:

All Accreditation Council for Graduate Medical Education accredited pathology residency training programs are now required to evaluate residents using the new Pathology Milestones assessment tool. Similar to implementation of the 6 Accreditation Council for Graduate Medical Education competencies a decade ago, there have been challenges in implementation of the new milestones for many residency programs. The pathology department at the University of Iowa has implemented a process that divides the labor of the task in rating residents while also maintaining consistency in the process. The process is described in detail, and some initial trends in milestone evaluation are described and discussed. Our experience indicates that thoughtful implementation of the Pathology Milestones can provide programs with valuable information that can inform curricular changes.

Navigating the Next Accreditation System: A Dashboard for the Milestones

Johna S, Woodward B. Perm J. 2015 Fall;19(4):61-3. doi: 10.7812/TPP/15-041.

INTRODUCTION:

In July 2014, all residency programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) were enrolled in a new system called the Next Accreditation System. Residency programs may not be clear on how best to comply with these new accreditation requirements. Large amounts of data must be collected, evaluated, and submitted twice a year to the council's Web-based data collection system. One challenge is that the new "end-of-rotation" evaluations must reflect specialty-specific milestones, on which many faculty members are not well versed. Like other residency programs, we tried to address the challenges using our local resources.

METHODS:

We used our existing electronic goals and objectives for each rotation coupled with appropriate end-of-rotation evaluations reflecting the specialty-specific milestones through a process of editing and mapping.

RESULTS:

Data extracted from these evaluations were added to an interactive dashboard that also contained evaluations on additional program-specific modifiers of residents' performance. A resident's final overall performance was visually represented on a plot graph. The novel dashboard included features to save evaluations for future comparisons and to track residents' progress during their entire training. It proved simple to use and was able to reduce the time needed for each resident evaluation to 5 to 10 minutes.

CONCLUSION:

This tool has made it much easier and less challenging for the members of our Clinical Competency Committee to start deliberation about each resident's performance.

Interprofessional Collaboration Milestones: Advocating for Common Assessment Criteria in Graduate Medical Education

Wingo MT, Havyer RD, Comfere NI, Nelson DR, Reed DA. BMC Med Educ. 2015 Sep 14;15:149. doi: 10.1186/s12909-015-0432-0.

BACKGROUND:

Milestone-based assessments of resident physicians inform critical decisions regarding resident competence and advancement. Thus, it is essential that milestone evaluations are based upon strong validity evidence and that consistent evaluation criteria are used across residency programs. A common approach to assessment of interprofessional collaboration milestones is particularly important since standardized measures of individual resident competence in interprofessional collaboration have not been established.

DISCUSSION:

We propose that assessments of interprofessional collaboration in graduate medical education meet common criteria, namely, these assessments should: 1) measure competency of an individual resident, 2) occur in the context of an interprofessional team, 3) be ascertained via direct observation of the resident, 4) be performed in a real-world clinical practice setting (such as a hospital ward, outpatient clinic, or operating room). We present the evidence-based rationale for these criteria and cite examples of published assessment instruments that fulfill one or more of the criteria, however further research is needed to ensure fidelity of assessments. The proposed criteria may assist residency educators as they endeavor to provide robust and consistent assessments of interprofessional collaboration milestones.

Development and Validation of an Assessment of Regional Anesthesia Ultrasound Interpretation Skills

Woodworth GE, Carney PA, Cohen JM, Kopp SL, Vokach-Brodsky LE, Horn JL, Missair A, Banks SE, Dieckmann NF, Maniker RB. *Reg Anesth Pain Med*. 2015 Jul-Aug;40(4):306-14. doi: 10.1097/AAP.0000000000000236.

BACKGROUND:

Interpretation of ultrasound images and knowledge of anatomy are essential skills for ultrasound-guided peripheral nerve blocks. Competency-based educational models promoted by the Accreditation Council for Graduate Medical Education require the development of assessment tools for the achievement of different competency milestones to demonstrate the longitudinal development of skills that occur during training.

METHODS:

A rigorous study guided by psychometric principles was undertaken to identify and validate the domains and items in an assessment of ultrasound interpretation skills for regional anesthesia. A survey of residents, academic faculty, and community anesthesiologists, as well as video recordings of experts teaching ultrasound-guided peripheral nerve blocks, was used to develop short video clips with accompanying multiple choice-style questions. Four rounds of pilot testing produced a 50-question assessment that was subsequently administered online to residents, fellows, and faculty from multiple institutions.

RESULTS:

Test results from 90 participants were analyzed with Item Response Theory model fitting indicating that a 47-item subset of the test fits the model well ($P = 0.11$). There was a significant linear relation between expected and predicted item difficulty ($P < 0.001$). Overall test scores increased linearly with higher levels of formal anesthesia training, regional anesthesia training, number of ultrasound-guided blocks performed per year, and a self-rating of regional anesthesia skill (all $P < 0.001$).

CONCLUSIONS:

This study provides evidence for the reliability, content validity, and construct validity of a 47-item multiple choice-style online test of ultrasound interpretation skills for regional anesthesia, which can be used as an assessment of competency milestone achievement in anesthesiology training.

Developing a Comprehensive Resident Education Evaluation System in the Era of Milestone Assessment

Gardner AK, Scott DJ, Choti MA, Mansour JC. J Surg Educ. 2015 Jul-Aug;72(4):618-24. doi: 10.1016/j.jsurg.2014.12.007. Epub 2015 Jan 23.

OBJECTIVES:

In an effort to move training programs toward competency-based education, the Accreditation Council for Graduate Medical Education (ACGME) introduced the Next Accreditation System (NAS), which organizes specific milestones regarding resident skills, knowledge, and abilities along a continuum. In order to foster innovation and creativity, the ACGME has provided programs with minimal guidelines regarding the optimal way to approach these milestones.

METHODS:

The education team at UT Southwestern embraced the milestones and developed a process in which performance assessment methods were critically evaluated, mapped onto an extrapolated performance list corresponding to the areas required by the ACGME milestones, and filled gaps in the previous system by modifying evaluation tools and creating new program components.

RESULTS:

Although the authors are early in the evolution of applying the new milestones system, this approach has thus far allowed them to comprehensively evaluate the residents and the program in an efficient and effective fashion, with notable improvements compared to the prior approach.

CONCLUSIONS:

The authors hope that these experiences can inform others embarking upon similar journeys with the milestones.

Implementation of Nephrology Subspecialty Curricular Milestones

Yuan CM, Prince LK, Oliver JD 3rd, Abbott KC, Nee R. Am J Kidney Dis. 2015 Jul;66(1):15-22. doi: 10.1053/j.ajkd.2015.01.020. Epub 2015 Mar 12.

ABSTRACT:

Beginning in the 2014-2015 training year, the US Accreditation Council for Graduate Medical Education (ACGME) required that nephrology Clinical Competency Committees assess fellows' progress toward 23 subcompetency "context nonspecific" internal medicine subspecialty milestones. Fellows' advancement toward the "ready for unsupervised practice" target milestone now is tracked in each of the 6 competencies: Patient Care, Medical Knowledge, Professionalism, Interpersonal Communication Skills, Practice-Based Learning and Improvement, and Systems-Based Practice. Nephrology program directors and subspecialty societies must define nephrology-specific "curricular milestones," mapped to the nonspecific ACGME milestones. Although the ACGME goal is to produce data that can discriminate between successful and underperforming training programs, the approach is at risk to produce biased, inaccurate, and unhelpful information. We map the ACGME internal medicine subspecialty milestones to our previously published nephrology-specific milestone schema and describe entrustable professional activities and other objective assessment tools that inform milestone decisions. Mapping our schema onto the ACGME subspecialty milestone reporting form allows comparison with the ACGME subspecialty milestones and the curricular milestones developed by the American Society of Nephrology Program Directors. Clinical Competency Committees may easily adapt and directly translate milestone decisions reached using our schema onto the ACGME internal medicine subspecialty competency milestone-reporting format.

Piloting a Structured Practice Audit to Assess ACGME Milestones in Written Handoff Communication in Internal Medicine

Farnan JM, McConville JF, Arora VM. J Grad Med Educ. 2015 Jun;7(2):238-41. doi: 10.4300/JGME-D-14-00482.1.

BACKGROUND:

Written communication skills are integral to patient care handoffs. Residency programs require feasible assessment tools that provide timely formative and summative feedback, ideally linked to the Accreditation Council for Graduate Medical Education Milestones.

OBJECTIVE:

We describe the use of 1 such tool-UPDATED-to assess written handoff communication skills in internal medicine interns.

METHODS:

During 2012-2013, the authors piloted a structured practice audit at 1 academic institution to audit written sign-outs completed by 45 interns, using the UPDATED tool, which scores 7 aspects of sign-out communication linked to milestones. Intern sign-outs were audited by trained faculty members throughout the year. Results were incorporated into intern performance reviews and Clinical Competency Committees.

RESULTS:

A total of 136 sign-outs were audited (averaging 3.1 audits per intern). In the first trimester, 14 interns (31%) had satisfactory audit results. Five interns (11%) had critical deficiencies and received immediate feedback, and the remaining 26 (58%) were assigned future audits due to missing audits or unsatisfactory scores. In the second trimester, 21 interns (68%) had satisfactory results, 1 had critical deficiencies, and 9 (29%) required future audits. Nine of the 10 remaining interns in the final trimester had satisfactory audits. Faculty time was estimated at 10 to 15 minutes per sign-out audited.

CONCLUSIONS:

The UPDATED audit is a milestone-based tool that can be used to assess written sign-out communication skills in internal medicine residency programs. Future work is planned to adapt the tool for use by senior supervisory residents to appraise sign-outs in real time.

Use of Emergency Medicine Milestones as Items on End-of-Shift Evaluations Results in Overestimates of Residents' Proficiency Level

Dehon E, Jones J, Puskarich M, Sandifer JP, Sikes K. J Grad Med Educ. 2015 Jun;7(2):192-6. doi: 10.4300/JGME-D-14-00438.1.

BACKGROUND:

The emergency medicine milestones were developed to provide more objective resident assessment than current methods. However, little is known about the best practices for applying the milestones in resident assessment.

OBJECTIVE:

We examined the utility of end-of-shift evaluations (ESEs) constructed using the milestones in resident assessment.

METHODS:

We developed 14 daily ESEs, each of which included 9 or 10 emergency medicine milestones. Postgraduate year (PGY)-1 and PGY-2 residents were assessed on milestone levels 1 through 3; PGY-3 and PGY-4 residents were assessed on levels 3 through 5. Each milestone was rated on a nominal scale (yes, no, or not applicable). The Clinical Competency Committee combined the ESE data with data from other assessments to determine each resident's proficiency level for the emergency medicine subcompetencies. We used descriptive statistics to summarize resident ESEs and milestone levels. We analyzed differences in ESE score across PGY levels using t tests and analyses of variance.

RESULTS:

Faculty completed 763 ESEs on 33 residents with a range of 2 to 54 (median=22) ESEs per resident. Faculty rarely (8%, 372 of 4633) rated a resident as not achieving a milestone on the ESEs. Analyses of variance revealed that ESE scores on level 3 milestones did not differ significantly by PGY level. There was poor agreement between ESE scores and Clinical Competency Committee ratings.

CONCLUSIONS:

The ESEs constructed using the milestones resulted in grade or milestone inflation. Our results do not support using milestones as a stand-alone assessment tool.

Clinical Assessment and Management Examination—Outpatient (CAMEO): Its Validity and Use in a Surgical Milestones Paradigm

Wilson AB, Choi JN, Torbeck LJ, Mellinger JD, Dunnington GL, Williams RG. *J Surg Educ.* 2015 Jan-Feb;72(1):33-40. doi: 10.1016/j.j Surg.2014.06.010. Epub 2014 Jul 24.

OBJECTIVES:

Clinical Assessment and Management Examination--Outpatient (CAMEO) is a metric for evaluating the clinical performance of surgery residents. The aim of this study was to investigate the measurement characteristics of CAMEO and propose how it might be used as an evaluation tool within the general surgery milestones project.

DESIGN:

A total of 117 CAMEO evaluations were gathered and used for analysis. Internal consistency reliability was estimated, and item characteristics were explored. A Kruskal-Wallis procedure was performed to discern how well the instrument discriminated between training levels. An exploratory factor analysis was also conducted to understand the dimensionality of the evaluation.

SETTING:

CAMEO evaluations were collected from 2 departments of surgery geographically located in the Midwestern United States. Combined, the participating academic institutions graduate approximately 18 general surgery residents per year.

PARTICIPANTS:

In this retrospective data analysis, the number of evaluations per resident ranged from 1 to 7, and evaluations were collected from 2006 to 2013. For the purpose of data analysis, residents were classified as interns (postgraduate year 1 [PGY1]), juniors (PGY2-3), or seniors (PGY4-5).

RESULTS:

CAMEO scores were found to have high internal consistency (Cronbach's $\alpha = 0.96$), and all items were highly correlated (≥ 0.86) to composite CAMEO scores. Scores discriminated between senior residents (PGY4-5) and lower level residents (PGY1-3). Per an exploratory factor analysis, CAMEO was revealed to measure a single dimension of "clinical competence."

CONCLUSIONS:

The findings of this research aligned with related literature and verified that CAMEO scores have desirable measurement properties, making CAMEO an attractive resource for evaluating the clinical performance of surgery residents.

A Faculty Development Program to Reduce Rater Error on Milestone-Based Assessments

Raj JM, Thorn, PM. Journal of Graduate Medical Education. December 2014. doi:
<http://dx.doi.org/10.4300/JGME-D-14-00161.1>

BACKGROUND:

Rater errors, such as halo/reverse halo, range restriction, and leniency errors, are frequently cited as threats to the validity of resident assessment by faculty.

OBJECTIVE:

We studied whether participation in faculty development on the use of a new Milestone-based assessment tool reduced rater error for participants compared to individuals who did not participate.

METHODS:

We reviewed evaluations of resident Milestones completed by faculty at the end of rotations between July 2012 and June 2013. The 2 Milestones in each competency with the greatest number of ratings were selected for analysis.

RESULTS:

A total of 412 evaluations were analyzed, including 217 completed by faculty who participated in the development activity, and 240 completed by nonparticipant faculty. All evaluations that contained identical scores for all Milestones (16%) were completed by nonparticipant faculty ($\chi^2 = 37.498$, $P, .001$). Faculty who had participated in development assigned a wider range of scores and lower minimum scores to residents, and provided the highest ratings for residents less frequently ($P, .001$) than nonparticipants.

CONCLUSIONS:

Faculty who participated in education about the Milestones demonstrated significantly less halo, range restriction, and leniency errors than faculty members who did not participate. These findings support a recommendation to develop a cadre of "core faculty" by training them in the use of Milestone assessment tools, and making them responsible for a significant portion of resident assessments.

Immediate Surgical Skills Feedback in the Operating Room Using "SurF" Cards

Connolly A, Hansen D, Schuler K, Galvin SL, Wolfe H. J Grad Med Educ. 2014 Dec;6(4):774-8. doi: 10.4300/JGME-D-14-00132.

BACKGROUND:

Ensuring residents develop operative skills requires application of the principles of guided learning, deliberate practice, and directed feedback.

OBJECTIVE:

We sought to create and implement a tool to promote procedural "key" step review and immediate feedback on surgical skills, and examined faculty and resident satisfaction with surgical skills feedback.

METHODS:

We created surgical skills feedback (SurF) cards for 8 gynecologic procedures. Faculty/fellows and residents completed prestudy surveys querying frequency of preoperative key step review and satisfaction with surgical skill feedback, a SurF card each time 1 of 8 procedures was performed, and poststudy surveys to evaluate for changes.

RESULTS:

Prestudy surveys were completed by 31 faculty/fellows and 20 residents, with 55% (17 of 31) of the faculty/fellows and 5% (1 of 20) of the residents reporting key step review before surgery. All reported low satisfaction rates with feedback frequency, quality, and timeliness. After implementation of SurF cards, preoperative key step review occurred in 78% (82 of 105) of the procedures. Twenty-one faculty/fellows (68%) and 16 residents (80%) completed our poststudy survey. Faculty/fellows reported statistically similar key step review ($n = 15$ [71%], $P = .23$), while residents reported that key step review had significantly improved ($n = 6$ [38%], $P = .01$). Resident satisfaction with feedback frequency (5% to 50%, $P = .002$) and quality (15% to 50%, $P = .02$) increased significantly.

CONCLUSIONS:

The SurF cards we developed facilitated procedural key step review, were associated with significantly improved resident satisfaction with surgical feedback, and could prove helpful with outcomes assessments, such as Accreditation Council for Graduate Medical Education-required documentation of Milestone attainment.

Assessment of Resident Operative Performance Using a Real-Time Mobile Web System: Preparing for the Milestone Age

Wagner JP, Chen DC, Donahue TR, Quach C, Hines OJ, Hiatt JR, Tillou A. J Surg Educ. 2014 Nov-Dec;71(6):e41-6. doi: 10.1016/j.jsurg.2014.06.008. Epub 2014 Jul 16.

OBJECTIVE:

To satisfy trainees' operative competency requirements while improving feedback validity and timeliness using a mobile Web-based platform.

DESIGN:

The Southern Illinois University Operative Performance Rating Scale (OPRS) was embedded into a website formatted for mobile devices. From March 2013 to February 2014, faculty members were instructed to complete the OPRS form while providing verbal feedback to the operating resident at the conclusion of each procedure. Submitted data were compiled automatically within a secure Web-based spreadsheet. Conventional end-of-rotation performance (CERP) evaluations filed 2006 to 2013 and OPRS performance scores were compared by year of training using serial and independent-samples t tests. The mean CERP scores and OPRS overall resident operative performance scores were directly compared using a linear regression model. OPRS mobile site analytics were reviewed using a Web-based reporting program.

SETTING:

Large university-based general surgery residency program.

PARTICIPANTS:

General Surgery faculty used the mobile Web OPRS system to rate resident performance. Residents and the program director reviewed evaluations semiannually.

RESULTS:

Over the study period, 18 faculty members and 37 residents logged 176 operations using the mobile OPRS system. There were 334 total OPRS website visits. Median time to complete an evaluation was 45 minutes from the end of the operation, and faculty spent an average of 134 seconds on the site to enter 1 assessment. In the 38,506 CERP evaluations reviewed, mean performance scores showed a positive linear trend of 2% change per year of training ($p = 0.001$). OPRS overall resident operative performance scores showed a significant linear ($p = 0.001$), quadratic ($p = 0.001$), and cubic ($p = 0.003$) trend of change per year of clinical training, reflecting the resident operative experience in our training program. Differences between postgraduate year-1 and postgraduate year-5 overall performance scores were greater with the OPRS (mean = 0.96, CI: 0.55-1.38) than with CERP measures (mean = 0.37, CI: 0.34-0.41).

Additionally, there were consistent increases in each of the OPRS subcategories.

CONCLUSIONS:

In contrast to CERPs, the OPRS fully satisfies the Accreditation Council for Graduate Medical Education and American Board of Surgery operative assessment requirements. The mobile Web platform provides a convenient interface, broad accessibility, automatic data compilation, and compatibility with common database and statistical software. Our mobile OPRS system encourages candid feedback dialog and generates a comprehensive review of individual and group-wide operative proficiency in real time.

Entrustable Professional Activities: Making Sense of the Emergency Medicine Milestones

Beeson MS, Warrington S, Bradford-Saffles A, Hart D. J Emerg Med. 2014 Oct;47(4):441-52. doi: 10.1016/j.jemermed.2014.06.014. Epub 2014 Aug 7.

BACKGROUND:

The Next Accreditation System (NAS) is being implemented by the Accreditation Council for Graduate Medical Education with seven specialties, including Emergency Medicine (EM), which began in July 2013. The NAS represents a more structured method of accreditation, with dependence on outcomes and less emphasis on educational process. A key component of the NAS is the individual resident semiannual reporting of the Milestone proficiency levels for all sub-competencies, which are more specific areas of domain for the general competencies. All specialties are struggling to some extent with developing assessment mechanisms for the Milestones. At the heart of this struggle is the conceptualization of the Milestones themselves- descriptors of the individual. In practice, faculty assess clinical care provided to the patient by the resident. This creates difficulty for faculty to assign a resident to a specific sub-competency proficiency level when their focus has been on assessment of clinical care.

OBJECTIVES:

The objectives of this article include the discussion of whether Entrustable Professional Activities (EPAs) could be defined and linked to milestones in a way that, once implemented, could inform Clinical Competency Committees of the Milestone proficiency reporting.

DISCUSSION:

EPAs are units of professional work, or clinical care that may help translate aspects of clinical care into Milestone proficiencies. This article explores EPAs in depth, and discusses how EPAs may be used within EM as one method of assigning proficiency levels to residents.

CONCLUSIONS:

EPAs may be a useful tool to inform Milestone proficiency placement of residents. Because EPAs are based on clinical descriptions rather than individual physician descriptions, there may be less faculty development needed for Milestone sub-competency assessment.

Entrustment and Mapping of Observable Practice Activities for Resident Assessment

Warm EJ, Mathis BR, Held JD, Pai S, Tolentino J, Ashbrook L, Lee CK, Lee D, Wood S, Fichtenbaum CJ, Schauer D, Munyon R, Mueller C. J Gen Intern Med. 2014 Aug;29(8):1177-82. doi: 10.1007/s11606-014-2801-5. Epub 2014 Feb 21.

ABSTRACT:

Entrustable Professional Activities (EPAs) and the Next Accreditation System reporting milestones reduce general competencies into smaller evaluable parts. However, some EPAs and reporting milestones may be too broad to use as direct assessment tools. We describe our internal medicine residency curriculum and assessment system, which uses entrustment and mapping of observable practice activities (OPAs) for resident assessment. We created discrete OPAs for each resident rotation and learning experience. In combination, these serve as curricular foundation and tools for assessment. OPA performance is measured via a 5-point entrustment scale, and mapped to milestones and EPAs. Entrustment ratings of OPAs provide an opportunity for immediate structured feedback of specific clinical skills, and mapping OPAs to milestones and EPAs can be used for longitudinal assessment, promotion decisions, and reporting. Direct assessment and demonstration of progressive entrustment of trainee skill over time are important goals for all training programs. Systems that use OPAs mapped to milestones and EPAs provide the opportunity for achieving both, but require validation.

Assessing Competency in Practice-Based Learning: A Foundation for Milestones in Learning Portfolio Entries

Webb TP, Merkley TR, Wade TJ, Simpson D, Yudkowsky R, Harris I. J Surg Educ. 2014 Jul-Aug;71(4): 472-9. doi: 10.1016/j.jsurg.2014.01.019. Epub 2014 Apr 26.

BACKGROUND:

Graduate medical education is undergoing a dramatic shift toward competency-based assessment of learners. Competency assessment requires clear definitions of competency and validated assessment methods. The purpose of this study is to identify criteria used by surgical educators to judge competence in Practice-Based Learning and Improvement (PBL&I) as demonstrated in learning portfolios.

METHODS:

A total of 6 surgical learning and instructional portfolio entries served as documents to be assessed by 3 senior surgical educators. These faculty members were asked to rate and then identify criteria used to assess PBL&I competency. Individual interviews and group discussions were conducted, recorded, and transcribed to serve as the study dataset. Analysis was performed using qualitative methodology to identify themes for the purpose of defining competence in PBL&I. The assessment themes derived are presented with narrative examples to describe the progression of competency.

RESULTS:

The collaborative coding process resulted in identification of 7 themes associated with competency in PBL&I related to surgical learning and instructional portfolio entries: (1) self-awareness regarding effect of actions; (2) identification and thorough description of learning goals; (3) cases used as catalyst for reflection; (4) reconceptualization with appropriate use and critique of cited literature; (5) communication skills/completeness of entry template; (6) description of future behavioral change; and (7) engagement in process--identifies as personally relevant.

CONCLUSIONS:

The identified themes are consistent with and complement other criteria emerging from reflective practice literature and experiential learning theory. This study provides a foundation for further development of a tool for assessing learner portfolios consistent with the Accreditation Council for Graduate Medical Education's Next Accreditation System requirements.

Programmatic Assessment of Level 1 Milestones in Incoming Interns

Hauff SR, Hopson LR, Losman E, Perry MA, Lypson ML, Fischer J, Santen SA. Acad Emerg Med. 2014 Jun;21(6):694-8. doi: 10.1111/acem.12393.

OBJECTIVES:

With the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System, emergency medicine (EM) residency programs will be required to report residents' progress through the EM milestones. The milestones include five progressively advancing skill levels, with Level 1 defining the skill set of a medical school graduate and Level 5, that of an attending physician. The ACGME stresses that multiple forms of assessment should be used to ensure capture of the multifaceted competencies. The objective of this study was to determine the feasibility and results of programmatic assessment of Level 1 milestones using multisource assessments for incoming EM interns in July.

METHODS:

The study population was interns starting in 2012 and 2013. Interns' Level 1 milestone assessment was done with four distinct methods: 1) the postgraduate orientation assessment (POA) by the Graduate Medical Education Office for all incoming interns (this multistation examination covers nine of the EM milestones and includes standardized patient cases, task completion, and computer-based stations); 2) direct observation of patient encounters by core faculty using a milestones-based clinical skills competency checklist; 3) the global monthly assessment at the end of the intern orientation month that was updated to reflect the EM milestones; and 4) faculty assessment during procedural labs. These occurred during the July orientation month that included the POA, clinical shifts, didactic sessions, and procedure labs.

RESULTS:

In the POA, interns were competent in 48% to 93% of the milestones assessed. Overall, competency was 70% to 80%, with low scores noted in aseptic technique (patient care Milestone 13 [PC13]) and written and verbal hand-off (interpersonal communications skills [ICS] 2). In overall communication, 70% of interns demonstrated competency. In excess of 80% demonstrated competency in critical values interpretation (PC3), informed consent (PC9), pain assessment (PC11), and geriatric functional assessment (PC3). On direct observation, almost all Level 1 milestones were achieved (93% to 100%); however, only 78% of interns achieved competency in pharmacotherapy (PC5). On global monthly evaluations, all interns met Level 1 milestones.

CONCLUSIONS:

A multisource assessment of EM milestones is feasible and useful to determine Level 1 milestones achievement for incoming interns. A structured assessment program, used in conjunction with more traditional forms of evaluation such as global monthly evaluations and direct observation, is useful for identifying deficits in new trainees and may be able inform the creation of early intervention programs.

Complexity in Graduate Medical Education: A Collaborative Education Agenda for Internal Medicine and Geriatric Medicine

Chang A, Fernandez H, Cayea D, Chheda S, Paniagua M, Eckstrom E, Day H. J Gen Intern Med. 2014 Jun;29(6):940-6. doi: 10.1007/s11606-013-2752-2.

ABSTRACT:

Internal medicine residents today face significant challenges in caring for an increasingly complex patient population within ever-changing education and health care environments. As a result, medical educators, health care system leaders, payers, and patients are demanding change and accountability in graduate medical education (GME). A 2012 Society of General Internal Medicine (SGIM) retreat identified medical education as an area for collaboration between internal medicine and geriatric medicine. The authors first determined a short-term research agenda for resident education by mapping selected internal medicine reporting milestones to geriatrics competencies, and listing available sample learner assessment tools. Next, the authors proposed a strategy for long-term collaboration in three priority areas in clinical medicine that are challenging for residents today: (1) team-based care, (2) transitions and readmissions, and (3) multi-morbidity. The short-term agenda focuses on learner assessment, while the long-term agenda allows for program evaluation and improvement. This model of collaboration in medical education combines the resources and expertise of internal medicine and geriatric medicine educators with the goal of increasing innovation and improving outcomes in GME targeting the needs of our residents and their patients.

Putting the Pediatrics Milestones into Practice: A Consensus Roadmap and Resource Analysis

Schumacher DJ, Spector ND, Calaman S, West DC, Cruz M, Frohna JG, Gonzalez Del Rey J, Gustafson KK, Poynter SE, Rosenbluth G, Southgate WM, Vinci RJ, Sectish TC. *Pediatrics*. 2014 May;133(5):898-906. doi: 10.1542/peds.2013-2917. Epub 2014 Apr 14.

ABSTRACT:

The Accreditation Council for Graduate Medical Education has partnered with member boards of the American Board of Medical Specialties to initiate the next steps in advancing competency-based assessment in residency programs. This initiative, known as the Milestone Project, is a paradigm shift from traditional assessment efforts and requires all pediatrics residency programs to report individual resident progression along a series of 4 to 5 developmental levels of performance, or milestones, for individual competencies every 6 months beginning in June 2014. The effort required to successfully make this shift is tremendous given the number of training programs, training institutions, and trainees. However, it holds great promise for achieving training outcomes that align with patient needs; developing a valid, reliable, and meaningful way to track residents' development; and providing trainees with a roadmap for learning. Recognizing the resources needed to implement this new system, the authors, all residency program leaders, provide their consensus view of the components necessary for implementing and sustaining this effort, including resource estimates for completing this work. The authors have identified 4 domains: (1) Program Review and Development of Stakeholders and Participants, (2) Assessment Methods and Validation, (3) Data and Assessment System Development, and (4) Summative Assessment and Feedback.

This work can serve as a starting point and framework for collaboration with program, department, and institutional leaders to identify and garner necessary resources and plan for local and national efforts that will ensure successful transition to milestones-based assessment.

Integrating the NAS Milestones and Handheld Technology to Improve Residency Training and Assessment

Cooney CM, Redett III RJ, Dorafshar AH, Zarrabi B, Lifchez SD. Journal of Surgical Education. 2014;(1): 39. DOI 10.1016/j.jsurg.2013.09.019

OBJECTIVE:

To incorporate the use of an intuitive and robust assessment tool in conjunction with the Next Accreditation System Milestones to maximize opportunities for trainee performance feedback and continuous trainee assessment, with the long-term goal of increasing the rate of performance improvement and mastery of knowledge and surgical skills.

DESIGN:

Pilot study.

SETTING:

Johns Hopkins Medicine, Baltimore, MD. Primary, tertiary, and quaternary clinical care; institutional environment.

PARTICIPANTS:

Experimental group: two randomly selected postgraduate year-1 integrated training program residents per year for 2 consecutive years from the Department of Plastic and Reconstructive Surgery.

CONTROL GROUP:

Traditionally trained residents from the integrated training program in the Department of Plastic and Reconstructive Surgery. Study duration: 7 years (until residents complete residency training).

ANTICIPATED RESULTS:

This assessment strategy would create large amounts of informative data on trainees, which can be cross-referenced to determine trainee progress. Assessment data would be collected continuously from all faculty surgeons. Comparisons of faculty and resident self-assessments would facilitate resident evaluations. Ease of use of the data collection structure would improve faculty evaluation compliance and timely resident case report completion.

CONCLUSIONS:

Improving the efficiency and efficacy of competency documentation is critical. Using portable technologies is an intuitive way to improve the trainee assessment process. We anticipate that this 2-pronged approach to trainee assessments would quickly provide large amounts of informative data to better assess trainee progress and inform Milestone assessments in a manner that facilitates immediate feedback. Assessments of faculty and resident satisfaction would help us further refine the assessment process as needed. If successful, this format could easily be implemented by other training programs.

Initial Performance of a Modified Milestones Global Evaluation Tool for Semiannual Evaluation of Residents by Faculty

Borman KR, Augustine R, Leibrandt T, Pezzi CM, Kukora JS. J Surg Educ. 2013 Nov- Dec;70(6):739-49. doi: 10.1016/j.jsurg.2013.08.004.

OBJECTIVES:

To determine whether faculty could successfully evaluate residents using a competency-based modified Milestones global evaluation tool.

DESIGN:

A program's leadership team modified a draft Surgery Milestones Working Group summative global assessment instrument into a modified Milestones tool (MMT) for local use during faculty meetings devoted to semiannual resident review. Residents were scored on 15 items spanning all competencies using an 8-point graphic response scale; unstructured comments also were solicited. Arithmetic means were computed at the resident and postgraduate year cohort levels for items and competency item sets. Score ranges (highest minus lowest score) were calculated; variability was termed "low" (range <2.0 points), "moderate" (range = 2.0), or "high" (range >2.0). A subset of "low" was designated "small" (1.0-1.9). Trends were sought among item, competency, and total Milestones scores. MMT correlations with examination scores and multisource (360°) assessments were explored. The success of implementing MMT was judged using published criteria for educational assessment methods.

SETTING:

Fully accredited, independently sponsored residency.

PARTICIPANTS:

Program leaders and 22 faculty members (71% voluntary, mean 12y of experience).

RESULTS:

Twenty-six residents were assessed, yielding 7 to 13 evaluations for MMT per categorical resident and 3 to 6 per preliminary trainee. Scores spanned the entire response scale. All MMT evaluations included narrative comments. Individual resident score variability was low (96% within competencies and 92% across competencies). Subset analysis showed that small variations were common (35% within competencies and 54% across competencies). Postgraduate year cohort variability was higher (61% moderate or high within competencies and 50% across competencies). Cohort scores at the item, competency, and total score levels exhibited rising trajectories, suggesting MMT construct validity. MMT scores did not demonstrate concurrent validity, correlating poorly with other metrics. The MMT met multiple criteria for good assessment.

CONCLUSIONS:

A modified Milestones global evaluation tool can be successfully adopted for semiannual assessments of resident performance by volunteer faculty members.

Early Feedback on the Use of the Internal Medicine Reporting Milestones in Assessment of Resident Performance

Aagaard E, Kane GC, Conforti L, Hood S, Caverzagie KJ, Smith C, Chick DA, Holmboe ES, Iobst WF. J Grad Med Educ. 2013 Sep;5(3):433-8

BACKGROUND:

The educational milestones were designed as a criterion-based framework for assessing resident progression on the 6 Accreditation Council for Graduate Medical Education competencies.

OBJECTIVE:

We obtained feedback on, and assessed the construct validity and perceived feasibility and utility of, draft Internal Medicine Milestones for Patient Care and Systems-Based Practice.

METHODS:

All participants in our mixed-methods study were members of competency committees in internal medicine residency programs. An initial survey assessed participant and program demographics; focus groups obtained feedback on the draft milestones and explored their perceived utility in resident assessment, and an exit survey elicited input on the value of the draft milestones in resident assessment. Surveys were tabulated using descriptive statistics. Conventional content analysis method was used to assess the focus group data.

RESULTS:

Thirty-four participants from 17 programs completed surveys and participated in 1 of 6 focus groups. Overall, the milestones were perceived as useful in formative and summative assessment of residents. Participants raised concerns about the length and complexity of some draft milestones and suggested specific changes. The focus groups also identified a need for faculty development. In the exit survey, most participants agreed that the Patient Care and Systems-Based Practice Milestones would help competency committees assess trainee progress toward independent practice.

CONCLUSIONS:

Draft reporting milestones for 2 competencies demonstrated significant construct validity in both the content and response process and the perceived utility for the assessment of resident performance. To ensure success, additional feedback from the internal medicine community and faculty development will be necessary.

Playing with Curricular Milestones in the Educational Sandbox: Q-Sort Results from an Internal Medicine Educational Collaborative

Meade LB, Caverzagie KJ, Swing SR, Jones RR, O'Malley CW, Yamazaki K, Zaas AK. Acad Med. 2013 Aug;88(8):1142-8. doi: 10.1097/ACM.0b013e31829a3967.

PURPOSE:

In competency-based medical education, the focus of assessment is on learner demonstration of predefined outcomes or competencies. One strategy being used in internal medicine (IM) is applying curricular milestones to assessment and reporting milestones to competence determination. The authors report a practical method for identifying sets of curricular milestones for assessment of a landmark, or a point where a resident can be entrusted with increased responsibility.

METHOD:

Thirteen IM residency programs joined in an educational collaborative to apply curricular milestones to training. The authors developed a game using Q-sort methodology to identify high-priority milestones for the landmark "Ready for indirect supervision in essential ambulatory care" (EsAMB). During May to December 2010, the programs' ambulatory faculty participated in the Q-sort game to prioritize 22 milestones for EsAMB. The authors analyzed the data to identify the top 8 milestones.

RESULTS:

In total, 149 faculty units (1-4 faculty each) participated. There was strong agreement on the top eight milestones; six had more than 92% agreement across programs, and five had 75% agreement across all faculty units. During the Q-sort game, faculty engaged in dynamic discussion about milestones and expressed interest in applying the game to other milestones and educational settings.

CONCLUSIONS:

The Q-sort game enabled diverse programs to prioritize curricular milestones with interprogram and interparticipant consistency. A Q-sort exercise is an engaging and playful way to address milestones in medical education and may provide a practical first step toward using milestones in the real-world educational setting.



CCCs – Structure and Function

Better Decision-Making: Shared Mental Models and the Clinical Competency Committee

Edgar L, Jones MD Jr, Harsy B, Passiment M, Hauer KE. J Grad Med Educ. 2021 Apr;13(2 Suppl):51-58. doi: 10.4300/JGME-D-20-00850.1. Epub 2021 Apr 23. PMID: 33936533; PMCID: PMC8078083.

BACKGROUND:

Shared mental models (SMMs) help groups make better decisions. Clinical competency committees (CCCs) can benefit from the development and use of SMMs in their decision-making as a way to optimize the quality and consistency of their decisions.

OBJECTIVE:

We reviewed the use of SMMs for decision making in graduate medical education, particularly their use in CCCs.

METHODS:

In May 2020, the authors conducted a narrative review of the literature related to SMMs. This review included the SMM related to teams, team functioning, CCCs, and graduate medical education.

RESULTS:

The literature identified the general use of SMMs, SMMs in graduate medical education, and strategies for building SMMs into the work of the CCC. Through the use of clear communication and guidelines, and a shared understanding of goals and expectations, CCCs can make better decisions. SMMs can be applied to Milestones, resident performance, assessment, and feedback.

CONCLUSIONS:

To ensure fair and robust decision-making, the CCC must develop and maintain SMMs through excellent communication and understanding of expectations among members.

Linking Workplace-Based Assessment to ACGME Milestones: A Comparison of Mapping Strategies in Two Specialties

Kelleher M, Kinnear B, Wong SEP, O'Toole J, Warm E. *Teach Learn Med.* 2020 Apr-May;32(2):194-203. doi: 10.1080/10401334.2019.1653764. Epub 2019 Sep 18.

CONSTRUCT:

The construct that is assessed is competency in Pediatrics and Internal Medicine residency training. Background: The Accreditation Council for Graduate Medical Education (ACGME) created milestones to measure learner progression toward competence over time but not as direct assessment tools. Ideal measurement of resident performance includes direct observation and assessment of patient care skills in the workplace. Residency programs have linked these concepts by mapping workplace-based assessments to the milestones of ACGME subcompetencies. Mapping is a subjective process, and little is known about specific techniques or the resulting consequences of mapping program-specific assessment data to larger frameworks of competency.

APPROACH:

In this article, the authors compare and contrast the techniques used to link workplace-based assessments called Observable Practice Activities (OPAs) to ACGME subcompetencies in two large academic residency programs from different specialties (Internal Medicine and Pediatrics). Descriptive analysis explored the similarities and differences in the assessment data generated by mapping assessment items to larger frameworks of competency.

RESULTS:

Each program assessed the core competencies with similar frequencies. The largest discrepancy between the two subspecialties was the assessment of Medical Knowledge, which Internal Medicine assessed twice as often. Pediatrics also assessed the core competency Systems-based Practice almost twice as often as Internal Medicine. Both programs had several subcompetencies that were assessed more or less often than what appeared to be emphasized by the blueprint of mapping. Despite using independent mapping processes, both programs mapped each OPA to approximately three subcompetencies.

CONCLUSIONS:

Mapping workplace-based assessments to the ACGME subcompetencies allowed each program to see the whole of their curricula in ways that were not possible before and to identify existing curricular and assessment gaps. Although each program used similar assessment tools, the assessment data generated were different. The lessons learned in this work could inform other programs attempting to link their own workplace-based assessment elements to ACGME subcompetencies.

Comparison of Male and Female Resident Milestone Assessments During Emergency Medicine Residency Training: A National Study

Santen SA, Yamazaki K, Holmboe ES, Yarris LM, Hamstra SJ. Acad Med. 2020 Feb;95(2):263-268. doi: 10.1097/ACM.0000000000002988.

PURPOSE:

A previous study found that milestone ratings at the end of training were higher for male than female residents in emergency medicine (EM). However, that study was restricted to a sample of 8 EM residency programs, and used individual faculty ratings from milestone reporting forms that were designed for use by the program's Clinical Competency Committee (CCC). The objective of this study was to investigate whether similar results would be found when examining the entire national cohort of EM milestone ratings reported by programs after CCC consensus review.

METHOD:

This study examined longitudinal milestone ratings for all EM residents (n = 1,363; 125 programs) reported to the Accreditation Council for Graduate Medical Education every 6 months from 2014-2017. A multilevel linear regression model was used to estimate differences in slope for all subcompetencies, and predicted marginal means between genders were compared at time of graduation.

RESULTS:

There were small but statistically significant differences between males' and females' increase in ratings from initial rating to graduation on 6 of the 22 subcompetencies. Marginal mean comparisons at time of graduation demonstrated gender effects for 4 patient care subcompetencies. For these subcompetencies, males were rated as performing better than females; differences ranged from 0.048 to 0.074 milestone ratings.

CONCLUSIONS:

In this national dataset of EM resident milestone assessments by CCCs, males and females were rated similarly at the end of their training for the majority of subcompetencies. Statistically significant but small absolute differences were noted in 4 patient care subcompetencies.

Understanding Assessment Systems for Clinical Competency Committee Decisions: Evidence from a Multisite Study of Psychiatry Residency Training Programs

Lloyd RB, Park YS, Tekian A, Marvin R. *Acad Psychiatry*. 2019 Dec 23. doi: 10.1007/s40596-019-01168-x.

OBJECTIVE:

This multisite study examines how clinical competency committees in Psychiatry synthesize resident assessments to inform milestones decisions to provide guidelines that support their use.

METHODS:

The study convened training directors and associate training directors from three psychiatry residency programs to examine decision-making processes of clinical competency committees. Annual resident assessments for one second year and one third year resident were used in a mock clinical competency committee format to assign milestones for two consecutive reporting periods. The committees reflected on the process and rated how the assessment tools impacted the assessment of milestones and evaluated the overall process. The authors compared reliability of assessment between the mock committees and examined both reliability of end of rotation assessments and their composite scores when combined with clinical skills evaluations.

RESULTS:

End of rotation evaluations were the most informative tool for assigning milestones and clarifying discrepancies in performance. In particular, the patient care and medical knowledge competencies were the easiest to rate, while the systems-based practice and practice-based learning and improvement were the most difficult. Reliability between committees was low although higher number of available evaluations improved reliability in decision-making.

CONCLUSIONS:

The results indicate that the medical knowledge and patient care competencies are the easiest to rate and informed most by end of rotation evaluations and clinical skills examinations. Other evaluation tools may better capture performance on specific sub-competencies beyond workplace-based assessment, or it may be helpful to reconsider the utility of how individual sub-competencies are evaluated.

How Well Do Core Faculty Understand The Emergency Medicine Milestones?

Sorge R, Li-Sauerwine S, Fernandez J, Hern G. West J Emerg Med. 2019 Dec 19;21(1):160-162. doi: 10.5811/westjem.2019.11.44289.

INTRODUCTION:

It is unclear how emergency medicine (EM) programs educate core faculty about the use of milestones in competency-based evaluations. We conducted a national survey to profile how programs educate core faculty regarding their use and to assess core faculty's understanding of the milestones.

METHODS:

Our survey tool was distributed over six months in 2017 via the Council of Emergency Medicine Residency Directors (CORD) listserv. Responses, which were de-identified, were solicited from program directors (PDs), assistant/associate program directors (APDs), and core faculty. A single response from a program was considered sufficient.

RESULTS:

Our survey had a 69.7% response rate (n=140/201). 62.9% of programs reported educating core faculty about the EM Milestones via the distribution of physical or electronic media. Although 82.6% of respondents indicated that it was important for core faculty to understand how the EM Milestones are used in competency-based evaluations, respondents estimated that 48.6% of core faculty possess "fair or poor" understanding of the milestones. Furthermore, only 50.7% of respondents felt that the EM Milestones were a valuable tool.

CONCLUSION:

These data suggest there is sub-optimal understanding of the EM Milestones among core faculty and disagreement as to whether the milestones are a valuable tool.

A National Study of Longitudinal Consistency in ACGME Milestone Ratings by Clinical Competency Committees: Exploring an Aspect of Validity in the Assessment of Residents' Competence

Hamstra SJ, Yamazaki K, Barton MA, Santen SA, Beeson MS, Holmboe ES. Acad Med. 2019 Oct;94(10):1522-1531. doi: 10.1097/ACM.0000000000002820.

PURPOSE:

To investigate whether clinical competency committees (CCCs) were consistent in applying milestone ratings for first-year residents over time or whether ratings increased or decreased.

METHOD:

Beginning in December 2013, the ACGME initiated a phased-in requirement for reporting milestones; emergency medicine (EM), diagnostic radiology (DR), and urology (UR) were among the earliest reporting specialties. The authors analyzed CCC milestone ratings of first-year residents from 2013-2016 from all ACGME-accredited EM, DR, and UR programs for which they had data. The number of first-year residents in these programs ranged from 2,838 to 2,928 over this time period. The program-level average milestone rating for each subcompetency was regressed onto the time of observation using a random coefficient multilevel regression model.

RESULTS:

National average program-level milestone ratings of first-year residents decreased significantly over the observed time period for 32 of the 56 subcompetencies examined. None of the other subcompetencies showed a significant change. National average in-training examination scores for each of the specialties remained essentially unchanged over the time period, suggesting differences between the cohorts was not likely an explanatory factor.

CONCLUSIONS:

The findings indicate that CCCs tend to become more stringent or maintain consistency in their ratings of beginning residents over time. One explanation for these results is that CCCs may become increasingly comfortable in assigning lower ratings when appropriate. This finding is consistent with an increase in confidence with the milestones rating process and the quality of feedback it provides. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Rising to the Challenge: Residency Programs' Experience With Implementing Milestones-Based Assessment

Dzara K, Huth K, Kesselheim JC, Schumacher DJ. J Grad Med Educ. 2019 Aug;11(4):439-446. doi: 10.4300/JGME-D-18-00717.1.

BACKGROUND:

Changes to assessment efforts following the shift to milestones-based assessment in the ACGME Next Accreditation System have not been fully characterized.

OBJECTIVE:

This study describes themes in initial milestones-based assessment practices with the goal of informing continued implementation and optimization of milestones-based assessment.

METHODS:

Semistructured interviews were conducted with 15 residency program leaders in 6 specialties at 8 academic medical centers between August and December 2016. We explored what was retained, what was added, and what was changed from pre-milestones assessment efforts. We also examined the perceived impact of the shift to milestones-based assessment on the programs. Thematic analysis began after the first 5 interviews and ended once thematic sufficiency was reached. Two additional authors reviewed the codes, offered critical input, and informed the formation and naming of the final themes.

RESULTS:

Three themes were identified: (1) program leaders faced challenges to effective implementation; (2) program leaders focused on adaptability and making milestones work in what felt like a less than ideal situation for them; and (3) despite challenges, program leaders see value and utility in their efforts to move to milestones-based assessment. We describe a number of strategies that worked for programs during the transition, with perceived benefits acknowledged.

CONCLUSIONS:

While adaptation to milestones has occurred and benefits are noted, negative impacts and challenges (eg, perceived lack of implementation guidance and faculty development resources) persist. There are important lessons learned (eg, utilizing implementation experiences formatively to improve curricula and assessment) in the transition to milestones-based assessment.

Ability of Ophthalmology Residents to Self-Assess Their Performance through Established Milestones

Srikumaran D, Tian J, Ramulu P, Boland MV, Woreta F, Wang KM, Mahoney N. J Surg Educ. 2019 Jul - Aug;76(4):1076-1087. doi: 10.1016/j.jsurg.2018.12.004. Epub 2019 Mar 5.

OBJECTIVES:

Accurate self-assessment is an important aspect of practice-based learning and improvement and a critical skill for resident growth. The Accreditation Council for Graduate Medical Education mandates semiannual milestones assessments by a clinical competency committee (CCC) for all ophthalmology residents. There are six core competencies: patient care (PC), medical knowledge, systems-based practice, practice-based learning and improvement, professionalism, and interpersonal communication skills. These competencies are assessed by the milestones rubric, which has detailed behavioral anchors and are also used for trainee self-assessments. This study compares resident self-assessed (SA) and faculty CCC milestones scores.

DESIGN:

Residents completed milestones self-assessments prior to receiving individual score reports from the CCC. Correlation coefficients were calculated comparing the SA and CCC scores. In addition, statistical models were used to determine predictors of disparities and differences between the SA and CCC scores.

SETTING:

Wilmer Eye Institute, Johns Hopkins Hospital.

PARTICIPANTS:

Twenty-one residents in the Wilmer Ophthalmology Residency program from July 2014 to June 2016.

RESULTS:

Fifty-seven self-assessments were available for the analysis. For each resident's first assessment, SA and CCC scores were strongly correlated ($r \geq 0.6$ and $p < 0.05$) for four milestones, and not correlated for the remaining 20 milestones. In multivariable models, the SA and CCC scores are less disparate for medical knowledge and systems-based practice competencies compared to practice-based learning and improvement. Higher year of training, PC and professionalism competencies were predictive of statistically significant resident overestimation of scores relative to the CCC. In addition, higher CCC scores predicted statistically significant lower SA-CCC disparities and differences. SA-CCC differences did not lower to a significant extent with repeated assessments or modification to the end-of-rotation evaluation forms.

CONCLUSIONS:

Self-assessments by ophthalmology residents are not well-correlated with faculty assessments, emphasizing the need for improved and frequent timely feedback. Residents have the greatest difficulty self-assessing their professionalism and PC competency. In general, senior residents and underperforming residents have more inaccurate self-assessments.

Some Assembly Required: Tracing the Interpretative Work of Clinical Competency Committees

Pack R, Lingard L, Watling CJ, Chahine S, Cristancho SM. Med Educ. 2019 Jul;53(7):723-734. doi: 10.1111/medu.13884. Epub 2019 Apr 30.

OBJECTIVES:

This qualitative study describes the social processes of evidence interpretation employed by Clinical Competency Committees (CCCs), explicating how they interpret, grapple with and weigh assessment data.

METHODS:

Over 8 months, two researchers observed 10 CCC meetings across four postgraduate programmes at a Canadian medical school, spanning over 25 hours and 100 individual decisions. After each CCC meeting, a semi-structured interview was conducted with one member. Following constructivist grounded theory methodology, data collection and inductive analysis were conducted iteratively.

RESULTS:

Members of the CCCs held an assumption that they would be presented with high-quality assessment data that would enable them to make systematic and transparent decisions. This assumption was frequently challenged by the discovery of what we have termed 'problematic evidence' (evidence that CCC members struggled to meaningfully interpret) within the catalogue of learner data. When CCCs were confronted with 'problematic evidence', they engaged in lengthy, effortful discussions aided by contextual data in order to make meaning of the evidence in question. This process of effortful discussion enabled CCCs to arrive at progression decisions that were informed by, rather than ignored, problematic evidence.

CONCLUSIONS:

Small groups involved in the review of trainee assessment data should be prepared to encounter evidence that is uncertain, absent, incomplete, or otherwise difficult to interpret, and should openly discuss strategies for addressing these challenges. The answer to the problem of effortful processes of data interpretation and problematic evidence is not as simple as generating more data with strong psychometric properties. Rather, it involves grappling with the discrepancies between our interpretive frameworks and the inescapably subjective nature of assessment data and judgement.

Should Objective Structured Clinical Examinations Assist the Clinical Competency Committee in Assigning Anesthesiology Milestones Competency?

Rebel A, DiLorenzo A, Nguyen D, Horvath I, McEvoy MD, Fragneto RY, Dority JS, Rose GL, Schell RM. *Anesth Analg*. 2019 Jul;129(1):226-234. doi: 10.1213/ANE.0000000000004120.

BACKGROUND:

With the integration of Objective Structured Clinical Examinations into the Anesthesiology primary board certification process, residency programs may choose to implement Objective Structured Clinical Examinations for resident skill assessment. The aim of this study was to evaluate Objective Structured Clinical Examination-based milestone assessment and compare with Clinical Competency Committee milestone assessment that is based purely on clinical evaluations.

METHODS:

An annual Objective Structured Clinical Examination event was used to obtain milestone assessment of clinical anesthesia year 0-clinical anesthesia year 3 residents for selected milestones in patient care, professionalism, and interpersonal/communication skills. The Objective Structured Clinical Examination scenarios were different for each training level. The Clinical Competency Committee evaluated each resident semiannually based on clinical evaluations of resident performance. The Clinical Competency Committee milestone assessments from 2014 to 2016 that were recorded closest to the Objective Structured Clinical Examination event (± 3 months) were compared to the Objective Structured Clinical Examination milestone assessments. A total of 35 residents were included in this analysis in 3 different training cohorts: A (graduates 2016, $n = 12$); B (graduates 2017, $n = 10$); and C (graduates 2018, $n = 13$). All residents participated in Objective Structured Clinical Examinations because their clinical anesthesia year 0 year and Clinical Competency Committee milestone data had been reported since December 2014.

RESULTS:

Both assessment techniques indicated a competency growth proportional to the length in training. Despite limited cumulative statistics in this study, average trends in the Objective Structured Clinical Examination-Clinical Competency Committee relationship indicated: (1) a good proportionality in reflecting competency growth; (2) a grade enhancement associated with Clinical Competency Committee assessment, dominated by evaluations of junior residents (clinical anesthesia year 0-clinical anesthesia year 1); and (3) an expectation bias in Clinical Competency Committee assessment, dominated by evaluation of senior residents (clinical anesthesia year 2-clinical anesthesia year 3).

CONCLUSIONS:

Our analysis confirms the compatibility of the 2 evaluation methods in reflecting longitudinal growth. The deviation of Objective Structured Clinical Examination assessments versus Clinical Competency Committee assessments suggests that Objective Structured Clinical Examinations may be providing additional or different information on resident performance. Educators might consider using both assessment methods to provide the most reliable and valid competency assessments during residency.

Use of Emergency Department Pharmacists in Emergency Medicine Resident Milestone Assessment

Bedy SC, Goddard KB, Stille JAW, Sampson CS. West J Emerg Med. 2019 Mar;20(2):357-362. doi: 10.5811/westjem.2018.10.37958. Epub 2018 Dec 5.

INTRODUCTION:

The use of competency-based milestones for emergency medicine (EM) was mandated by the Accreditation Council for Graduate Medical Education in 2013. However, clinical competency committees (CCC) may lack diverse, objective data to assess these new competencies. To remedy the lack of objective data when assessing the pharmacotherapy sub-competency (PC5) we introduced a unique approach that actively involves departmental clinical pharmacists in determining the milestone level achieved by the resident.

METHODS:

Our pharmacists assess the pharmacotherapy knowledge of the residents through multiple methods: direct observation of orders, communication with the residents while performing patient care within the emergency department (ED), and real-time chart review. This observation occurs informally on a daily basis in the ED and is incorporated into the routine work of the pharmacist. The pharmacists use the PC5 sub-competency as their standard evaluation tool in this setting to keep all assessments consistent.

RESULTS:

Since our residency program introduced pharmacist assessment of resident pharmacotherapy knowledge, the CCC has conducted seven biannual meetings. Of the 120 separate PC5 sub-competency assessments made during those meetings there was 100% agreement between the pharmacist's assessment and the CCC's final assessment of the trainee. A survey of the CCC members concluded that the pharmacists' assessments were useful and aided in accurate resident evaluation.

CONCLUSION:

The use of ED pharmacists in assessing the pharmacotherapy sub-competency provides important information used in resident assessment of the PC5 milestone.

Assessment Methods and Resource Requirements for Milestone Reporting by an Emergency Medicine Clinical Competency Committee

Goyal N, Folt J, Jaskulka B, Baliga S, Slezak M, Schultz LR, Vallee P. Med Educ Online. 2018 Dec;23(1): 1538925. doi: 10.1080/10872981.2018.1538925.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) introduced milestones for Emergency Medicine (EM) in 2012. Clinical Competency Committees (CCC) are tasked with assessing residents on milestones and reporting them to the ACGME. Appropriate workflows for CCCs are not well defined.

OBJECTIVE:

Our objective was to compare different approaches to milestone assessment by a CCC, quantify resource requirements for each and to identify the most efficient workflow.

DESIGN:

Three distinct processes for rendering milestone assessments were compared: Full milestone assessments (FMA) utilizing all available resident assessment data, Ad-hoc milestone assessments (AMA) created by multiple expert educators using their personal assessment of resident performance, Self-assessments (SMA) completed by residents. FMA were selected as the theoretical gold standard. Intraclass correlation coefficients were used to analyze for agreement between different assessment methods. Kendall's coefficient was used to assess the inter-rater agreement for the AMA.

RESULTS:

All 13 second-year residents and 7 educational faculty of an urban EM Residency Program participated in the study in 2013. Substantial or better agreement between FMA and AMA was seen for 8 of the 23 total subcompetencies (PC4, PC8, PC9, PC11, MK, PROF2, ICS2, SBP2), and for 1 subcompetency (SBP1) between FMA and SMA. Multiple AMA for individual residents demonstrated substantial or better interobserver agreement in 3 subcompetencies (PC1, PC2, and PROF2). FMA took longer to complete compared to AMA (80.9 vs. 5.3 min, $p < 0.001$).

CONCLUSIONS:

Using AMA to evaluate residents on the milestones takes significantly less time than FMA. However, AMA and SMA agree with FMA on only 8 and 1 subcompetencies, respectively. An estimated 23.5 h of faculty time are required each month to fulfill the requirement for semiannual reporting for a residency with 42 trainees.

Program Director Perceptions of Usefulness of the Accreditation Council for Graduate Medical Education Milestones System for Urology Resident Evaluation

Sebesta EM, Cooper KL, Badalato GM. *Urology*. 2018 Nov 8. pii: S0090-4295(18)31132-4. doi: 10.1016/j.urology.2018.10.042.

OBJECTIVES:

To assess the application and perceived usefulness of the Accreditation Council for Graduation Medical Education (ACGME) Milestones system for resident evaluation among urology program directors (PDs).

METHOD:

We conducted an online survey of 133 urology PDs. The survey addressed several domains: (1) demographic information, (2) logistics and implementation of the faculty Clinical Competency Committee (CCC) meetings, and (3) perceived overall effectiveness and usefulness of the Milestones assessments.

RESULTS:

Eighty-eight responses were obtained (66% response rate). A total of 42/88 programs (48%) described the Milestones as very or somewhat unhelpful in resident evaluation, with a comparable proportion (44%) responding Milestones assessments never or almost never accurately distinguished between residents. Respondents felt higher scores on all domains of the Milestones were completely or somewhat uncorrelated to higher inservice exam scores (58%), with a smaller fraction (49%) deeming they were not predictive of board passage rates. Overall, 30% of respondents answered neutrally as to whether they felt the Milestones format has led to better resident formative feedback, and 35% were neutral as to the implications of this system toward promoting professional development.

CONCLUSIONS:

The ACGME Milestones system for resident evaluation was initiated to create a uniform competency-based assessment system; however, a sizable proportion of urology PDs in our cohort did not find the Milestones system helpful or accurate in assessing residents or predicting future successes. Given the Milestones system is still in its infancy, the utility of this system within urology has yet to be fully assessed.

Influence of Clinical Competency Committee Review Process on Summative Resident Assessment Decisions

Schumacher DJ, King B, Barnes MM, Elliott SP, Gibbs K, McGreevy JF, Del Rey JG, Sharma T, Michelson C, Schwartz A; Members of the APPD LEARN CCC Study Group. *J Grad Med Educ.* 2018 Aug;10(4):429-437. doi: 10.4300/JGME-D-17-00762.1.

BACKGROUND:

Clinical Competency Committees (CCCs) are charged with making summative assessment decisions about residents.

OBJECTIVE:

We explored how review processes CCC members utilize influence their decisions regarding residents' milestone levels and supervisory roles.

METHODS:

We conducted a multisite longitudinal prospective observational cohort study at 14 pediatrics residency programs during academic year 2015-2016. Individual CCC members biannually reported characteristics of their review process and Accreditation Council for Graduate Medical Education milestone levels and recommended supervisory role categorizations assigned to residents. Relationships among characteristics of CCC member reviews, mean milestone levels, and supervisory role categorizations were analyzed using mixed-effects linear regression, reported as mean differences with 95% confidence intervals (CIs), and Bayesian mixed-effects ordinal regression, reported as odds ratios (ORs) and 95% credible intervals (CrIs).

RESULTS:

A total of 155 CCC members participated. Members who provided milestones or other professional development feedback after CCC meetings assigned significantly lower mean milestone levels (mean 1.4 points; CI -2.2 to -0.6; $P < .001$) and were significantly less likely to recommend supervisory responsibility in any setting (OR = 0.23, CrI 0.05-0.83) compared with CCC members who did not. Members recommended less supervisory responsibility when they reviewed more residents (OR = 0.96, 95% CrI 0.94-0.99) and participated in more review cycles (OR = 0.22, 95% CrI 0.07-0.63).

CONCLUSIONS:

This study explored the association between characteristics of individual CCC member reviews and their summative assessment decisions about residents. Further study is needed to gain deeper understanding of factors influencing CCC members' summative assessment decisions.

Milestone Ratings and Supervisory Role Categorizations Swim Together, But Is the Water Muddy?

Schumacher DJ, Bartlett KW, Elliott SP, Michelson C, Sharma T, Garfunkel LC, King B, Schwartz A; APPD LEARN CCC Study Group. *Acad Pediatr*. 2018 Jun 18. pii: S1876- 2859(18)30374-7. doi: 10.1016/j.acap.2018.06.002.

OBJECTIVE:

This single-specialty, multi-institutional study aimed to determine 1) the association between milestone ratings for individual competencies and average milestone ratings (AMRs) and 2) the association between AMRs and recommended supervisory role categorizations made by individual clinical competency committee (CCC) members.

METHODS:

During the 2015-16 academic year, CCC members at 14 pediatric residencies reported milestone ratings for 21 competencies and recommended supervisory role categories (may not supervise, may supervise in some settings, may supervise in all settings) for residents they reviewed. An exploratory factor analysis of competencies was conducted. The associations among individual competencies, the AMR, and supervisory role categorizations were determined by computing bivariate correlations. The relationship between AMRs and recommended supervisory role categorizations was examined using an ordinal mixed logistic regression model.

RESULTS:

Of the 155 CCC members, 68 completed both milestone assignments and supervision categorizations for 451 residents. Factor analysis of individual competencies controlling for clustering of residents in raters and sites resulted in a single-factor solution (cumulative variance: 0.75). All individual competencies had large positive correlations with the AMR (correlation coefficient: 0.84-0.93), except for two professionalism competencies (Prof1: 0.63 and Prof4: 0.65). When combined across training year and time points, the AMR and supervisory role categorization had a moderately positive correlation (0.56).

CONCLUSIONS:

This exploratory study identified a modest correlation between average milestone ratings and supervisory role categorization. Convergence of competencies on a single factor deserves further exploration, with possible rater effects warranting attention.

The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs

Conforti LN, Yaghmour NA, Hamstra SJ, Holmboe ES, Kennedy B, Liu JJ, Waldo H, Selden NR. *J Surg Educ*.

2018 Jan - Feb;75(1):147-155. doi: 10.1016/j.jsurg.2017.06.001. Epub 2017 Jun 22.

OBJECTIVES:

The purpose of this study was to determine the effect of the Accreditation Council for Graduate Medical Education Milestones on the assessment of neurological surgery residents. The authors sought to determine the feasibility, acceptability, and utility of this new framework in making judgments of progressive competence, its implementation within programs, and the influence on curricula. Residents were also surveyed to elicit the effect of Milestones on their educational experience and professional development.

DESIGN, SETTING, AND PARTICIPANTS:

In 2015, program leadership and residents from 21 neurological surgery residency programs participated in an online survey and telephone interview in which they reflected on their experiences with the Milestones. Survey data were analyzed using descriptive statistics. Interview transcripts were analyzed using grounded theory.

RESULTS:

Response themes were categorized into 2 groups: outcomes of the Milestones implementation process, and facilitators and barriers. Because of Milestones implementation, participants reported changes to the quality of the assessment process, including the ability to identify struggling residents earlier and design individualized improvement plans. Some programs revised their curricula based on training gaps identified using the Milestones. Barriers to implementation included limitations to the adoption of a developmental progression model in the context of rotation block schedules and misalignment between progression targets and clinical experience. The shift from time-based to competency-based evaluation presented an ongoing adjustment for many programs. Organized preparation before clinical competency committee meetings and diverse clinical competency committee composition led to more productive meetings and perceived improvement in promotion decisions.

CONCLUSIONS:

The results of this study can be used by program leadership to help guide further implementation of the Milestones and program improvement. These results also help to guide the evolution of Milestones language and their implementation across specialties.

Thresholds and Interpretations: How Clinical Competency Committees Identify Pediatric Residents with Performance Concerns

Schumacher DJ, Michelson C, Poynter S, Barnes MM, Li ST, Burman N, Sklansky DJ, Thoreson L, Calaman S, King B, Schwartz A; APPD LEARN CCC Study Group, Elliott S, Sharma T, Gonzalez Del Rey J, Bartlett K, Scott-Vernaglia SE, Gibbs K, McGreevy JF, Garfunkel LC, Gellin C, Frohna JG. *Med Teach.* 2018 Jan;40(1):70-79. doi: 10.1080/0142159X.2017.1394576.

BACKGROUND:

Clinical competency committee (CCC) identification of residents with performance concerns is critical for early intervention.

METHODS:

Program directors and 94 CCC members at 14 pediatric residency programs responded to a written survey prompt asking them to describe how they identify residents with performance concerns. Data was analyzed using thematic analysis.

RESULTS:

Six themes emerged from analysis and were grouped into two domains. The first domain included four themes, each describing a path through which residents could meet or exceed a concern threshold: 1) written comments from rotation assessments are foundational in identifying residents with performance concerns, 2) concerning performance extremes stand out, 3) isolated data points may accumulate to raise concern, and 4) developmental trajectory matters. The second domain focused on how CCC members and program directors interpret data to make decisions about residents with concerns and contained 2 themes: 1) using norm- and/or criterion-referenced interpretation, and 2) assessing the quality of the data that is reviewed.

CONCLUSIONS:

Identifying residents with performance concerns is important for their education and the care they provide. This study delineates strategies used by CCC members across several programs for identifying these residents, which may be helpful for other CCCs to consider in their efforts.

A Multicenter Prospective Comparison of the Accreditation Council for Graduate Medical Education Milestones: Clinical Competency Committee vs. Resident Self-Assessment

Watson RS, Borgert AJ, O Heron CT, Kallies KJ, Sidwell RA, Mellinger JD, Joshi AR, Galante JM, Chambers LW, Morris JB, Josloff RK, Melcher ML, Fuhrman GM, Terhune KP, Chang L, Ferguson EM, Auyang ED, Patel KR, Jarman BT. *J Surg Educ.* 2017 Nov - Dec;74(6):e8-e14. doi: 10.1016/j.jsurg.2017.06.009. Epub 2017 Jun 27.

OBJECTIVE:

The Accreditation Council for Graduate Medical Education requires accredited residency programs to implement competency-based assessments of medical trainees based upon nationally established Milestones. Clinical competency committees (CCC) are required to prepare biannual reports using the Milestones and ensure reporting to the Accreditation Council for Graduate Medical Education. Previous research demonstrated a strong correlation between CCC and resident scores on the Milestones at 1 institution. We sought to evaluate a national sampling of general surgery residency programs and hypothesized that CCC and resident assessments are similar.

DESIGN:

Details regarding the makeup and process of each CCC were obtained. Major disparities were defined as an absolute mean difference of ≥ 0.5 on the 4-point scale. A negative assessment disparity indicated that the residents evaluated themselves at a lower level than did the CCC. Statistical analysis included Wilcoxon rank sum and Sign tests.

SETTING:

CCCs and categorical general surgery residents from 15 residency programs completed the Milestones document independently during the spring of 2016.

RESULTS:

Overall, 334 residents were included; 44 (13%) and 43 (13%) residents scored themselves ≥ 0.5 points higher and lower than the CCC, respectively. Female residents scored themselves a mean of 0.08 points lower, and male residents scored themselves a mean of 0.03 points higher than the CCC. Median assessment differences for postgraduate year (PGY) 1-5 were 0.03 (range: -0.94 to 1.28), -0.11 (range: -1.22 to 1.22), -0.08 (range: -1.28 to 0.81), 0.02 (range: -0.91 to 1.00), and -0.19 (range: -1.16 to 0.50), respectively. Residents in university vs. independent programs had higher rates of negative assessment differences in medical knowledge (15% vs. 6%; $P = 0.015$), patient care (17% vs. 5%; $P = 0.002$), professionalism (23% vs. 14%; $P = 0.013$), and system-based practice (18% vs. 9%; $P = 0.031$) competencies. Major assessment disparities by sex or PGY were similar among individual competencies.

CONCLUSIONS:

Surgery residents in this national cohort demonstrated self-awareness when compared to assessments by their respective CCCs. This was independent of program type, sex, or level of training. PGY 5 residents, female residents, and those from university programs consistently rated themselves lower than the CCC, but these were not major disparities and the significance of this is unclear.

How Do Clinical Competency Committees Use Different Sources of Data to Assess Residents' Performance on the Internal Medicine Milestones? A Mixed Methods Pilot Study

Ekpenyong A, Baker E, Harris I, Tekian A, Abrams R, Reddy S, Park YS. *Med Teach.* 2017 Oct;39(10): 1074-1083. doi: 10.1080/0142159X.2017.1353070. Epub 2017 Jul 25.

PURPOSE:

This study examines how Clinical Competency Committees (CCCs) synthesize assessment data to make judgments about residents' clinical performances.

METHODS:

Between 2014 and 2015, after four six-month reporting periods to the Accreditation Council for Graduate Medical Education (ACGME), 7 of 16 CCC faculty at Rush University Medical Center completed questionnaires focused on their perspectives about rating residents on their achievement of the milestones and participated in a focus group. Qualitative data were analyzed using grounded theory. Milestones ratings for two six-month ACGME reporting cycles (n = 100 categorical residents) were also analyzed.

RESULTS:

CCC members weighted resident rotation ratings highest (weight = 37%), followed by faculty rotation comments (weight = 27%) and personal experience with residents (weight = 14%) for making judgments about learner's milestone levels. Three assessment issues were identified from qualitative analyses: (1) "design issues" (e.g. problems with available data or lack thereof); (2) "synthesis issues" (e.g. factors influencing ratings and decision-making processes) and (3) "impact issues" (e.g. how CCC generated milestones ratings are used).

CONCLUSIONS:

Identifying factors that affect assessment at all stages of the CCC process can contribute to improving assessment systems, including support for faculty development for CCCs. Recognizing challenges in synthesizing first and second-hand assessment data is an important step in understanding the CCC decision-making process.

Ensuring Resident Competence: A Narrative Review of the Literature on Group Decision Making to Inform the Work of Clinical Competency Committees

Hauer KE, Cate OT, Boscardin CK, Iobst W, Holmboe ES, Chesluk B, Baron RB, O'Sullivan PS. *J Grad Med Educ.* 2016 May;8(2):156-64. doi: 10.4300/JGME-D-15-00144.1.

INTRODUCTION:

The expectation for graduate medical education programs to ensure that trainees are progressing toward competence for unsupervised practice prompted requirements for a committee to make decisions regarding residents' progress, termed a clinical competency committee (CCC). The literature on the composition of these committees and how they share information and render decisions can inform the work of CCCs by highlighting vulnerabilities and best practices.

OBJECTIVE:

We conducted a narrative review of the literature on group decision making that can help characterize the work of CCCs, including how they are populated and how they use information.

METHODS:

English language studies of group decision making in medical education, psychology, and organizational behavior were used.

RESULTS:

The results highlighted 2 major themes. Group member composition showcased the value placed on the complementarity of members' experience and lessons they had learned about performance review through their teaching and committee work. Group processes revealed strengths and limitations in groups' understanding of their work, leader role, and information-sharing procedures. Time pressure was a threat to the quality of group work.

CONCLUSIONS:

Implications of the findings include the risks for committees that arise with homogeneous membership, limitations to available resident performance information, and processes that arise through experience rather than deriving from a well-articulated purpose of their work. Recommendations are presented to maximize the effectiveness of CCC processes, including their membership and access to, and interpretation of, information to yield evidence-based, well-reasoned judgments.

How Do Emergency Medicine Residency Programs Structure their Clinical Competency Committees? A Survey

Doty CI, Roppolo LP, Asher S, Seamon JP, Bhat R, Taft S, Graham A, Willis J. Acad Emerg Med. 2015 Nov;22(11):1351-4. doi: 10.1111/acem.12804. Epub 2015 Oct 16.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) recently has mandated the formation of a clinical competency committee (CCC) to evaluate residents across the newly defined milestone continuum. The ACGME has been nonproscriptive of how these CCCs are to be structured in order to provide flexibility to the programs.

OBJECTIVES:

No best practices for the formation of CCCs currently exist. We seek to determine common structures of CCCs recently formed in the Council of Emergency Medicine Residency Directors (CORD) member programs and identify unique structures that have been developed.

METHODS:

In this descriptive study, an 18-question survey was distributed via the CORD listserv in the late fall of 2013. Each member program was asked questions about the structure of its CCC. These responses were analyzed with simple descriptive statistics.

RESULTS:

A total of 116 of the 160 programs responded, giving a 73% response rate. Of responders, most (71.6%) CCCs are chaired by the associate or assistant program director, while a small number (14.7%) are chaired by a core faculty member. Program directors (PDs) chair 12.1% of CCCs. Most CCCs are attended by the PD (85.3%) and selected core faculty members (78.5%), leaving the remaining committees attended by any core faculty. Voting members of the CCC consist of the residency leadership either with the PD (53.9%) or without the PD (36.5%) as a voting member. CCCs have an average attendance of 7.4 members with a range of three to 15 members. Of respondents, 53.1% of CCCs meet quarterly while 37% meet monthly. The majority of programs (76.4%) report a system to match residents with a faculty mentor or advisor. Of respondents, 36% include the resident's faculty mentor or advisor to discuss a particular resident. Milestone summaries (determination of level for each milestone) are the primary focus of discussion (93.8%), utilizing multiple sources of information.

CONCLUSIONS:

The substantial variability and diversity found in our CORD survey of CCC structure and function suggest that there are myriad strategies that residency programs can use to match individual program needs and resources to requirements of the ACGME. Identifying a single protocol for CCC structure and development may prove challenging.

Pathology Milestones: Assessing Clinical Competency by Committee

Klutts JS, Guerin LA, Bruch LA, Firchau DJ, Knudson CM, Rosenthal NS, Samuelson MI, Jensen CS, Delwiche JL, Krasowski MD. Acad Pathol. 2015 Oct 29;2(4):2374289515614003. doi: 10.1177/2374289515614003.

ABSTRACT:

All Accreditation Council for Graduate Medical Education accredited pathology residency training programs are now required to evaluate residents using the new Pathology Milestones assessment tool. Similar to implementation of the 6 Accreditation Council for Graduate Medical Education competencies a decade ago, there have been challenges in implementation of the new milestones for many residency programs. The pathology department at the University of Iowa has implemented a process that divides the labor of the task in rating residents while also maintaining consistency in the process. The process is described in detail, and some initial trends in milestone evaluation are described and discussed. Our experience indicates that thoughtful implementation of the Pathology Milestones can provide programs with valuable information that can inform curricular changes.

Navigating the Next Accreditation System: A Dashboard for the Milestones

Johna S, Woodward B. Perm J. 2015 Fall;19(4):61-3. doi: 10.7812/TPP/15-041.

INTRODUCTION:

In July 2014, all residency programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) were enrolled in a new system called the Next Accreditation System. Residency programs may not be clear on how best to comply with these new accreditation requirements. Large amounts of data must be collected, evaluated, and submitted twice a year to the council's Web-based data collection system. One challenge is that the new "end-of-rotation" evaluations must reflect specialty-specific milestones, on which many faculty members are not well versed. Like other residency programs, we tried to address the challenges using our local resources.

METHODS:

We used our existing electronic goals and objectives for each rotation coupled with appropriate end-of-rotation evaluations reflecting the specialty-specific milestones through a process of editing and mapping.

RESULTS:

Data extracted from these evaluations were added to an interactive dashboard that also contained evaluations on additional program-specific modifiers of residents' performance. A resident's final overall performance was visually represented on a plot graph. The novel dashboard included features to save evaluations for future comparisons and to track residents' progress during their entire training. It proved simple to use and was able to reduce the time needed for each resident evaluation to 5 to 10 minutes.

CONCLUSION:

This tool has made it much easier and less challenging for the members of our Clinical Competency Committee to start deliberation about each resident's performance.

Reviewing Residents' Competence: A Qualitative Study of the Role of Clinical Competency Committees in Performance Assessment

Hauer KE, Chesluk B, Iobst W, Holmboe E, Baron RB, Boscardin CK, Cate OT, O'Sullivan PS. Acad Med. 2015 Aug;90(8):1084-92. doi: 10.1097/ACM.0000000000000736.

PURPOSE:

Clinical competency committees (Milestones: a rapid assessment method for the Clinical Competency Committee).

INTRODUCTION:

Educational milestones are now used to assess the developmental progress of all U.S. graduate medical residents during training. Twice annually, each program's Clinical Competency Committee (CCC) makes these determinations and reports its findings to the Accreditation Council for Graduate Medical Education (ACGME). The ideal way to conduct the CCC is not known. After finding that deliberations reliant upon the new milestones were time intensive, our internal medicine residency program tested an approach designed to produce rapid but accurate assessments.

MATERIAL AND METHODS:

For this study, we modified our usual CCC process to include pre-meeting faculty ratings of resident milestones progress with in-meeting reconciliation of their ratings. Data were considered largely via standard report and presented in a pre-arranged pattern. Participants were surveyed regarding their perceptions of data management strategies and use of milestones. Reliability of competence assessments was estimated by comparing pre-/post- intervention class rank lists produced by individual committee members with a *master* class rank list produced by the collective CCC after full deliberation.

RESULTS:

Use of the study CCC approach reduced committee deliberation time from 25 min to 9 min per resident ($p < 0.001$). Committee members believed milestones improved their ability to identify and assess expected elements of competency development ($p = 0.026$). Individual committee member assessments of trainee progress agreed well with collective CCC assessments.

CONCLUSIONS:

Modification of the clinical competency process to include pre-meeting competence ratings with in-meeting reconciliation of these ratings led to shorter deliberation times, improved evaluator satisfaction and resulted in reliable milestone assessments.

Implementation of Nephrology Subspecialty Curricular Milestones

Yuan CM, Prince LK, Oliver JD 3rd, Abbott KC, Nee R. Am J Kidney Dis. 2015 Jul;66(1):15-22. doi: 10.1053/j.ajkd.2015.01.020. Epub 2015 Mar 12.

ABSTRACT:

Beginning in the 2014-2015 training year, the US Accreditation Council for Graduate Medical Education (ACGME) required that nephrology Clinical Competency Committees assess fellows' progress toward 23 subcompetency "context nonspecific" internal medicine subspecialty milestones. Fellows' advancement toward the "ready for unsupervised practice" target milestone now is tracked in each of the 6 competencies: Patient Care, Medical Knowledge, Professionalism, Interpersonal Communication Skills, Practice-Based Learning and Improvement, and Systems-Based Practice. Nephrology program directors and subspecialty societies must define nephrology-specific "curricular milestones," mapped to the nonspecific ACGME milestones. Although the ACGME goal is to produce data that can discriminate between successful and underperforming training programs, the approach is at risk to produce biased, inaccurate, and unhelpful information. We map the ACGME internal medicine subspecialty milestones to our previously published nephrology-specific milestone schema and describe entrustable professional activities and other objective assessment tools that inform milestone decisions. Mapping our schema onto the ACGME subspecialty milestone reporting form allows comparison with the ACGME subspecialty milestones and the curricular milestones developed by the American Society of Nephrology Program Directors. Clinical Competency Committees may easily adapt and directly translate milestone decisions reached using our schema onto the ACGME internal medicine subspecialty competency milestone-reporting format.

A Systematic Approach toward Building a Fully Operational Clinical Competency Committee

French JC, Dannefer EF, Colbert CY. J Surg Educ. 2014 Nov-Dec;71(6):e22-7. doi: 10.1016/j.jsurg.2014.04.005. Epub 2014 May 28.

BACKGROUND:

The Accreditation Council for Graduate Medical Education has offered minimal guidelines for the creation and implementation of clinical competency committees (CCCs). As surgical residency programs may differ greatly in terms of size and structure, requirements that are too specific throughout the process could place some programs at a great disadvantage.

OBJECTIVE:

The purpose of this article is to address some of the common considerations all surgery residency programs will face. The creation of standard operating procedures for the CCCs will allow each committee to develop internal consistency, improve productivity, maintain efficiency and quality control, facilitate training of new committee members, and cross-train other faculty and residents on the key processes to provide transparency.

METHODS:

This article offers recommendations on the 3 key areas of CCC implementation: the prereview, resident milestone review, and the postreview processes. Specific components related to shifting culture, committee membership and terms, assessing available evidence, and review dissemination are outlined, and example scenarios are provided throughout the article.

CONCLUSION:

With the implementation of CCCs and the milestones project, residency programs have an opportunity to improve the overall quality of decision making regarding residents' promotion to the next training level or independent practice. CCCs will undoubtedly be confronted with numerous challenges, as they implement the milestones project and are faced with the need to make multiple changes. Therefore, implementing milestones should be viewed as a goal to be accomplished over the long term.



How to Use Milestones Data to Improve your Program

Longitudinal Reliability of Milestones-Based Learning Trajectories in Family Medicine Residents

Park YS, Hamstra SJ, Yamazaki K, Holmboe E. *JAMA Netw Open*. 2021 Dec 1;4(12):e2137179. doi: 10.1001/jamanetworkopen.2021.37179. PMID: 34874406; PMCID: PMC8652607.

IMPORTANCE:

Longitudinal Milestones data reported to the Accreditation Council for Graduate Medical Education (ACGME) can be used to measure the developmental and educational progression of learners. Learning trajectories illustrate the pattern and rate at which learners acquire competencies toward unsupervised practice.

OBJECTIVE:

To investigate the reliability of learning trajectories and patterns of learning progression that can support meaningful intervention and remediation for residents.

DESIGN:

This national retrospective cohort study included Milestones data from residents in family medicine, representing 6 semi-annual reporting periods from July 2016 to June 2019.

INTERVENTIONS:

Longitudinal formative assessment using the Milestones assessment system reported to the ACGME.

MAIN OUTCOMES TO MEASURE:

To estimate longitudinal consistency, growth rate reliability (GRR) and growth curve reliability (GCR) for 22 subcompetencies in the ACGME family medicine Milestones were used, incorporating clustering effects at the program level. Latent class growth curve models were used to examine longitudinal learning trajectories.

RESULTS:

This study included Milestones ratings from 3872 residents in 514 programs. The Milestones reporting system reliably differentiated individual longitudinal patterns for formative purposes (mean [SD] GRR, 0.63 [0.03]); there was also evidence of precision for model-based rates of change (mean [SD] GCR, 0.91 [0.02]). Milestones ratings increased significantly across training years and reporting periods (mean [SD] of 0.55 [0.04] Milestones units per reporting period; $P < .001$); patterns of developmental progress varied by subcompetency. There were 3 or 4 distinct patterns of learning trajectories for each of the 22 subcompetencies. For example, for the professionalism subcompetency, residents were classified to 4 groups of learning trajectories; during the 3-year family medicine training period, trajectories diverged further after postgraduate year (PGY) 1, indicating a potential remediation point between the end of PGY 1 and the beginning of PGY 2 for struggling learners, who represented 16% of learners (620 residents). Similar inferences for learning trajectories were found for practice-based learning and improvement, systems-based practice, and interpersonal and communication skills. Subcompetencies in medical knowledge and patient care demonstrated more consistent patterns of upward growth.

CONCLUSIONS:

These findings suggest that the Milestones reporting system provides reliable longitudinal data for individualized tracking of progress in all subcompetencies. Learning trajectories with supporting reliability evidence could be used to understand residents' developmental progress and tailored for individualized learning plans and remediation.

Longitudinal Milestone Assessment Extending Through Subspecialty Training: The Relationship Between ACGME Internal Medicine Residency Milestones and Subsequent Pulmonary and Critical Care Fellowship Milestones

Heath JK, Wang T, Santhosh L, Denson JL, Holmboe E, Yamazaki K, Clay AS, Carlos WG. *Acad Med.* 2021 Nov 1;96(11):1603-1608. doi: 10.1097/ACM.0000000000004165. PMID: 34010863.

PURPOSE:

Accreditation Council for Graduate Medical Education (ACGME) milestones were implemented across medical subspecialties in 2015. Although milestones were proposed as a longitudinal assessment tool potentially providing opportunities for early implementation of individualized fellowship learning plans, the association of subspecialty fellowship ratings with prior residency ratings remains unclear. This study aimed to assess the relationship between internal medicine (IM) residency milestones and pulmonary and critical care medicine (PCCM) fellowship milestones.

METHOD:

A multicenter retrospective cohort analysis was conducted for all PCCM trainees in ACGME-accredited PCCM fellowship programs, 2017-2018, who had complete prior IM milestone ratings from 2014 to 2017. Only professionalism and interpersonal and communication skills (ICS) were included based on shared anchors between IM and PCCM milestones. Using a generalized estimating equations model, the association of PCCM milestones ≤ 2.5 during the first fellowship year with corresponding IM subcompetencies was assessed at each time point, nested by program. Statistical significance was determined using logistic regression.

RESULTS:

The study included 354 unique PCCM fellows. For ICS and professionalism subcompetencies, fellows with higher IM ratings were less likely to obtain PCCM ratings ≤ 2.5 during the first fellowship year. Each ICS subcompetency was significantly associated with future lapses in fellowship (ICS01: $\beta = -0.67$, $P = .003$; ICS02: $\beta = -0.70$, $P = .001$; ICS03: $\beta = -0.60$, $P = .004$) at various residency time points. Similar associations were noted for PROF03 ($\beta = -0.57$, $P = .007$).

CONCLUSIONS:

Findings demonstrated an association between IM milestone ratings and low milestone ratings during PCCM fellowship. IM trainees with low ratings in several professionalism and ICS subcompetencies were more likely to be rated ≤ 2.5 during the first PCCM fellowship year. This highlights a potential use of longitudinal milestones to target educational gaps at the beginning of PCCM fellowship.

Can ACGME Milestones Predict Surgical Specialty Board Passage: An Example in Obstetrics and Gynecology

Ottum S, Chao C, Tamakuwala S, Dean J, Shafi A, Kramer KJ, Kaur S, Recanati MA. Clin Exp Obstet Gynecol. 2021 Oct 15;48(5):1048-1055. doi: 10.31083/j.ceog4805168. PMID: 34720368; PMCID: PMC8555913.

BACKGROUND:

Multiple tools including Accreditation Council for Graduate Medical Education (ACGME) standardized milestones can be utilized to assess trainee and residency program performance. However, little is known regarding the objective validation of these tools in predicting written board passage.

METHODS:

In this retrospective study, data was gathered on $n = 45$ Wayne State University Obstetrics and Gynecology program graduates over the five-year period ending July 2018. United States Medical Licensing Examination (USMLE) scores, Council on Resident Education in Obstetrics and Gynecology (CREOG) in-training scores and ACGME milestones were used to predict American Board of Obstetrics and Gynecology (ABOG) board passage success on first attempt. Significance was set at $p < 0.05$.

RESULTS:

Written board passage was associated with average CREOGs ($p = 0.01$) and milestones ($p = 0.008$) while USMLE1 was not significantly associated ($p = 0.055$). USMLE1 < 217 (Positive predictive value (PPV) = 96%). CREOGs < 197 (PPV = 100%) and milestones < 3.25 (PPV = 100%), particularly practice-based learning and systems-based practice milestones were most strongly correlated with board failure. Using a combination of these two milestones, it is possible to correctly predict board passage using our model (PPV = 86%).

DISCUSSION:

This study is the first validating the utility of milestones in a surgical specialty by demonstrating their ability to predict board passage. Residents with CREOGs or milestones below thresholds are at risk for board failure and may warrant early intervention.

The Use of Learning Analytics to Enable Detection of Underperforming Trainees: An Analysis of National Vascular Surgery Trainee ACGME Milestones Assessment Data

Smith BK, Yamazaki K, Tekian A, Holmboe E, Hamstra SJ, Mitchell EL, Park YS. Ann Surg. 2021 Oct 8. doi: 10.1097/SLA. 0000000000005243. Epub ahead of print. PMID: 35129524.

OBJECTIVE:

This study aims to investigate at-risk scores of semiannual Accreditation Council for Graduate Medical Education (ACGME) Milestone ratings for vascular surgical trainees' final achievement of competency targets.

BACKGROUND:

ACGME Milestones assessments have been collected since 2015 for Vascular Surgery. It is unclear whether milestone ratings throughout training predict achievement of recommended performance targets upon graduation.

METHODS:

National ACGME Milestones data were utilized for analyses. All trainees completing 2-year vascular surgery fellowships in June 2018 and 5-year integrated vascular surgery residencies in June 2019 were included. A generalized estimating equations model was used to obtain at-risk scores for each of the 31 sub-competencies by semiannual review periods, to estimate the probability of trainees achieving the recommended graduation target based on their previous ratings.

RESULTS:

122 VSFs (95.3%) and 52 IVSRs (100%) were included. VSFs and IVSRs did not achieve level 4.0 competency targets at a rate of 1.6-25.4% across sub-competencies, which was not significantly different between the two groups for any of the sub-competencies ($p=0.161-0.999$). Trainees were found to be at greater risk of not achieving competency targets when lower milestone ratings were assigned, and at later time-points in training. At a milestone rating of ≤ 2.5 , with one year remaining prior to graduation, the at-risk score for not achieving the target level 4.0 milestone ranged from 2.9% - 77.9% for VSFs and 33.3% - 75.0% for IVSRs.

CONCLUSIONS:

The ACGME Milestones provide early diagnostic and predictive information for vascular surgery trainees' achievement of competence at completion of training.

National Resident Matching Program Rank Order and Performance in an Internal Medicine Residency

Everett GD, Maharam E, Yi F. South Med J. 2021 Oct;114(10):657-661. doi: 10.14423/SMJ.0000000000001301. PMID: 34599345.

OBJECTIVES:

Prospective first-year house staff and residency program leaders spend substantial time, effort, and expense preparing a rank order list for the National Resident Matching Program (NRMP). Previous studies have mostly shown minimal or no relation between rank order and subsequent resident performance, raising questions about the value of this process. Furthermore, no previous studies have been done with Internal Medicine residencies. As such, the purpose of this study was to compare NRMP rank order to multiple objective outcomes of an Internal Medicine residency.

METHODS:

A retrospective cohort of Internal Medicine residents from five consecutive graduating classes, trained between July 1, 2013 and July 31, 2020, were evaluated for five objective outcomes: Accreditation Council for Graduate Medical Education (ACGME) milestones, faculty rankings of quality, National In-Training Examination scores, chief resident attainment, and fellowship attainment. Outcomes were analyzed in relation to eight potential predictors: NRMP rank, medical school type and grades, immigration status, added qualifications, sex, age and US Medical Licensing Examination (USMLE) scores, using univariate and multivariate analyses.

RESULTS:

From a cohort of 61 residents, 56 were eligible. All eligible residents' data were included, for a participation rate of 100% (56 of 56). There were no statistically significant univariate or multivariate predictors for the endpoint of fellowship attainment. Higher USMLE scores were predictive of chief resident status in univariate analysis only. NRMP rank was significantly correlated with ACGME milestones in the univariate analysis. The multivariate analysis revealed that higher USMLE score was statistically significantly predictive of more favorable milestones, faculty ranking, and National In-Training Examination score.

CONCLUSIONS:

Higher USMLE score was statistically significantly associated with multiple favorable objective residency outcomes in an Internal Medicine residency. A better NRMP rank was correlated with favorable ACGME milestones in univariate analysis, but USMLE score emerged as the strongest predictor in multivariate analysis.

Using Learning Analytics to Examine Achievement of Graduation Targets for Systems-Based Practice and Practice-Based Learning and Improvement: A National Cohort of Vascular Surgery Fellows

Smith BK, Luman A, Yamazaki K, Tekian A, Hamstra SJ, Holmboe E, Mitchell EL, Park YS. *Ann Vasc Surg.* 2021 Oct;76:463-471. doi: 10.1016/j.avsg.2021.03.046. Epub 2021 Apr 24. PMID: 33905852.

BACKGROUND:

Surgeons provide patient care in complex health care systems and must be able to participate in improving both personal performance and the performance of the system. The Accreditation Council for Graduate Medical Education (ACGME) Vascular Surgery Milestones are utilized to assess vascular surgery fellows' (VSF) achievement of graduation targets in the competencies of Systems Based Practice (SBP) and Practice Based Learning and Improvement (PBLI). We investigate the predictive value of semiannual milestones ratings for final achievement within these competencies at the time of graduation.

METHODS:

National ACGME milestones data were utilized for analysis. All trainees entering the 2-year vascular surgery fellowship programs in July 2016 were included in the analysis (n = 122). Predictive probability values (PPVs) were obtained for each SBP and PBLI sub-competencies by biannual review periods, to estimate the probability of VSFs not reaching the recommended graduation target based on their previous milestones ratings.

RESULTS:

The rate of nonachievement of the graduation target level 4.0 on the SBP and PBLI sub-competencies at the time of graduation for VSFs was 13.1-25.4%. At the first time point of assessment, 6 months into the fellowship program, the PPV of the SBP and PBLI milestones for nonachievement of level 4.0 upon graduation ranged from 16.3-60.2%. Six months prior to graduation, the PPVs across the 6 sub-competencies ranged from 14.6-82.9%.

CONCLUSIONS:

A significant percentage of VSFs do not achieve the ACGME Vascular Surgery Milestone targets for graduation in the competencies of SBP and PBLI, suggesting a need to improve curricula and assessment strategies in these domains across vascular surgery fellowship programs. Reported milestones levels across all time point are predictive of ultimate achievement upon graduation and should be utilized to provide targeted feedback and individualized learning plans to ensure graduates are prepared to engage in personal and health care system improvement once in unsupervised practice.

Exploring the Association Between USMLE Scores and ACGME Milestone Ratings: A Validity Study Using National Data From Emergency Medicine

Hamstra SJ, Cuddy MM, Jurich D, Yamazaki K, Burkhardt J, Holmboe ES, Barone MA, Santen SA. *Acad Med.* 2021 Sep 1;96(9):1324-1331. doi: 10.1097/ACM.0000000000004207. PMID: 34133345; PMCID: PMC8378430.

PURPOSE:

The United States Medical Licensing Examination (USMLE) sequence and the Accreditation Council for Graduate Medical Education (ACGME) milestones represent 2 major components along the continuum of assessment from undergraduate through graduate medical education. This study examines associations between USMLE Step 1 and Step 2 Clinical Knowledge (CK) scores and ACGME emergency medicine (EM) milestone ratings.

METHOD:

In February 2019, subject matter experts (SMEs) provided judgments of expected associations for each combination of Step examination and EM subcompetency. The resulting sets of subcompetencies with expected strong and weak associations were selected for convergent and discriminant validity analysis, respectively. National-level data for 2013-2018 were provided; the final sample included 6,618 EM residents from 158 training programs. Empirical bivariate correlations between milestone ratings and Step scores were calculated, then those correlations were compared with the SMEs' judgments. Multilevel regression analyses were conducted on the selected subcompetencies, in which milestone ratings were the dependent variable, and Step 1 score, Step 2 CK score, and cohort year were independent variables.

RESULTS:

Regression results showed small but statistically significant positive relationships between Step 2 CK score and the subcompetencies (regression coefficients ranged from 0.02 [95% confidence interval (CI), 0.01-0.03] to 0.12 [95% CI, 0.11-0.13]; all $P < .05$), with the degree of association matching the SMEs' judgments for 7 of the 9 selected subcompetencies. For example, a 1 standard deviation increase in Step 2 CK score predicted a 0.12 increase in MK-01 milestone rating, when controlling for Step 1. Step 1 score showed a small statistically significant effect with only the MK-01 subcompetency (regression coefficient = 0.06 [95% CI, 0.05-0.07], $P < .05$).

CONCLUSIONS:

These results provide incremental validity evidence in support of Step 1 and Step 2 CK score and EM milestone rating uses.

Female Residents Give Themselves Lower Scores Than Male Colleagues and Faculty Evaluators on ACGME Milestones

Brady JM, Bray A, Kim P, Schneider B, Lippe J, Mercer D, Sutton K. *J Surg Educ.* 2021 Jul-Aug;78(4):1305-1311. doi: 10.1016/j.jsurg.2020.12.003. Epub 2020 Dec 19. PMID: 33349566.

OBJECTIVE:

Orthopedic surgery is one of the specialties with the lowest number of women residents and practicing surgeons. The gender discrepancy in orthopedic residency training may drive a competency bias. We asked whether female orthopedic surgery residents score themselves lower on the Accreditation Council for Graduate Medical Education (ACGME) Milestones than their male counterparts, and lower than their faculty evaluators.

DESIGN:

We conducted a retrospective review of ACGME Milestone data from faculty and residents over a 4-year period. The data were analyzed using a snapshot of PGY2 (n = 20 residents) and PGY4 (n = 19 residents) scores, and using a Generalized Estimation Equation (GEE) to account for additional data points from the same residents over the 4-year data collection period.

SETTING:

Assessment scores were compiled from a single orthopedic surgery residency at Oregon Health & Science University from 2014 to 2017.

PARTICIPANTS:

The residency program has 5 residents in each program year (PGY1 through PGY5); a total of 25 residents during each year of the study were included.

RESULTS:

On average, female residents scored themselves lower than both their male counterparts and their faculty mentors. Female PGY2 self-evaluation scores were lower than males in both patient care ($p = 0.005$) and medical knowledge ($p < 0.001$). When the GEE model was applied to 99 responses from 41 residents over a 4-year period, there were no gender-related differences in resident self-evaluation scores and in faculty scores of male and female residents, with the exception of meniscal tear. For this milestone, faculty rated female residents lower than males. Furthermore, the differences between faculty evaluation scores and resident self-evaluation scores were significantly lower for males than for females for 4 of the clinical domains, as well as the systems-based practice domains of cost and communication.

CONCLUSIONS:

Our results indicate female residents are at risk for a competency bias during training, as reflected by evaluations using the ACGME Milestones.

Development and Pilot Testing of Entrustable Professional Activities for US Anesthesiology Residency Training

Woodworth GE, Marty AP, Tanaka PP, Ambardekar AP, Chen F, Duncan MJ, Fromer IR, Hallman MR, Klesius LL, Ladlie BL, Mitchell SA, Miller Juve AK, McGrath BJ, Shepler JA, Sims C 3rd, Spofford CM, Van Cleve W, Maniker RB. *Anesth Analg*. 2021 Jun 1;132(6):1579-1591. doi: 10.1213/ ANE.0000000000005434. PMID: 33661789.

BACKGROUND:

Modern medical education requires frequent competency assessment. The Accreditation Council for Graduate Medical Education (ACGME) provides a descriptive framework of competencies and milestones but does not provide standardized instruments to assess and track trainee competency over time. Entrustable professional activities (EPAs) represent a workplace-based method to assess the achievement of competency milestones at the point-of-care that can be applied to anesthesiology training in the United States.

METHODS:

Experts in education and competency assessment were recruited to participate in a 6-step process using a modified Delphi method with iterative rounds to reach consensus on an entrustment scale, a list of EPAs and procedural skills, detailed definitions for each EPA, a mapping of the EPAs to the ACGME milestones, and a target level of entrustment for graduating US anesthesiology residents for each EPA and procedural skill. The defined EPAs and procedural skills were implemented using a website and mobile app. The assessment system was piloted at 7 anesthesiology residency programs. After 2 months, faculty were surveyed on their attitudes on usability and utility of the assessment system. The number of evaluations submitted per month was collected for 1 year.

RESULTS:

Participants in EPA development included 18 education experts from 11 different programs. The Delphi rounds produced a final list of 20 EPAs, each differentiated as simple or complex, a defined entrustment scale, mapping of the EPAs to milestones, and graduation entrustment targets. A list of 159 procedural skills was similarly developed. Results of the faculty survey demonstrated favorable ratings on all questions regarding app usability as well as the utility of the app and EPA assessments. Over the 2-month pilot period, 1636 EPA and 1427 procedure assessments were submitted. All programs continued to use the app for the remainder of the academic year resulting in 12,641 submitted assessments.

CONCLUSIONS:

A list of 20 anesthesiology EPAs and 159 procedural skills assessments were developed using a rigorous methodology to reach consensus among education experts. The assessments were pilot tested at 7 US anesthesiology residency programs demonstrating the feasibility of implementation using a mobile app and the ability to collect assessment data. Adoption at the pilot sites was variable; however, the use of the system was not mandatory for faculty or trainees at any site.

Gender Differences in Milestone Ratings and Medical Knowledge Examination Scores Among Internal Medicine Residents

Hauer KE, Jurich D, Vandergrift J, Lipner RS, McDonald FS, Yamazaki K, Chick D, McAllister K, Holmboe ES. *Acad Med.* 2021 Jun 1;96(6):876-884. doi: 10.1097/ACM.0000000000004040. PMID: 33711841.

PURPOSE:

To examine whether there are group differences in milestone ratings submitted by program directors working with clinical competency committees (CCCs) based on gender for internal medicine (IM) residents and whether women and men rated similarly on milestones perform comparably on subsequent in-training and certification examinations.

METHOD:

This national retrospective study examined end-of-year medical knowledge (MK) and patient care (PC) milestone ratings and IM In-Training Examination (IM-ITE) and IM Certification Examination (IM-CE) scores for 2 cohorts (2014-2017, 2015-2018) of U.S. IM residents at ACGME-accredited programs. It included 20,098/21,440 (94%) residents, with 9,424 women (47%) and 10,674 men (53%). Descriptive statistics and differential prediction techniques using hierarchical linear models were performed.

RESULTS:

For MK milestone ratings in PGY-1, men and women showed no statistical difference at a significance level of .01 ($P = .02$). In PGY-2 and PGY-3, men received statistically higher average MK ratings than women ($P = .002$ and $P < .001$, respectively). In contrast, men and women received equivalent average PC ratings in each PGY ($P = .47$, $P = .72$, and $P = .80$, for PGY-1, PGY-2, and PGY-3, respectively). Men slightly outperformed women with similar MK or PC ratings in PGY-1 and PGY-2 on the IM-ITE by about 1.7 and 1.5 percentage points, respectively, after adjusting for covariates. For PGY-3 ratings, women and men with similar milestone ratings performed equivalently on the IM-CE.

CONCLUSIONS:

Milestone ratings were largely similar for women and men. Generally, women and men with similar MK or PC milestone ratings performed similarly on future examinations. Although there were small differences favoring men on earlier examinations, these differences disappeared by the final training year. It is questionable whether these small differences are educationally or clinically meaningful. The findings suggest fair, unbiased milestone ratings generated by program directors and CCCs assessing residents.

Is there a Gender Bias in Milestones Evaluations in General Surgery Residency Training?

Kwasny L, Shebrain S, Munene G, Sawyer R. Am J Surg. 2021 Mar;221(3):505-508. doi: 10.1016/j.amjsurg.2020.12.020. Epub 2020 Dec 13. PMID: 33358140.

BACKGROUND:

Studies of gender disparity in surgical training have yielded conflicting results. We hypothesize that there is no influence of gender on resident self-evaluation Milestone (SEM) scores and those assigned by the Clinical Competency Committee (CCC).

METHODS:

42 residents (25 male & 17 female) and faculty completed 300 Accreditation Council for Graduate Medical Education (ACGME) Milestone evaluations over a 4-year period. Two-way ANOVA, intraclass correlations coefficients, and general linear mixed models were used for analysis.

RESULTS:

CCC Milestone scores from 150 evaluations, 51 (34%) for female residents and 99 (66%) for male residents, were compared to corresponding SEM scores. There is a high interrater reliability (self vs. CCC). There was a significant increase in scores with advancing PGY levels ($p < 0.001$). No effect of gender on Milestones scores ($p > 0.05$) was noted.

CONCLUSIONS:

We found no significant differences in Milestones scores between male and female residents as determined by the CCC. Both scores improved significantly as residents progressed in training.

Do Milestone Ratings Predict Physical Medicine and Rehabilitation Board Certification Examination Scores?

Francisco GE, Yamazaki K, Raddatz M, Sabharwal S, Robinson L, Kinney C, Holmboe E. *Am J Phys Med Rehabil.* 2021 Feb 1;100(2S Suppl 1):S34-S39. doi: 10.1097/PHM.0000000000001613. PMID: 33048889.

ABSTRACT:

The Accreditation Council of Graduate Medical Education developed the Milestones to assist training programs in assessing resident physicians in the context of their participation in Accreditation Council of Graduate Medical Education-accredited training programs. Biannual assessments are done over a resident's entire training period to define the trajectory in achieving specialty-specific competencies. As part of its process of initial certification, the American Board of Physical Medicine and Rehabilitation requires successful completion of two examinations administered approximately 9 mos apart. The Part I Examination measures a single dimensional construct, physical medicine and rehabilitation medical knowledge, whereas Part II assesses the application of medical and psychiatric knowledge to multiple domains, including data acquisition, problem solving, patient management, systems-based practice, and interpersonal and communication skills through specific patient case scenarios. This study aimed to investigate the validity of the Milestones by demonstrating its association with performance in the American Board of Physical Medicine and Rehabilitation certifying examinations. A cohort of 233 physical medicine and rehabilitation trainees in 3-yr residency programs (postgraduate year 2 entry) in the United States from academic years 2014-2016, who also took the American Board of Physical Medicine and Rehabilitation Parts I and II certifying examinations between 2016 and 2018, were included in the study. Milestones ratings in four distinct observation periods were correlated with scores in the American Board of Physical Medicine and Rehabilitation Parts I and II Examinations. Milestones ratings of medical knowledge (but not patient care, professionalism, problem-based learning, interpersonal and communication skills, and systems-based practice) predicted performance in subsequent Part I American Board of Physical Medicine and Rehabilitation Examination, but none of the Milestone ratings correlated with Part II Examination scaled scores.

A Not So Perfect Score: Factors Associated with the Rate of Straight Line Scoring in Oncology Training Programs

Hinchcliff E, Gunther J, Ponnio AE, Bednarski B, Onstad M, Shafer A, Frumovitz M, Jazaeri A, Urbauer D, Bodurka DC. *J Cancer Educ.* 2020 Aug 25. doi: 10.1007/s13187-020-01855-6. Epub ahead of print. PMID: 32839894.

ABSTRACT:

Straight line scoring (SLS), defined as trainee assessments with the same score for all evaluation items, is statistically improbable and potentially indicates inaccurate assessment. Factors contributing to higher SLS rates are unknown, and knowledge of SLS prevalence within oncologic training is lacking. SLS frequency was measured for evaluations from all Accreditation Council for Graduate Medical Education (ACGME)-accredited programs at a single cancer care institution between 2014 and 2018. SLS prevalence was estimated using hierarchical linear models (HLM) that considered characteristics of evaluator, trainee, and evaluation potentially related to SLS. Results were compared with national SLS rates. Six thousand one hundred sixty evaluations were included from 476 evaluators. Overall prevalence of SLS was 12.1% (95% CI 4.5–28.8). Residents (vs fellows) were less likely to have SLS evaluations (OR 0.5, 95% CI 0.4–0.8), though for all trainees increasing training year corresponded with increasing SLS frequency (OR 1.5, 95% CI 1.3–1.7). SLS was more common in procedural specialties compared with medical specialties (OR 2.1, 95% CI 1.1–3.8). Formative evaluations had lower SLS rates (OR 0.6, 95% CI 0.5–0.9) than summative evaluations, while milestone-based evaluations had higher rates than those that were not milestone-based (OR 1.5, 95% CI 1.03–2.2). Features of evaluators, such as subspecialty within oncology, and of trainees, such as seniority or trainee type, were related to SLS. Summative intent and milestone-based evaluations were more likely to be straight line scored. Specific evaluation scenarios at higher risk of SLS should be further examined.

Do Pediatric Emergency Medicine Fellows Meet the Milestone Targets for Graduation?

Roskind, C. G., Leonard, K., Baghdassarian, A., Kou, M., Levasseur, K., Rose, J., Shabanova, V., Vu, T., Zuckerbraun, N. S., & Langhan, M. L. *Academic Pediatrics*. 2020;20(7):e35-e36.

ABSTRACT:

The ACGME Milestone Project is a competency-based assessment tool. Subcompetencies (SC) are scored on a 5-point scale, and level 4 is recommended for graduation. The 2018 Milestones Report found that across subspecialties, not all graduates are attaining a level 4 for every SC. To describe the number of pediatric emergency medicine (PEM) fellows who achieve level 4 in all 23 SC at graduation and to identify SC and predictive factors where a level 4 is not achieved. This is a multicenter, retrospective cohort study of PEM fellows. Program directors provided de-identified milestone reports from 2015- 2018. Descriptive analysis of milestone scores at graduation was performed. Demographics were compared between fellows who did and did not meet level 4 at graduation for each SC. Sub-analyses assessed differences in residency and first year milestone scores and the rate of milestone attainment between fellows who did and did not attain level 4 at graduation. Data from 48 PEM fellowship programs yielded graduation scores for 392 fellows (62% of total). 87% completed pediatric residency and 60% were female. Residency scores were available for 45 fellows. There were no SC in which all fellows attained at least level 4 at graduation; the range of fellows scoring < level 4 per SC was 7-39%. (Table 1) 67% of fellows did not attain level 4 on one or more of the 23 SC at graduation. While some fellows failed to attain a level 4 on up to all 23 SC, 26% failed to meet level 4 on only 1 or 2 SC. In 19/23 SC, residency and/or first year milestones scores were significantly lower for those who did not attain level 4 at graduation compared to those who did (mean difference 0.74 points). Those who did not attain level 4 at graduation had a significantly faster rate of improvement in milestone scores for 10/23 SC compared to those who did attain level 4. In our sample, 67% of PEM fellows did not attain level 4 for at least 1 of the 23 SC at graduation. Low scores during residency or early in fellowship may predict difficulty in meeting level 4 by fellowship completion.

The Implementation of ACGME 'Reporting Milestones' in Internal Medicine Postgraduate Year Training Program - Experience Sharing and Preliminary Outcome

Hsiao-Ju L, Jhong-Han W, Chia-Yu L, Pei-Jen T, Chiung-Yu C. 醫學教育/ Journal of Medical Education. 2020;(3):161. doi:10.6145/jme.202009_24(3).0005

PURPOSE:

Competency-based medical education has been the current trend of education, and milestones assessment is one of the means to practice it. We hereby shared our experience and preliminary results in applying reporting milestones in our postgraduate year (PGY) training program.

METHODS:

We translated the English version of 'reporting milestones' to Chinese one and built the electronic report worksheets on our web-system. Milestones assessments were conducted at the end of every month since August 2018. We analyzed the completion rate and the results of the assessments in the 2018 academic year by using IBM SPSS Statistics version 23.

RESULTS:

The completion rate of milestones assessments was 96.7% (175/181), of which the most frequent unassessed subcompetencies were patient care (PC)-4 and PC-5 (both n = 9). The mean levels of the subcompetencies ranged from 3.5 to 4 on a scale of 1-5. Our PGY physicians demonstrated better in subcompetencies systems-based practice (SBP)-1, practice-based learning and improvement (PBLI)-1, and PBLI-3 (mean levels 4.0 ± 0.4 , 4.0 ± 0.4 , 4.0 ± 0.5 , respectively), and worse in subcompetence SBP-3 (mean levels 3.5 ± 0.6) ($p < 0.05$ by ANOVA). The progress of all subcompetencies between the first and third months of rotation course was insignificant.

CONCLUSIONS:

We accomplished the reporting milestones assessments in our hospital. Our experience in implementing milestones can be as a reference for other hospitals. The learning outcomes from milestones assessments may be helpful to improve our PGY program.

Application Factors Associated with Clinical Performance during Pediatric Internship

Gross C, O'Halloran C, Winn AS, Lux SE, Michelson CD, Sectish T, Sox CM. Acad Pediatr. 2020 Apr 5. pii: S1876-2859(20)30130-3. doi: 10.1016/j.acap.2020.03.010. [Epub ahead of print]

OBJECTIVE:

Our goal was to identify aspects of residency applications predictive of subsequent performance during pediatric internship.

METHODS:

We conducted a retrospective cohort study of graduates of U.S. medical schools who began pediatric internship in a large pediatric residency program in the summers of 2013 through 2017. The primary outcome was the weighted average of subjects' ACGME pediatric milestones scores at the end of pediatric internship. To determine factors independently associated with performance, we conducted multivariate linear mixed-effects models controlling for match year and Milestone grading committee as random effects and the following application factors as fixed effects: letter of recommendation strength, clerkship grades, medical school reputation, master's or PhD degrees, gender, USMLE Step 1 score, Alpha Omega Alpha membership, private medical school, and interview score.

RESULTS:

Our study population included 195 interns. In multivariate analyses, the aspects of applications significantly associated with composite Milestone scores at the end of internship were LOR strength (estimate 0.09, 95% confidence intervals 0.04, 0.15), numbers of clerkship honors (est. 0.05, 95% CI: 0.01-0.09), medical school ranking (est. 0.04, 95% CI: 0.08-0.01), having a master's degree (est. 0.19, 95% CI: 0.03-0.36), and not having a PhD (est. 0.14, 95% CI: 0.02-0.26). Overall the final model explained 18% of the variance in milestone scoring.

CONCLUSION:

Letter of recommendation strength, clerkship grades, medical school ranking, and having obtained a Master's degree were significantly associated with higher clinical performance during pediatric internship.

Utility of Residency Milestones Reported to Fellowship Directors: A National Survey of Pediatric Fellowship Program Directors

Reed S, Mink R, Li ST. *Acad Pediatr*. 2020 Jan 21. pii: S1876-2859(20)30005-X. doi: 10.1016/j.acap.2020.01.004. [Epub ahead of print]

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) requires milestone-based assessments of residents and fellows. The ACGME recently allowed fellowship programs access to the final residency milestones for incoming fellows through the ACGME Accreditation Data System. It is unknown if fellowship programs are downloading residency milestones and if fellowship program directors (FPDs) believe they have value.

OBJECTIVE:

Determine how many pediatric FPDs downloaded residency milestones and FPD perspectives on usefulness of residency milestones for first-year fellows.

METHODS:

Cross-sectional survey of pediatric FPDs in the US, with assistance from the Subspecialty Pediatrics Investigator Network (SPIN) Steering Committee. Respondents were asked whether they downloaded residency milestones and their programs' specific use of these milestones for their first-year fellows. FPDs were asked open-ended questions about why residency milestones were or were not useful, how they could be more useful, and if they would be useful in recruitment. Descriptive statistics were used to explore quantitative data and content analysis was used to analyze qualitative data.

RESULTS:

66.5% (532/800) of FPDs responded, representing all 14 pediatric subspecialties. Most programs (60.7%; 323/532) did not download residency milestones for their first-year fellows. Of these, 67.5% (218/323) did not know they could. Of FPDs that downloaded and reviewed residency milestones, only 27% (50/185) used them for individualized education. Only 24% (129/532) of all FPDs thought residency milestones were useful or very useful. 41% (218/532) thought residency milestones would be useful or very useful during recruitment, but some believed this may harm applicants. FPDs felt residency milestones allowed for identification of trainee needs and baseline assessments, but felt that these milestones had limited usefulness during fellowship due to concerns about lack of validity evidence, relevance, and how milestones are assessed and reported (Table).

CONCLUSIONS:

Most pediatric subspecialty programs do not use residency milestones to tailor education for their first-year fellows and most think they have limited usefulness. While more FPDs felt that residency milestones might be useful during recruitment, there was not universal agreement. Further studies to improve validity of residency milestones may make them more useful to fellowship programs.

Using Longitudinal Milestones Data and Learning Analytics to Facilitate the Professional Development of Residents: Early Lessons from Three Specialties

Holmboe ES, Yamazaki K, Nasca TJ, Hamstra SJ. Acad Med. 2020 Jan;95(1):97-103. doi: 10.1097/ACM.0000000000002899.

PURPOSE:

To investigate the effectiveness of using national, longitudinal milestones data to provide formative assessments to identify residents at risk of not achieving recommended competency milestone goals by residency completion. The investigators hypothesized that specific, lower milestone ratings at earlier time points in residency would be predictive of not achieving recommended Level (L) 4 milestones by graduation.

METHOD:

In 2018, the investigators conducted a longitudinal cohort study of emergency medicine (EM), family medicine (FM), and internal medicine (IM) residents who completed their residency programs from 2015 to 2018. They calculated predictive values (PVs) and odds ratios (ORs), adjusting for nesting within programs, for specific milestone rating thresholds at 6-month intervals for all subcompetencies within each specialty. They used final milestone ratings (May/June 2018) as the outcome variables, setting L4 as the ideal educational outcome.

RESULTS:

The investigators included 1,386 (98.9%) EM residents, 3,276 (98.0%) FM residents, and 7,399 (98.0%) IM residents in their analysis. The percentage of residents not reaching Level 4 by graduation ranged from 11-31% in EM, 16-53% in FM, and 5-15% in IM. Using a milestone rating of Level 2.5 or lower at the end of PGY2, the predictive probability of not attaining the L4 milestone graduation goal ranged from 32-56% in EM, 32-67% in FM, and 15-36% in IM.

CONCLUSIONS:

Longitudinal milestones ratings may provide educationally useful, predictive information to help individual residents address potential competency gaps, but the predictive power of the milestones ratings varies by specialty and subcompetency within these three adult care specialties.

Palliative Care and Communication Training in Neurosurgery Residency: Results of a Trainee Survey

Miranda SP, Schaefer KG, Vates GE, Gormley WB, Buss MK. J Surg Educ. 2019 Nov - Dec;76(6):1691-1702. doi: 10.1016/j.jsurg.2019.06.010. Epub 2019 Jun 22.

OBJECTIVE:

Neurosurgeons care for critically ill patients near the end of life, yet little is known about how well their training prepares them for this role. We surveyed a random sample of neurosurgery residents to describe the quantity and quality of teaching activities related to serious illness communication and palliative care, and resident attitudes and perceived preparedness to care for seriously ill patients.

METHODS:

A previously validated survey instrument was adapted to reflect required communication and palliative care competencies in the 2015 the Accreditation Council for Graduate Medical Education (ACGME) Milestones for Neurological Surgery. The survey was reviewed for content validity by independent faculty neurosurgeons, piloted with graduating neurosurgical residents, and distributed online in August 2016 to neurosurgery residents in the United States using the American Association of Neurological Surgeons (AANS)/Congress of Neurological Surgeons (CNS) Joint Section on Neurotrauma and Critical Care email listserv. Multiple choice and Likert scale responses were analyzed using descriptive statistics.

RESULTS:

Sixty-two responses were recorded between August 2016 and October 2016. Most respondents reported no explicit teaching on: explaining risks and benefits of intubation and ventilation (69%), formulating prognoses in neurocritical care (60%), or leading family meetings (69%). Compared to performing craniotomies, respondents had less frequent practice leading discussions about withdrawing life-sustaining treatment (61% vs. 90%, $p < 0.01$, "weekly or more frequently"), and were less often observed (18% vs. 87%, $p < 0.01$) and given feedback on their performance (11% vs. 58%, $p < 0.01$). Nearly all respondents (95%) felt "prepared to discuss withdrawing life-sustaining treatments," however half (48%) reported they "would benefit from more communication training during residency." Most (87%) reported moral distress, agreeing that they "participated in operations and worried whether surgery aligned with patient goals."

CONCLUSIONS:

Residents in our sample reported limited formal training, and relatively less observation and feedback, on required ACGME competencies in palliative care and communication. Most reported preparedness in this domain, but many were receptive to more training. Better quality and more consistent palliative care education in neurosurgery residency could improve competency and help ensure that neurosurgical care aligns with patient goals.

Family Medicine Residency Graduates' Preparation for Quality Improvement Leadership

Lichkus J, Fang B, Peterson LE. J Grad Med Educ. 2019 Oct;11(5):558-564. doi: 10.4300/JGME-D-18-01060.1.

BACKGROUND:

Training in quality improvement (QI) is a standard component of family medicine residency education. Graduating family medicine residents' ability to lead QI initiatives is unknown.

OBJECTIVE:

We assessed the preparedness of graduating family medicine residents to lead QI projects and to identify factors that may increase such readiness.

METHODS:

Milestone data for all graduating family medicine residents were linked to a practice demographic questionnaire completed by the same residents who registered for the American Board of Family Medicine certification examination between 2014 and 2017. The change in self-assessed QI preparedness over time and its association with faculty-assigned milestone ratings were examined using descriptive and regression analyses.

RESULTS:

The questionnaire had a 100% response rate (12 208 responded). Between 2014 and 2017, the percentage of residents who self-reported being "extremely" or "moderately" prepared to lead QI projects increased from 72.7% (2208 of 3038) to 75.8% (2434 of 3210, $P = .009$). Self-reported QI team leadership was associated with 93% higher odds of feeling extremely prepared compared to moderately prepared (odds ratio 1.93, 95% CI 1.58-2.35). The average midyear faculty-assigned milestone rating for QI among residents who felt "extremely" prepared was 3.28 compared to 3.14 among those who felt "not at all" prepared.

CONCLUSIONS:

Over the past 4 years, family medicine residents' self-assessed preparedness to lead QI projects has barely increased. There was no correlation between self-assessed preparation and faculty-assigned milestone rating. However, we found a small association between self-reported QI leadership and self-assessed QI preparedness.

Resident Education in Complex Obstetric Procedures: Are We Adequately Preparing Tomorrow's Obstetricians?

Dotters-Katz SK, Gray B, Heine RP, Propst K. Am J Perinatol. 2019 Jun 25. doi: 10.1055/s-0039-1692714.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) milestones for obstetrics and gynecology (OB/GYN) residents include obstetrical technical skills. We sought to describe resident experience with surgical obstetrics and comfort performing procedures independently postgraduation.

STUDY DESIGN:

An anonymous 27-question e-survey was sent to OB/GYN residents in United States in March 2018, using the Council of Resident Education in Obstetrics and Gynecology coordinator listserv. Complex obstetric procedures included: forceps-assisted vaginal delivery (FAVD) and vacuum-assisted vaginal delivery (VAVD), cerclage, breech second twin, breech delivery, perineal repairs, and cesarean hysterectomy. Technical skill questions included experience as primary surgeon, comfort performing procedures independently, and for 4th year residents- comfort performing procedures postresidency. Demographic information was queried.

Descriptive statistics was used to analyze responses.

RESULTS:

A total of 417 residents completed the survey. Respondents were 88% female, 75% from academic programs, and 48% postgraduate year 3 and 4. Among all residents, many had been primary surgeon in operative vaginal deliveries (51% FAVD, 72% VAVD), fewer for breech vaginal delivery (21%), breech second twin (34%), cesarean hysterectomy (21%), and 4th degree repairs (37%). All 4th-year respondents stated that they would feel comfortable performing either VAVD or FAVD postresidency. Note that 17, 33, 28, and 74% would not feel comfortable performing a 4th degree repair, cesarean hysterectomy, breech second twin, and breech vaginal delivery, respectively, postresidency.

CONCLUSION:

Despite ACGME recommendations, data suggest that many graduating residents may not be comfortable with these complex procedures.

Milestone Implementation's Impact on Narrative Comments and Perception of Feedback for Internal Medicine Residents: A Mixed Methods Study

Raaum SE, Lappe K, Colbert-Getz JM, Milne CK. J Gen Intern Med. 2019 Jun;34(6):929-935.
doi: 10.1007/s11606-019-04946-3.

BACKGROUND:

Feedback is a critical element of graduate medical education. Narrative comments on evaluation forms are a source of feedback for residents. As a shared mental model for performance, milestone-based evaluations may impact narrative comments and resident perception of feedback.

OBJECTIVE:

To determine if milestone-based evaluations impacted the quality of faculty members' narrative comments on evaluations and, as an extension, residents' perception of feedback.

DESIGN:

Concurrent mixed methods study, including qualitative analysis of narrative comments and survey of resident perception of feedback.

PARTICIPANTS:

Seventy internal medicine residents and their faculty evaluators at the University of Utah.

APPROACH:

Faculty narrative comments from 248 evaluations pre- and post-milestone implementation were analyzed for quality and Accreditation Council for Graduate Medical Education competency by area of strength and area for improvement. Seventy residents were surveyed regarding quality of feedback pre- and post-milestone implementation.

KEY RESULTS:

Qualitative analysis of narrative comments revealed nearly all evaluations pre- and post-milestone implementation included comments about areas of strength but were frequently vague and not related to competencies. Few evaluations included narrative comments on areas for improvement, but these were of higher quality compared to areas of strength ($p < 0.001$). Overall resident perception of quality of narrative comments was low and did not change following milestone implementation ($p = 0.562$) for the 86% of residents ($N = 60/70$) who completed the pre- and post-surveys.

CONCLUSIONS:

The quality of narrative comments was poor, and there was no evidence of improved quality following introduction of milestone-based evaluations. Comments on areas for improvement were of higher quality than areas of strength, suggesting an area for targeted intervention. Residents' perception of feedback quality did not change following implementation of milestone-based evaluations, suggesting that in the post-milestone era, internal medicine educators need to utilize additional interventions to improve quality of feedback.

Feedback with Performance Metric Scorecards Improves Resident Satisfaction but Does Not Impact Clinical Performance

Mamtani M, Shofer FS, Sackeim A, Conlon L, Scott K, Mills AM. *AEM Educ Train*. 2019 May 20;3(4):323-330. doi: 10.1002/aet2.10348. eCollection 2019 Oct.

OBJECTIVES:

The Emergency Medicine Milestone Project, a framework for assessing competencies, has been used as a method of providing focused resident feedback. However, the emergency medicine milestones do not include specific objective data about resident clinical efficiency and productivity, and studies have shown that milestone-based feedback does not improve resident satisfaction with the feedback process. We examined whether providing performance metric reports to resident physicians improves their satisfaction with the feedback process and their clinical performance.

METHODS:

We conducted a three-phase stepped-wedge randomized pilot study of emergency medicine residents at a single, urban academic site. In phase 1, all residents received traditional feedback; in phase 2, residents were randomized to receive traditional feedback (control group) or traditional feedback with performance metric reports (intervention group); and in phase 3, all residents received monthly performance metric reports and traditional feedback. To assess resident satisfaction with the feedback process, surveys using 6-point Likert scales were administered at each study phase and analyzed using two-sample t-tests. Analysis of variance in repeated measures was performed to compare impact of feedback on resident clinical performance, specifically patient treatment time (PTT) and patient visits per hour.

RESULTS:

Forty-one residents participated in the trial of which 21 were randomized to the intervention group and 20 in the control group. Ninety percent of residents liked receiving the report and 74% believed that it better prepared them for expectations of becoming an attending physician. Additionally, residents randomized to the intervention group reported higher satisfaction ($p = 0.01$) with the quality of the feedback compared to residents in the control group. However, receiving performance metric reports, regardless of study phase or postgraduate year status, did not affect clinical performance, specifically PTT (183 minutes vs. 177 minutes, $p = 0.34$) or patients visits per hour (0.99 vs. 1.04, $p = 0.46$).

CONCLUSIONS:

While feedback with performance metric reports did not improve resident clinical performance, resident physicians were more satisfied with the feedback process, and a majority of residents expressed liking the reports and felt that it better prepared them to become attending physicians. Residency training programs could consider augmenting feedback with performance metric reports to aide in the transition from resident to attending physician.

Effectiveness of the Adolescent Medicine Rotation in Improving Pediatric Residents Self-Assessed Skill and Confidence Caring for Youth

Ruedinger E, Carlin K, Inwards-Breland D, McCarty CA. *J Adolesc Health*. 2019 Apr;64(4):530-536. doi: 10.1016/j.jadohealth.2018.10.007. Epub 2018 Dec 6.

PURPOSE:

Practicing and resident pediatricians report inadequate skill in caring for adolescents, despite adolescents comprising roughly one-quarter of most general and subspecialty practices. This study examined the effectiveness of participation in an adolescent medicine rotation at improving pediatric residents' self-perceived skills and confidence across nine key adolescent health domains. We also evaluated the impact of didactic instruction during the rotation.

METHODS:

Resident and recent-graduate participants (n = 34) completed milestone-based self-assessment of their skill and confidence caring for adolescent patients in nine key adolescent health-related domains. This study employed a post-test then retrospective pretest, an educational study design used to minimize response-shift bias whereby participants rate their skill and confidence at the end of the intervention (post-test), and then reflect back to retrospectively rate their preintervention skill (retrospective pretest). Additionally, differences in gains between those who did and did not participate in didactic instruction were evaluated. Didactic instruction was delivered during the adolescent medicine rotation utilizing a flipped-classroom model; participants received standardized preparatory materials and participated in active-learning workshops.

RESULTS:

Participants demonstrated a significant ($p \leq .0001$) increase in self-perceived skill levels for all assessed domains after the rotation as compared to before the rotation, whether or not they received didactic instruction. Participation in didactic instruction did not yield significant ($p \leq .05$) additional benefit for any of the assessed domains.

CONCLUSIONS:

Participation in an adolescent medicine rotation is of value to pediatric resident trainees and leads to increased self-assessed skill and confidence in caring for youth.

The Use of Patient-Specific Three-Dimensional Printed Surgical Models Enhances Plastic Surgery Resident Education in Craniofacial Surgery

Lobb DC, Cottler P, Dart D, Black JS. *J Craniofac Surg.* 2019 Mar/Apr;30(2):339-341. doi: 10.1097/SCS.0000000000005322.

PURPOSE:

A significant challenge in surgical education is to provide a meaningful hands-on experience with the pathology the trainee will see in independent practice. Craniofacial anatomy is challenging and unfamiliar to the learner.

METHODS:

Using preoperative computed tomography data, the authors produced an accurately sized, three-dimensional (3D) printed model of the congenital craniofacial anatomy of patients treated by the same attending surgeon-PGY4 resident surgeon pair over the course of a 6-month rotation. A preoperative stepwise surgical plan was written by the attending and resident, and the plan was marked on the 3D model by the attending and resident separately. The written and marked plans were measured for accuracy and time to completion. The resident surgeon's applicable milestone levels were assessed.

RESULTS:

Seven congenital craniofacial anomalies met criteria for inclusion: 4 craniosynostosis cases, 2 mandibular distractions, and 1 LeFort I distraction. The number of inaccuracies of the written plan improved from 5 to 0 for sagittal synostosis and 4 to 0 for mandibular distraction. The time to complete the written plan decreased by 22% for sagittal synostosis and 45% for mandibular distraction. The number of inaccuracies of the marked plan decreased from 5 to 0 for sagittal synostosis and 2 to 0 for mandibular distraction. Time to completion of the marked plan decreased by 76% for sagittal synostosis and 50% for mandibular distraction. Milestone scores increased an average of 1.875 levels.

CONCLUSION:

Three-dimensional printed craniofacial models are a positive addition to resident training and have been objectively quantified to improve the accuracy and time to completion of the surgical plan as well as progression in the plastic surgery milestones.

Factors that Contribute to Resident Teaching Effectiveness

Rutz M, Turner J, Pettit K, Palmer MM, Perkins A, Cooper DD. *Cureus*. 2019 Mar 21;11(3):e4290. doi: 10.7759/cureus.4290.

BACKGROUND:

One of the key components of residency training is to become an educator. Resident physicians teach students, advanced practice providers, nurses, and even faculty on a daily basis.

OBJECTIVE:

The goal of this study was to identify the objective characteristics of residents, which correlate with perceived overall teaching effectiveness.

METHODS:

We conducted a one-year, retrospective study to identify factors that were associated with higher resident teaching evaluations. Senior emergency medicine (EM) teaching residents are evaluated by medical students following clinical teaching shifts. Eighteen factors pertaining to resident teaching effectiveness were chosen. Two items from the medical students' evaluations were analyzed against each factor: teaching effectiveness was measured on a five-point Likert scale and an overall teaching score (1-75).

RESULTS:

A total of 46 EM residents and 843 medical student evaluations were analyzed. The ACGME milestones for systems-based practice ($p = 0.02$) and accountability ($p = 0.05$) showed a statistically significant association with a rating of "five" on the Likert scale for teaching effectiveness. Three other ACGME milestones, systems-based practice ($p = 0.01$), task switching ($p = 0.04$), and team management ($p = 0.03$) also showed a statically significant association of receiving a score of 70 or greater on the overall teaching score.

CONCLUSION:

Residents with higher performance associated with system management and accountability were perceived as highly effective teachers. USMLE and in-service exams were not predictive of higher teaching evaluations. Our data also suggest that effective teachers are working in both academic and community settings, providing a potential resource to academic departments and institutions.

Resident Case Volume Correlates with Clinical Performance: Finding the Sweet Spot

Agarwal V, Bump GM, Heller MT, Chen LW, Branstetter BF 4th, Amesur NB, Hughes MA. Acad Radiol. 2019 Jan;26(1):136-140. doi: 10.1016/j.acra.2018.06.023. Epub 2018 Aug 4.

RATIONALE AND OBJECTIVES:

To determine whether the total number of studies interpreted during radiology residency correlates with clinical performance as measured by objective criteria.

MATERIALS AND METHODS:

We performed a retrospective cohort study of three graduating classes of radiology residents from a single residency program between the years 2015-2017. The total number of studies interpreted by each resident during residency was tracked. Clinical performance was determined by tracking an individual resident's major discordance rate. A major discordance was recorded when there was a difference between the preliminary resident interpretation and final attending interpretation that could immediately impact patient care. Accreditation council for graduate medical education milestones at the completion of residency, Diagnostic radiology in-training scores in the third year, and score from the American board of radiology core exam were also tabulated. Pearson correlation coefficients and polynomial regression analysis were used to identify correlations between the total number of interpreted films and clinical, test, and milestone performance.

RESULTS:

Thirty-seven residents interpreted a mean of 12,709 studies (range 8898-19,818; standard deviation [SD] 2351.9) in residency with a mean major discordance rate of 1.1% (range 0.34%- 2.54%; stand dev 0.49%). There was a nonlinear correlation between total number of interpreted films and performance. As the number of interpreted films increased to approximately 16,000, clinical performance ($p = 0.004$) and test performance ($p = 0.01$) improved, but volumes over 16,000 correlated with worse performance.

CONCLUSION:

The total number of studies interpreted during radiology training correlates with performance. Residencies should endeavor to find the "sweet spot": the amount of work that maximizes clinical exposure and knowledge without overburdening trainees.

Intern Self-Reported Preparedness for Residency: An ACGME Milestone-Based Study

McLean ME, Huls TA, Park JC, Anana MC, Chen AS, Chien GK, Cygan L, Gupta SJ, Husain A, Mishra DN, Ng KM, Russell JT, Surlles RT, Kulkami ML. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*. 2019;20:S10.

OBJECTIVE:

Transitioning from medical school to internship is challenging. While several curricula for medical students and interns have been proposed during this transition period, there has not been a large-scale self assessment of incoming emergency medicine (EM) interns' preparedness for EM milestones. While many medical schools and EM residencies host "boot camps" or other intensive orientation programs for EM-bound students, having knowledge of incoming EM residents' self-perceived strengths and weaknesses will help clerkship directors and EM residency leadership better serve this group of learners. Milestones in EM are used in the United States to measure residents' progress and determine competence at residency completion.⁴ Incoming interns are expected to have achieved level 1 milestones by the time they enter residency, to have achieved level 2 milestones between the first and second year, and to have achieved level 4 milestones before completion of residency. We reached out to 151 newly-matched interns at 11 different sites to ask about their self-perceived "preparedness" for levels 1, 2, and 3 of our eight selected EM milestones (numbers 1, 3, 4, 5, 7, 9, 10, and 12).

DESIGN AND METHOD:

This was a prospective, cross-sectional study of 151 newly-matched pre-interns at 11 EM residency programs. We included all newly-matched interns at each program. Interns were invited via email from their programs to complete a voluntary, anonymous survey prior to the start of residency. The survey used a Likert scale (1 = very unprepared to 5 = extremely prepared) to assess self-reported preparedness to perform levels 1 and 2 of milestones 1, 3, 4, 5, 7, 9, 10, and 12. Milestones were chosen based on ease of teaching in an EM case curriculum that was later implemented.

RESULTS:

A total of 126 pre-interns completed the survey (response rate 83.4%).

CONCLUSION:

Subjects reported highest level of preparedness for emergency stabilization (PC1), and lowest levels of preparedness for airway management (PC10) and pharmacological management (PC5). The data suggest that teachers of fourth-year medical students and new EM interns may want to emphasize milestones 5 and 10 early in internship or late in medical school.

A Milestone-Based Pediatric Intern Boot Camp: An Educational Intervention to Minimize the July Effect

Novosel A, van de Ridder M, Smith-King C, McLeod M, Triemstra J. 69. *Academic Pediatrics*. 2019;(6). doi:10.1016/j.acap.2019.05.083.

INTRODUCTION:

The transition from student to intern is difficult and highlighted by performance missteps often referred to as the July Effect. Some pediatric institutions have implemented intern boot camps (IBC) to better prepare interns at the start of residency. Such pediatric boot camps described in the literature have not specifically targeted the ACGME/ABP Pediatric Milestones. We implemented an IBC that utilized these milestones to improve the interns' confidence, knowledge, and skills. Methods 19 new interns participated in the IBC at the HDVCH/MSU Pediatric Residency Program. We used Kerns Six-Step Approach as a conceptual framework and targeted 3 levels of Kirkpatrick's level of evaluation (reaction, learning, and behavior). A needs assessment from residents and faculty was used to identify specific milestones. We designed our IBC to include lectures, workshops and clinical experiences to target these milestones. A questionnaire containing 15-confidence (Likert Scale 1-5) and 10 knowledge-based questions was given before and after the IBC. The paired t-test was used to assess total confidence scores and pre/post knowledge measures. The sign test was used to compare individual confidence questions. Block 1 milestone evaluations were analyzed for pre-IBC (2016, 2017) and post-IBC interns (2018). Significance was assessed at $p < 0.05$.

RESULTS:

Interns demonstrated a significant improvement in their overall confidence score (Pre: 47.7 ± 4.1 , Post: 58.6 ± 5.3 ; $p < 0.001$). All individual confidence questions showed increases. Interns demonstrated a significant improvement in perceived pediatric knowledge on the post-IBC test (Pre: 5.2 ± 1.5 , Post: 6.8 ± 1.3 ; $p = 0.004$). Block 1 evaluations from 7/2018 did not show improved evaluations when compared to pre-IBC cohorts.

CONCLUSIONS:

Incoming interns demonstrated a significant improvement in confidence and perceived knowledge of the targeted pediatric milestones after participating in the IBC. Our innovative approach of targeting pediatric milestones in an IBC suggests that such a targeted curriculum helps the difficult transition for interns.

Moving toward Milestone-Based Assessment in Osteopathic Manipulative Medicine

Seals RA. J Am Osteopath Assoc. 2018 Dec 1;118(12):806-811. doi: 10.7556/jaoa.2018.173.

ABSTRACT:

Osteopathic medicine is continuing to move toward competency-based education at undergraduate and graduate levels. Competencies and Entrustable Professional Activities (EPAs) have been implemented to guide educators on the skills and abilities that osteopathic medical students and residents should be able to perform as physicians. Unfortunately, many of these skills have not been well described, and the threshold of "competence" or "entrustability" for each of these tasks remains elusive. The author presents an approach to measuring competence in the domain of osteopathic manipulative medicine using a milestone rubric to assess skills related to osteopathic screening, diagnosis, technique, and explanation. This rubric can be applied to all levels of osteopathic training and across many diagnostic and treatment modalities. Clearly defining and assessing the individual skills composing competence in osteopathic manipulative medicine will be increasingly important as medical education continues to evolve and modernize.

Electronic Health Records as an Educational Tool: Viewpoint

Habboush Y, Hoyt R, Beidas S' JMIR Med Educ. 2018 Nov 12;4(2):e10306. doi: 10.2196/10306.

BACKGROUND:

Electronic health records (EHRs) have been adopted by most hospitals and medical offices in the United States. Because of the rapidity of implementation, health care providers have not been able to leverage the full potential of the EHR for enhancing clinical care, learning, and teaching. Physicians are spending an average of 49% of their working hours on EHR documentation, chart review, and other indirect tasks related to patient care, which translates into less face time with patients.

OBJECTIVE:

The purpose of this article is to provide a preliminary framework to guide the use of EHRs in teaching and evaluation of residents.

METHODS:

First we discuss EHR educational capabilities that have not been reviewed in sufficient detail in the literature and expand our discussion for each educational activity with examples. We emphasize quality improvement of clinical notes as a basic foundational skill using a spreadsheet-based application as an assessment tool. Next, we integrate the six Accreditation Council for Graduate Medical Education (ACGME) Core Competencies and Milestones (CCMs) framework with the Reporter-Interpreter- Manager-Educator (RIME) model to expand our assessments of other areas of resident performance related to EHR use. Finally, we discuss how clinical utility, clinical outcome, and clinical reasoning skills can be assessed in the EHR.

RESULTS:

We describe a pilot conceptual framework-CCM framework-to guide and demonstrate the use of the EHR for education in a clinical setting.

CONCLUSIONS:

As EHRs and other supporting technologies evolve, medical educators should continue to look for new opportunities within the EHR for education. Our framework is flexible to allow adaptation and use in most training programs. Future research should assess the validity of such methods on trainees' education.

Competencies, Milestones, and a Level of Supervision Scale for Entrustable Professional Activities for Scholarship

Mink RB, Myers AL, Turner DA, Carraccio CL. Acad Med. 2018 Nov;93(11):1668-1672. doi: 10.1097/ACM.0000000000002353.

PROBLEM:

Scholarship is an important element of both undergraduate and graduate medical education, and scholarly activity is required for all pediatric fellows. However, despite the creation of entrustable professional activities (EPA) for scholarship, the specific progressive levels of performance and the appropriate level of supervision for a given performance level have not been defined. The authors developed competencies and milestones for the scholarship EPA to provide a framework for assessment across the continuum; a level of supervision scale was also developed.

APPROACH:

The Vitae Researcher Development Framework served as a template to create the competencies and milestones for the scholarship EPA. Beginning in September 2015 and using a modified Delphi approach, three distinct drafts were circulated to individuals with expertise in various types of scholarship until broad agreement was achieved. Then, in October 2016, the Steering Committee of the Subspecialty Pediatrics Investigator Network created a level of supervision scale, modeled after one it had previously developed.

OUTCOMES:

Eight competencies were identified as important in making entrustment decisions related to scholarship. For each competency, five milestone levels that span the continuum from novice to expert were created. A supervision scale with five progressive levels of entrustment was also created.

NEXT STEPS:

Next steps include a study to obtain validity evidence for the supervision scale and determine the correlation between milestone and supervision levels. These competencies, milestones, and supervision levels can potentially serve as a roadmap for trainees and junior faculty and also play a role in the assessment of physician-scientists.

Radiology Resident Assessment and Feedback Dashboard

Durojaiye AB, Snyder E, Cohen M, Nagy P, Hong K, Johnson PT. Radiographics. 2018 Sep-Oct; 38(5): 1443-1453. doi: 10.1148/rg.2018170117. Epub 2018 Aug 10.

ABSTRACT:

Assessment of residents is optimally performed through processes and platforms that provide daily feedback, which can be immediately acted on. Given the documentation required by the Accreditation Council for Graduate Medical Education (ACGME), effective data management, integration, and presentation are crucial to ease the burden of manual documentation and increase the timeliness of actionable information. To this end, the authors modeled the learning activities of residents using the Experience Application Programming Interface (xAPI) framework, which is a standard framework for the learning community. On the basis of the xAPI framework and using open-source software to extend their existing infrastructure, the authors developed a Web-based dashboard that provides residents with a more holistic view of their educational experience. The dashboard was designed around the ACGME radiology milestones and provides real-time feedback to residents using various assessment metrics derived from multiple data sources. The purpose of this article is to describe the dashboard's architecture and components, the design and technical considerations, and the lessons learned in implementing the dashboard.

Analysis of Milestone-Based End-of-Rotation Evaluations for Ten Residents Completing a Three-Year Anesthesiology Residency

Chemtob CM, Tanaka P, Keil M, Macario A. *Cureus*. 2018 Aug 24;10(8):e3200. doi: 10.7759/cureus.3200.

INTRODUCTION:

Faculty are required to assess the development of residents using educational milestones. This descriptive study examined the end-of-rotation milestone-based evaluations of anesthesiology residents by rotation faculty directors. The goals were to measure: (1) how many of the 25 Accreditation Council for Graduate Medical Education (ACGME) anesthesiology subcompetency milestones were included in each of the residency's rotations evaluations, (2) the percentage of evaluations sent to the rotation director that were actually completed by the director, (3) the length of time between the end of the residents' rotations and completion of the evaluations, (4) the frequency of straight line scoring, defined as the resident receiving the same milestone level score for all subcompetencies on the evaluation, and (5) how often a resident received a score below a Level 4 in at least one subcompetency in the three months prior to graduating.

METHODS:

In 2013, the directors for each the 24 anesthesia rotations in the Stanford University School of Medicine Anesthesiology Residency Program created new milestone-based evaluations to be used at the end of rotations to evaluate residents. The directors selected the subcompetencies from the list released by the ACGME that were most appropriate for their rotation. End-of-rotation evaluations for the post graduate year (PGY)-2 to PGY-4 from July 1, 2014 to June 30, 2017 were retrospectively analyzed for a sample of 10 residents randomly selected from 22 residents in the graduating class.

RESULTS:

The mean number of subcompetencies evaluated by each of the 24 rotations in the residency equaled 17.88 (standard deviation (SD): 3.39, range 10-24, median 18.5) from the available possible total of 25 subcompetencies. Three subcompetencies (medical knowledge, communication with patients and families, and coordination of patient care within the healthcare system) were included in the evaluation instruments of all 24 rotations. The three least frequently listed subcompetencies were: "acute, chronic, and cancer-related pain consultation/management" (25% of rotations had this on the end-of-rotation evaluation), "triage and management of critically ill patient in non-operative setting" (33%), and "education of patient, families, students, residents, and others" (38%). Overall, 418 end of rotation evaluations were issued and 341 (82%) completed, with 63% completed within one month, 22% between month one and two, and 15% after two months. The frequency of straight line scoring varied, from never occurring (0%) in three rotations to always occurring (100%) in two rotations, with an overall average of 51% (SD: 33%). Sixty-one percent of straight line scoring corresponded to the residents' postgraduate year whereby, for example, a post-graduate year two resident received an ACGME Level 2 proficiency for all subcompetencies. Thirty-one percent of the straight line scoring was higher than the resident's year of training (e.g., a PGY-2 received Level 3 or higher for all the subcompetencies). The remaining 7% of straight line scoring was below the expected level for the year of training. Three of seven residents had at least one subcompetency rated as below a Level 4 on one of the evaluations during the three months prior to finishing residency.

CONCLUSION:

Formal analysis of a residency program's end-of-rotation milestone evaluations may uncover opportunities to improve competency-based evaluations.

Resident-Specific Morbidity Reduced Following ACS NSQIP Data-Driven Quality Program

Turrentine FE, Hanks JB, Tracci MC, Jones RS, Schirmer BD, Smith PW. J Surg Educ. 2018 Apr 16. pii: S1931-7204(17)30689-X. doi: 10.1016/j.jsurg.2018.04.001.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Milestone Project for general surgery provided a more robust method for developing and tracking residents' competence. This framework enhanced systematic and progressive development of residents' competencies in surgical quality improvement.

STUDY DESIGN:

A 22-month interactive, educational program based on resident-specific surgical outcomes data culminated in a quality improvement project for postgraduate year 4 surgery residents. Self-assessment, quality knowledge test, and resident-specific American College of Surgeons National Surgical Quality Improvement Program Quality In-Training Initiative morbidity were compared before and after the intervention.

RESULTS:

Quality in-training initiative morbidity decreased from 25% (82/325) to 18% (93/517), $p = 0.015$ despite residents performing more complex cases. All participants achieved level 4 competency (4/4) within the general surgery milestones improvement of care, practice-based learning and improvement competency. Institutional American College of Surgeons National Surgical Quality Improvement Program general surgery morbidity improved from the ninth to the sixth decile. Quality assessment and improvement self-assessment postintervention scores ($M = 23.80$, $SD = 4.97$) were not significantly higher than preintervention scores ($M = 19.20$, $SD = 5.26$), $p = 0.061$. Quality Improvement Knowledge Application Tool postintervention test scores ($M = 17.4$, $SD = 4.88$), were not significantly higher than pretest scores ($M = 13.2$, $SD = 1.92$), $p = 0.12$.

CONCLUSION:

Sharing validated resident-specific clinical data with participants was associated with improved surgical outcomes. Participating fourth year surgical residents achieved the highest score, a level 4, in the practice based learning and improvement competency of the improvement of care practice domain and observed significantly reduced surgical morbidity for cases in which they participated.

Education Research: The Current State of Neurophysiology Education in Selected Neurology Residency Programs

Daniello KM, Weber DJ. *Neurology*. 2018 Apr 10;90(15):708-711. doi: 10.1212/WNL.0000000000005296.

OBJECTIVE:

Prior research has illustrated there is a knowledge gap in neurology residents' neurophysiology education (EEG and EMG), and we sought to understand whether this is still an issue and to recognize the barriers in order to create solutions and improve education.

METHODS:

Surveys were developed for adult neurology residents and one for program directors asking about confidence in neurophysiology knowledge, percent of graduates reaching level 4 ACGME (American Council of Graduate Medical Education) milestones in EEG and EMG, methods of learning used, interest in the subjects, and suggestions for improvements.

RESULTS:

Twenty-six program directors (19% responder rate) and 55 residents (from at least 16 different programs) completed the survey. Program directors thought that 85% of graduating residents met level 4 milestones in EEG and only 75% in EMG. Structured rotations and more time allocated to education of these topics were frequent barriers mentioned. Postgraduate year 4 residents were 60% and 67% confident in EEG and 64%, 59%, and 62.3% in EMG level 4 milestones. Learning to read EEGs was considered important throughout residents' training; however, this interest and value decreased over time with EMG.

CONCLUSION:

In our study, program directors suspect up to a quarter of residents may graduate not meeting level 4 ACGME milestones, and residents expressed lack of confidence in these areas. The educational methods used to instruct residents in EEG and EMG were similar as were the barriers they face across programs. This information hopefully will help fuel curriculum design and interest in these important neurology techniques.

Using an Alumni Survey to Target Improvements in an Emergency Medicine Training Programme

Gaeta T, Mahalingam G, Pyle M, Dam A, Visconti A. Emerg Med J. 2018 Mar;35(3):189-191. doi: 10.1136/emered-2017-206692. Epub 2017 Oct 21.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education (ACGME) is the governing body responsible for accrediting graduate medical training programme in the USA. The Emergency Medicine Milestones (EM-Milestones) were developed by the ACGME and American Board of Emergency Medicine as a guide and monitoring tool for the knowledge, skills, abilities and experiences to be acquired during training. Alumni surveys have been reported as a valuable resource for training programme to identify areas for improvement; however, there are few studies regarding programme improvement in emergency medicine. We aimed to use the EM- Milestones, adapted as an alumni self-assessment survey, to identify areas for training programme improvement.

METHODS:

This study was conducted at an urban, academic affiliated, community hospital in New York city with an emergency medicine training programme consisting of 30 residents over 3 years. Alumni of our emergency medicine training programme were sent an EM-Milestones-based self- assessment survey. Participants evaluated their ability in each EM-Milestones subcompetency on a Likert scale. Data were analysed using descriptive statistics.

RESULTS:

Response rate was 74% (69/93). Alumni reported achieving the target performance in 5/6 general competencies, with Systems-Based Practice falling below the target performance. The survey further identified 6/23 subcompetencies (Pharmacotherapy, Ultrasound, Wound Management, Patient Safety, Systems-Based Management and Technology) falling below the target performance level.

DISCUSSION:

Alumni self-evaluation of competence using the EM-Milestones provides valuable information concerning confidence to practice independently; these data, coupled with regular milestone evaluation of existing trainees, can identify problem areas and provide a blueprint for targeted programme improvement.

Burnout is Associated with Emotional Intelligence but not Traditional Job Performance Measurements in Surgical Residents

Cofer KD, Hollis RH, Goss L, Morris MS, Porterfield JR, Chu DI. J Surg Educ. 2018 Feb 23. pii: S1931-7204(17)30516-0. doi: 10.1016/j.jsurg.2018.01.021.

OBJECTIVE:

To evaluate whether burnout was associated with emotional intelligence and job performance in surgical residents.

DESIGN:

General surgery residents at a single institution were surveyed using the Maslach Burnout Inventory (MBI) and trait EI questionnaire (TEIQ-SF). Burnout was defined as scoring in 2 of the 3 following domains; Emotional Exhaustion (high), Depersonalization (high), and Personal Accomplishment (low). Job performance was evaluated using faculty evaluations of clinical competency-based surgical milestones and standardized test scores including the American Board of Surgery In-Training Exam (ABSITE) and the United States Medical Licensing Examination (USMLE) Step 3. USMLE Step 1 and USMLE Step 2, which were taken prior to residency training, were included to examine possible associations of burnout with USMLE examinations. Statistical comparison was made using Pearson correlation and simple linear regression adjusting for PGY level.

SETTING:

This study was conducted at the University of Alabama at Birmingham (UAB) general surgery residency program.

PARTICIPANTS:

All current and incoming general surgery residents at UAB were invited to participate in this study.

RESULTS:

Forty residents participated in the survey (response rate 77%). Ten residents, evenly distributed from incoming residents to PGY-4, had burnout (25%). Mean global EI was lower in residents with burnout versus those without burnout (3.71 vs 3.9, $p = 0.02$). Of the 4 facets of EI, mean self-control values were lower in residents with burnout versus those without burnout (3.3 vs 4.06, $p < 0.01$). Each component of burnout was associated with global EI, with the strongest correlation being with personal accomplishment ($r = 0.64$; $p < 0.01$). Residents with burnout did not have significantly different mean scores for USMLE Step 1 (229 vs 237, $p = 0.12$), Step 2 (248 vs 251, $p = 0.56$), Step 3 (223 vs 222, $p = 0.97$), or ABSITE percentile (44.6 vs 58, $p = 0.33$) compared to residents without burnout. Personal accomplishment was associated with ABSITE percentile scores ($r = 0.35$; $p = 0.049$). None of the 16 surgical milestone scores were significantly associated with burnout.

CONCLUSIONS:

Burnout is present in surgery residents and associated with emotional intelligence. There was no association of burnout with USMLE scores, ABSITE percentile, or surgical milestones. Traditional methods of assessing resident performance may not be capturing burnout and strategies to reduce burnout should consider targeting emotional intelligence.

The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs

Conforti LN, Yaghmour NA, Hamstra SJ, Holmboe ES, Kennedy B, Liu JJ, Waldo H, Selden NR. *J Surg Educ*.

2018 Jan - Feb;75(1):147-155. doi: 10.1016/j.jsurg.2017.06.001. Epub 2017 Jun 22.

OBJECTIVES:

The purpose of this study was to determine the effect of the Accreditation Council for Graduate Medical Education Milestones on the assessment of neurological surgery residents. The authors sought to determine the feasibility, acceptability, and utility of this new framework in making judgments of progressive competence, its implementation within programs, and the influence on curricula. Residents were also surveyed to elicit the effect of Milestones on their educational experience and professional development.

DESIGN, SETTING, AND PARTICIPANTS:

In 2015, program leadership and residents from 21 neurological surgery residency programs participated in an online survey and telephone interview in which they reflected on their experiences with the Milestones. Survey data were analyzed using descriptive statistics. Interview transcripts were analyzed using grounded theory.

RESULTS:

Response themes were categorized into 2 groups: outcomes of the Milestones implementation process, and facilitators and barriers. Because of Milestones implementation, participants reported changes to the quality of the assessment process, including the ability to identify struggling residents earlier and design individualized improvement plans. Some programs revised their curricula based on training gaps identified using the Milestones. Barriers to implementation included limitations to the adoption of a developmental progression model in the context of rotation block schedules and misalignment between progression targets and clinical experience. The shift from time-based to competency-based evaluation presented an ongoing adjustment for many programs. Organized preparation before clinical competency committee meetings and diverse clinical competency committee composition led to more productive meetings and perceived improvement in promotion decisions.

CONCLUSIONS:

The results of this study can be used by program leadership to help guide further implementation of the Milestones and program improvement. These results also help to guide the evolution of Milestones language and their implementation across specialties.

Identifying Gaps in the Performance of Pediatric Trainees Who Receive Marginal/Unsatisfactory Ratings

Li ST, Tancredi DJ, Schwartz A, Guillot A, Burke A, Trimm RF, Guralnick S, Mahan JD, Gifford KA; Association of Pediatric Program Directors (APPD) Longitudinal Educational Assessment Research Network (LEARN) Validity of Resident Self-Assessment Group. *Acad Med.* 2018 Jan;93(1):119-129. doi: 10.1097/ACM.0000000000001775.

PURPOSE:

To perform a derivation study to determine in which subcompetencies marginal/unsatisfactory pediatric residents had the greatest deficits compared with their satisfactorily performing peers and which subcompetencies best discriminated between marginal/unsatisfactory and satisfactorily performing residents.

METHOD:

Multi-institutional cohort study of all 21 milestones (rated on four or five levels) reported to the Accreditation Council for Graduate Medical Education, and global marginal/unsatisfactory versus satisfactory performance reported to the American Board of Pediatrics. Data were gathered in 2013-2014. For each level of training (postgraduate year [PGY] 1, 2, and 3), mean differences between milestone levels of residents with marginal/unsatisfactory and satisfactory performance adjusted for clustering by program and C-statistics (area under receiver operating characteristic curve) were calculated. A Bonferroni-corrected significance threshold of .0007963 was used to account for multiple comparisons.

RESULTS:

Milestone and overall performance evaluations for 1,704 pediatric residents in 41 programs were obtained. For PGY1s, two subcompetencies had almost a one-point difference in milestone levels between marginal/unsatisfactory and satisfactory trainees and outstanding discrimination (≥ 0.90): organize/prioritize (0.93; C-statistic: 0.91) and transfer of care (0.97; C-statistic: 0.90). The largest difference between marginal/unsatisfactory and satisfactory PGY2s was trustworthiness (0.78). The largest differences between marginal/unsatisfactory and satisfactory PGY3s were ethical behavior (1.17), incorporating feedback (1.03), and professionalization (0.96). For PGY2s and PGY3s, no subcompetencies had outstanding discrimination.

CONCLUSIONS:

Marginal/unsatisfactory pediatric residents had different subcompetency gaps at different training levels. While PGY1s may have global deficits, senior residents may have different performance deficiencies requiring individualized counseling and targeted performance improvement plans.

Comprehensive Assessment of Struggling Learners Referred to a Graduate Medical Education Remediation Program

Warburton KM, Goren E, Dine CJ. J Grad Med Educ. 2017 Dec;9(6):763-767.
doi: 10.4300/JGME-D-17-00175.1.

BACKGROUND:

Implementation of the Next Accreditation System has provided a standardized framework for identifying learners not meeting milestones, but there is as yet no corresponding framework for remediation.

OBJECTIVE:

We developed a comprehensive assessment process that allows correct diagnosis of a struggling learner's deficit(s) to promote successful remediation.

METHODS:

At the University of Pennsylvania, resident learners within the Department of Medicine who are not meeting milestones are referred to the Early Intervention Remediation Committee (EIRC). The EIRC, composed of 14 faculty members with expertise in remediation, uses a standardized process to assess learners' deficits. These faculty members categorize primary deficits as follows: medical knowledge, clinical reasoning, organization and efficiency, professionalism, and communication skills. The standardized process of assessment includes an analysis of the learner's file, direct communication with evaluators, an interview focused on learner perception of the problem, screening for underlying medical or psychosocial issues, and a review of systems for deficits in the 6 core competencies. Participants were surveyed after participating in this process.

RESULTS:

Over a 2-year period, the EIRC assessed and developed remediation plans for 4% of learners (14 of a total 342). Following remediation and reassessment, the identified problems were satisfactorily resolved in all cases with no disciplinary action. While the process was time intensive, an average of 45 hours per learner, the majority of faculty and residents rated it as positive and beneficial.

CONCLUSIONS:

This structured assessment process identifies targeted areas for remediation and adds to the tools available to Clinical Competency Committees.

Impact of an Event Reporting System on Resident Complication Reporting in Plastic Surgery Training: Addressing an ACGME and Plastic Surgery Milestone Project Core Competency

Parikh RP, Snyder-Warwick A, Naidoo S, Skolnick GB, Patel KB. *Plast Reconstr Surg.* 2017 Nov;140(5):736e-745e. doi: 10.1097/PRS.0000000000003771.

BACKGROUND:

The Accreditation Council for Graduate Medical Education and Plastic Surgery Milestone Project has identified practice-based learning and improvement, which involves systematically analyzing current practices and implementing changes, as a core competency in residency education. In surgical care, complication reporting is an essential component of practice-based learning and improvement as complications are analyzed in morbidity and mortality conference for quality improvement. Unfortunately, current methods for capturing a comprehensive profile of complications may significantly underestimate the true occurrence of complications. Therefore, the objectives of this study are to evaluate an intervention for complication reporting and compare this to current practice, in a plastic surgery training program.

METHODS:

This is a preintervention and postintervention study evaluating resident reporting of complications on a plastic surgery service. The intervention was an online event reporting system developed by department leadership and patient safety experts. The cohorts consisted of all patients undergoing surgery during two separate 3-month blocks bridged by an implementation period. A trained reviewer recorded complications, and this served as the reference standard. Fisher's exact test was used for binary comparisons.

RESULTS:

There were 32 complications detected in 219 patients from June to August of 2015 and 35 complications in 202 patients from October to December of 2015. The proportion of complications reported in the preintervention group was nine of 32 (28.1 percent). After the intervention, this significantly increased to 32 of 35 (91.4 percent) ($p < 0.001$).

CONCLUSION:

An intervention using an event reporting system, supported by departmental leadership, led to significant improvements in complication reporting by plastic surgery residents.

Using the Teaching Perspectives Inventory as an Introduction to a Residents-as-Teachers Curriculum

Robertson AC, Fowler LC, Juve AM. J Educ Perioper Med. 2017 Oct 1;19(4):E614. eCollection 2017 Oct-Dec.

OBJECTIVE:

The Anesthesiology Milestone Project includes a milestone for assessing the teaching attributes of residents within the competency of Practice-based Learning and Improvement. We intend to develop a Residents-as-Teachers educational curriculum to assist our residents in successfully achieving this milestone. The goal of this study is to identify the specific teaching perspectives and intentions of our residents and to promote residents' comprehension of their own teaching philosophy.

METHODS:

We invited our residents to complete the Teaching Perspective Inventory (TPI) and a follow-up survey to gather information regarding dominant and recessive teaching perspectives, their intended career pathway, and their view of the importance of understanding teaching perspectives.

RESULTS:

The two most common dominant teaching perspectives are apprenticeship and nurturing for residents who are planning a career in both academic medicine and private practice. A greater percentage of residents planning an academic career agree that identifying their teaching perspective is beneficial to their role as a clinical educator, compared to those anticipating a career in private practice.

CONCLUSIONS:

Based on this pilot data, our Residents-as-Teachers curriculum will include instruction of educational strategies specifically designed towards the apprenticeship and nurturing perspectives.

Towards Consensus: Training in Procedural Skills for Diagnostic Radiology Residents – Current Opinions of Residents and Faculty at a Large Academic Center

Prater A, Rostad BS, Ebert EL, Mullins ME, Ho CP. *Curr Probl Diagn Radiol*. 2017 Oct 31. pii: S0363-0188(17)30162-7. doi: 10.1067/j.cpradiol.2017.09.012.

RATIONALE AND OBJECTIVES:

The Diagnostic Radiology Milestones Project provides a framework for measuring resident competence in radiologic procedures, but there are limited data available to assist in developing these guidelines. We performed a survey of current radiology residents and faculty at our institution as a first step toward obtaining data for this purpose. The survey addressed attitudes toward procedural standardization and procedures that trainees should be competent by the end of residency.

MATERIALS AND METHODS:

Current residents and faculty members were surveyed about whether or not there should be standardization of procedural training, in which procedures residents should achieve competency, and the number of times a procedure needs to be performed to achieve competency.

RESULTS:

Survey data were received from 60 study participants with an overall response rate of 32%. Sixty-five percent of respondents thought that procedural training should be standardized. Standardization of procedural training would include both the list of procedures that trainees should be competent in at the end of residency and the standard minimum number of procedures to achieve competency. Procedures that both residents and faculty agreed are important in which to achieve competency included central line/port procedures; CT-guided abdominal, thoracic, and musculoskeletal procedures; minor fluoroscopic-guided procedures; general fluoroscopy; peripheral line placements; and US-guided abdominal procedures. For most of these categories, most respondents believed that these procedures needed to be performed 6-20 times to achieve competency.

CONCLUSION:

Both resident and faculty respondents agreed that procedural training should be standardized during residency, and competence in specific procedures should be achieved at the completion of residency. Although this study is limited to a single institution, our data may provide assistance in developing future guidelines for standardizing image-guided procedure training. Future studies could be expanded to create a national consensus regarding the implementation of the Diagnostic Radiology Milestones Project.

How Do Clinical Competency Committees Use Different Sources of Data to Assess Residents' Performance on the Internal Medicine Milestones? A Mixed Methods Pilot Study

Ekpenyong A, Baker E, Harris I, Tekian A, Abrams R, Reddy S, Park YS. Med Teach. 2017 Oct;39(10):1074-1083. doi: 10.1080/0142159X.2017.1353070. Epub 2017 Jul 25.

PURPOSE:

This study examines how Clinical Competency Committees (CCCs) synthesize assessment data to make judgments about residents' clinical performances.

METHODS:

Between 2014 and 2015, after four six-month reporting periods to the Accreditation Council for Graduate Medical Education (ACGME), 7 of 16 CCC faculty at Rush University Medical Center completed questionnaires focused on their perspectives about rating residents on their achievement of the milestones and participated in a focus group. Qualitative data were analyzed using grounded theory. Milestones ratings for two six-month ACGME reporting cycles (n = 100 categorical residents) were also analyzed.

RESULTS:

CCC members weighted resident rotation ratings highest (weight = 37%), followed by faculty rotation comments (weight = 27%) and personal experience with residents (weight = 14%) for making judgments about learner's milestone levels. Three assessment issues were identified from qualitative analyses: (1) "design issues" (e.g. problems with available data or lack thereof); (2) "synthesis issues" (e.g. factors influencing ratings and decision-making processes) and (3) "impact issues" (e.g., how CCC generated milestones ratings are used).

CONCLUSIONS:

Identifying factors that affect assessment at all stages of the CCC process can contribute to improving assessment systems, including support for faculty development for CCCs. Recognizing challenges in synthesizing first and second-hand assessment data is an important step in understanding the CCC decision-making process.

Mindfulness, Burnout, and Effects on Performance Evaluations in Internal Medicine Residents

Braun SE, Auerbach SM, Rybarczyk B, Lee B, Call S. *Adv Med Educ Pract*. 2017 Aug 16;8:591- 597. doi: 10.2147/AMEP.S140554. eCollection 2017.

PURPOSE:

Burnout has been documented at high levels in medical residents with negative effects on performance. Some dispositional qualities, like mindfulness, may protect against burnout. The purpose of the present study was to assess burnout prevalence among internal medicine residents at a single institution, examine the relationship between mindfulness and burnout, and provide preliminary findings on the relation between burnout and performance evaluations in internal medicine residents.

METHODS:

Residents (n = 38) completed validated measures of burnout at three time points separated by 2 months and a validated measure of dispositional mindfulness at baseline. Program director end-of-year performance evaluations were also obtained on 22 milestones used to evaluate internal medicine resident performance; notably, these milestones have not yet been validated for research purposes; therefore, the investigation here is exploratory.

RESULTS:

Overall, 71.1% (n = 27) of the residents met criteria for burnout during the study. Lower scores on the "acting with awareness" facet of dispositional mindfulness significantly predicted meeting burnout criteria $\chi^2(5) = 11.88, p = 0.04$. Lastly, meeting burnout criteria significantly predicted performance on three of the performance milestones, with positive effects on milestones from the "system-based practices" and "professionalism" domains and negative effects on a milestone from the "patient care" domain.

CONCLUSION:

Burnout rates were high in this sample of internal medicine residents and rates were consistent with other reports of burnout during medical residency. Dispositional mindfulness was supported as a protective factor against burnout. Importantly, results from the exploratory investigation of the relationship between burnout and resident evaluations suggested that burnout may improve performance on some domains of resident evaluations while compromising performance on other domains. Implications and directions for future research are discussed.

Critical Deficiency Ratings in Milestone Assessment: A Review and Case Study

Kinnear B, Bensman R, Held J, O'Toole J, Schauer D, Warm E. Acad Med. 2017 Jun;92(6):820-826. doi: 10.1097/ACM.0000000000001383.

PURPOSE:

The Accreditation Council for Graduate Medical Education (ACGME) requires programs to report learner progress using specialty-specific milestones. It is unclear how milestones can best identify critical deficiencies (CDs) in trainee performance. Specialties developed milestones independently of one another; not every specialty included CDs within milestones ratings. This study examined the proportion of ACGME milestone sets that include CD ratings, and describes one residency program's experiences using CD ratings in assessment.

METHOD:

The authors reviewed ACGME milestones for all 99 specialties in November 2015, determining which rating scales contained CDs. The authors also reviewed three years of data (July 2012-June 2015) from the University of Cincinnati Medical Center (UCMC) internal medicine residency assessment system based on observable practice activities mapped to ACGME milestones. Data were analyzed by postgraduate year, assessor type, rotation, academic year, and core competency. The Mantel-Haenszel chi-square test was used to test for changes over time.

RESULTS:

Specialties demonstrated heterogeneity in accounting for CDs in ACGME milestones, with 22% (22/99) of specialties having no language describing CDs in milestones assessment. Thirty-three percent (63/189) of UCMC internal medicine residents received at least one CD rating, with CDs accounting for 0.18% (668/364,728) of all assessment ratings. The authors identified CDs across multiple core competencies and rotations.

CONCLUSIONS:

Despite some specialties not accounting for CDs in milestone assessment, UCMC's experience demonstrates that a significant proportion of residents may be rated as having a CD during training. Identification of CDs may allow programs to develop remediation and improvement plans.

Evaluating Surgical Residents Quickly and Easily Against the Milestones Using Electronic Formative Feedback

Hartranft TH, Yandle K, Graham T, Holden C, Chambers LW. J Surg Educ. 2017 Mar- Apr;74(2):237-242. doi: 10.1016/j.jsurg.2016.09.006. Epub 2016 Oct 13.

OBJECTIVE:

This study was conducted to assess the effectiveness of a newly implemented electronic web-based review system created at our institution for evaluating resident performance relative to established milestones.

DESIGN:

Retrospective review of data collected from a survey of general surgery faculty and residents.

SETTING:

Tertiary care teaching hospital system and independent academic medical center.

PARTICIPANTS:

A total of 12 general surgery faculty and 17 general surgery residents participated in this study. The survey queried the level of satisfaction before and after the adoption of QuickNotes using several statements scored on a 5-point scale, with 1 being the lowest rating as "not satisfied," and 5 being the highest rating as "completely satisfied."

RESULTS:

The weighted average improvements from pre- to post-QuickNotes implementation for the faculty responding to the survey ranged from 10% to 40%; weighted average improvements for the residents responding to the survey ranged from 5% to 73%. For the survey of faculty, both sets of weighted averages tended to be higher than the weighted average for the resident's survey responses. The highest rated topic was the faculty's level of satisfaction with the "frequency to provide feedback" with a post-QuickNotes implementation weighted average of 4.25, closely followed by the residents' level of satisfaction with the "evaluation includes positive feedback" with a post-QuickNotes implementation weighted average of 4.24. The most notable increases in weighted averages from preimplementation to postimplementation were noted for "overall satisfaction" (20% increase for faculty, 37% for residents), "reflects actual criteria that matter" (36% increase for faculty, 73% for residents), faculty "opportunity for follow-up" (increase of 40%), resident "reflects overall trends" (increase of 37%), and resident "provides new information about my performance" (increase of 37%).

CONCLUSIONS:

Our institutional adoption of QuickNotes into the resident evaluation process has been associated with an overall increased level of satisfaction in the evaluation process by both faculty and residents. The design of QuickNotes facilitates its integration into the resident training environment, as it is web based, easy to use, and has no additional cost over the standard New Innovations subscription. Although it is designed to capture snapshots of trainee behavior and performance, monthly reports through QuickNotes can be used effectively in conjunction with the more traditional end-of-rotation evaluations to show trends, identify areas of strength that should be reinforced, demonstrate areas needing improvement, allow for a more tailored individual education plan to be developed, and permit a more accurate determination of milestone progression.

Competent for Unsupervised Practice: Use of Pediatric Residency Training Milestones to Assess Readiness

Li ST, Tancredi DJ, Schwartz A, Guillot AP, Burke AE, Trimm RF, Guralnick S, Mahan JD, Gifford KA; Association of Pediatric Program Directors (APPD) Longitudinal Educational Assessment Research Network (LEARN) Validity of Resident Self-Assessment Group. *Acad Med.* 2017 Mar;92(3):385-393. doi: 10.1097/ACM.0000000000001322.

PURPOSE:

To describe clinical skills progression during pediatric residency using the distribution of pediatric milestone assessments by subcompetency and year of training and to determine reasonable milestone expectations at time of graduation.

METHOD:

Multi-institutional cohort study of the milestones reported to the Accreditation Council for Graduate Medical Education for all 21 pediatric subcompetencies. Most subcompetencies were measured using five milestone levels (1 = novice, 2 = advanced beginner, 3 = competent, 4 = proficient, 5 = master); 3 subcompetencies had only four levels defined.

RESULTS:

Milestone assessments for 2,030 pediatric residents in 47 programs during academic year 2013-2014 were obtained. There was significant variation in end-of-year milestone ratings for residents within each level of training, which decreased as training level increased. Most (78.9%; 434/550) graduating third-year pediatric residents received a milestone rating of ≥ 3 in all 21 subcompetencies; fewer (21.1%; 116/550) received a rating of ≥ 4 in all subcompetencies. Across all training levels, professionalism and interpersonal communication skills were rated highest; quality improvement was rated lowest.

CONCLUSIONS:

Trainees entered residency with a wide range of skills. As they advanced, skill variability within a training level decreased. Most graduating pediatric residents were still advancing on the milestone continuum toward proficiency and mastery, and an expectation of milestone ratings ≥ 4 in all categories upon graduation is unrealistic; milestone ratings ≥ 3 upon graduation may be more realistic. Understanding current pediatric residents' and graduates' skills can help to identify key areas that should be specifically targeted during training.

Milestones: A Rapid Assessment Method for the Clinical Competency Committee

Nabors C, Forman L, Peterson SJ, Gennarelli M, Aronow WS, DeLorenzo L, Chandy D, Ahn C, Sule S, Stallings GW, Khera S, Palaniswamy C, Frishman WH. Arch Med Sci. 2017 Feb1;13(1):201-209. doi: 10.5114/aoms.2016.64045. Epub 2016 Nov 29.

INTRODUCTION:

Educational milestones are now used to assess the developmental progress of all U.S. graduate medical residents during training. Twice annually, each program's Clinical Competency Committee (CCC) makes these determinations and reports its findings to the Accreditation Council for Graduate Medical Education (ACGME). The ideal way to conduct the CCC is not known. After finding that deliberations reliant upon the new milestones were time intensive, our internal medicine residency program tested an approach designed to produce rapid but accurate assessments.

MATERIAL AND METHODS:

For this study, we modified our usual CCC process to include pre-meeting faculty ratings of resident milestones progress with in-meeting reconciliation of their ratings. Data were considered largely via standard report and presented in a pre-arranged pattern. Participants were surveyed regarding their perceptions of data management strategies and use of milestones. Reliability of competence assessments was estimated by comparing pre-/post- intervention class rank lists produced by individual committee members with a *master* class rank list produced by the collective CCC after full deliberation.

RESULTS:

Use of the study CCC approach reduced committee deliberation time from 25 min to 9 min per resident ($p < 0.001$). Committee members believed milestones improved their ability to identify and assess expected elements of competency development ($p = 0.026$). Individual committee member assessments of trainee progress agreed well with collective CCC assessments.

CONCLUSIONS:

Modification of the clinical competency process to include pre-meeting competence ratings with in-meeting reconciliation of these ratings led to shorter deliberation times, improved evaluator satisfaction and resulted in reliable milestone assessments.

Do Attending Surgeons and Residents See Eye to Eye? An Evaluation of the Accreditation Council for Graduate Medical Education Milestones in General Surgery Residency

Lyle B, Borgert AJ, Kallies KJ, Jarman BT. J Surg Educ. 2016 Nov - Dec;73(6):e54-e58. doi: 10.1016/j.jsurg.2016.07.004. Epub 2016Aug 23.

OBJECTIVE:

The Accreditation Council for Graduate Medical Education requires accredited general surgery residencies to implement competency-based developmental outcomes in resident evaluations. Overall, 16 milestones are evaluated by a clinical competency committee (CCC). The milestones span 8 domains of surgical practice and 6 Accreditation Council for Graduate Medical Education clinical competencies. The highest level suggests preparedness for independent practice. Our objective was to compare self-assessments and committee evaluations within the milestone framework.

STUDY DESIGN:

All residents underwent semiannual evaluations from 2013 to 2015. Residents independently completed a self-assessment using the milestones. The CCC completed the milestones document using resident evaluations and consensus opinion of committee members. Assessment differences were calculated for each evaluation. A negative value indicated that the residents evaluated themselves at a lower level than the committee. Major assessment disparities were defined as >0.5 on a 4-point scale.

SETTING:

An independent academic medical center.

PARTICIPANTS:

General surgery residents.

RESULTS:

Overall, 20 residents participated; 7 were female. In total, 5 (7%) evaluations had a mean overall assessment difference >0.5 , whereas 6 (8%) had a difference <-0.5 . Residents evaluated themselves lower than the committee with a median assessment difference of -0.06 [-0.25 to 0.16] ($p = 0.041$). Evaluations were similar across surgical domains. Negative self-evaluations were more common for medical knowledge (-0.25 [-0.25 to 0.25], $p = 0.025$). Female residents had 2% positive and 13% negative major assessment disparity rates versus 10% positive and 9% negative rates among male residents. Postgraduate year III residents had 12% positive and 4% negative major disparity rates; all other years had higher negative than positive rates.

CONCLUSIONS:

Surgery residents within our program demonstrated adequate self-awareness, with most self-evaluations falling within a half level of the CCC report. This self-awareness was consistent across surgical domains and most clinical competencies. Residents perceived a lower level of medical knowledge than the CCC. Subgroup analysis revealed interesting trends in the effects of sex, postgraduate year level, and academic year timing, which will take additional study to fully delineate.

Using Milestones as Evaluation Metrics during an Emergency Medicine Clerkship

Quinn SM, WorriLOW CC, Jayant DA, Bailey B, Eustice E, Kohlhepp J, Rogers R, Kane BG. J Emerg Med. 2016 Oct;51(4):426-431.

BACKGROUND:

The Accreditation Council for Graduate Medical Education's (ACGME) Milestones presumes graduating medical students will enter residency proficient at Milestone level 1 for 23 skills. The Next Accreditation System now includes Milestones for each postgraduate specialty, and it is unlikely that schools will document every emergency medicine (EM) applicant's EM-specific skills in their performance evaluation.

OBJECTIVES:

The goals of this research were to determine if assessment of the Milestones was feasible during a medical student clerkship and examine the proportion of medical students performing at Milestone Level 1.

METHODS:

This study was conducted at a center with Liaison Committee on Medical Education-approved medical training and a 4-year EM residency. Using traditional clerkship, we studied the feasibility of an ACGME EM Milestones-based clerkship assessment. Data led to redesign of the clerkship and its evaluation process, including all level 1 anchor(s) to add "occasionally" (>60%), "usually" (>80%), and "always" (100%) on a Likert scale to on-shift assessment forms.

RESULTS:

During the feasibility phase (2013-14), 75 students rotated through the clerkship; 55 evaluations were issued and 50 contained the Milestone summary. Eight deficiencies were noted in Milestone 12 and three in Milestone 14. After changes, 49 students rotated under the new evaluation rubric. Of 575 completed on-shift evaluations, 16 Milestone deficiencies were noted. Of 41 institutional evaluations issued, only one student had deficiencies noted, all of which pertained to patient care. All evaluations in this second cohort contained each student's Milestone proficiency.

CONCLUSIONS:

Assessment of the Milestones is feasible. Communication of ACGME EM Milestone proficiency may identify students who require early observation or remediation. The majority of students meet the anchors for the Milestones, suggesting that clerkship assessment with the ACGME EM Milestones does not adequately differentiate students.

A First Look at the Accreditation Council for Graduate Medical Education Anesthesiology Milestones: Implementation of Self-Evaluation in a Large Residency Program

Ross FJ, Metro DG, Beaman ST, Cain JG, Dowdy MM, Apfel A, Jeong JH, Ibinson JW. J Clin Anesth. 2016 Aug;32:17-24. doi: 10.1016/j.jclinane.2015.12.026. Epub 2016 Mar 22

STUDY OBJECTIVE:

The objective was to determine if there is a correlation between resident postgraduate year (PGY) of training and self-evaluation of performance using the Accreditation Council for Graduate Medical Education milestones.

DESIGN:

Survey.

SETTING:

Residency program at a large academic center.

PATIENTS:

Residents and Faculty Clinical Competency Committee (CCC).

INTERVENTIONS:

None.

MEASUREMENTS:

Resident and CCC milestone scores.

MAIN RESULTS:

Correlation coefficients for average score for each milestone vs PGY level ranged from 0.80 for receiving and giving feedback to 0.95 for anesthetic choice and conduct. All milestones showed a relatively linear relationship with PGY of training, and none were found to be consistently reached very late or very early in training. When examining variation across the scores for the individual residents, the distributions for PGY-2 and -3 appeared to be wider than those for PGY- 1 and -4. The intraclass correlation coefficients ranged from 0.718 to 0.928.

CONCLUSIONS:

There was a remarkable degree of consistency in the relationship between level of training and resident self-assessment score for every milestone, as well as strong agreement between the resident and CCC faculty scores. Examination of the variance in the scores, when interpreted in light of our particular training program's characteristics, suggests that the milestones accurately reflect the progression in skill across the residency. In addition, given the concordance between the self-evaluation scores and the CCC faculty scores, self-evaluation may be a reasonable starting point as programs begin the daunting task of determining scores for each of the 25 milestones as part of the biannual evaluation process.

A Survey of Ultrasound Milestone Incorporation into Emergency Medicine Training Programs

Smalley CM, Dorey A, Thiessen M, Kendall JL. J Ultrasound Med. 2016 Jul;35(7):1517-21. doi: 10.7863/ultra.15.09012. Epub 2016 Jun 7.

OBJECTIVES:

With the introduction of the Emergency Medicine Milestone Project in 2013, residencies now assess emergency ultrasound (US) skills at regular intervals. However, it is unclear how programs are implementing the emergency US milestones and assessing competency. With the use of the milestone tool, a survey was distributed to emergency US educators to determine when programs are providing emergency US education, when residents are expected to attain competency, and whether the milestones reflect their expectations of trainees.

METHODS:

We conducted a prospective cross-sectional survey study distributed electronically to designated emergency US experts at 169 programs. Participants were queried on education and competency evaluation within the context of the milestones by designating a postgraduate year when the 5 milestone levels were taught and competency was expected. Survey findings were reported as percentages of total respondents from descriptive statistics.

RESULTS:

Responses were received from 53% of programs, and 99% were familiar with the milestones. Most programs provide level 1 (88%) and 2 (85%) instruction during postgraduate year 1. Most programs expect level 1 competency before residency (61%) and expect mastery of level 2 by the end of postgraduate year 1 (60%). Sixty-two percent believe the milestones do not accurately reflect their expectations, citing insufficient minimum scan numbers, lack of specificity, and unattainable level 5 requirements.

CONCLUSIONS:

There is substantial variability in the frequency and methods of competency evaluation using the emergency US milestones. However, most responders agree that residents should obtain level 2 competency by postgraduate year 1. Variation exists regarding what year and what skills define level 3 or greater competency.

The Problem Resident Behavior Guide: Strategies for Remediation

Williamson K, Quattromani E, Aldeen A. Intern Emerg Med. 2016 Apr;11(3):437-49. doi: 10.1007/s11739-015-1367-5. Epub 2015 Dec 14.

ABSTRACT:

In 2012, the ACGME supplemented the core competencies with outcomes-based milestones for resident performance within the six competency domains. These milestones address the knowledge, skills, abilities, attitudes, and experiences that a resident is expected to progress through during the course of training. Even prior to the initiation of the milestones, there was a paucity of EM literature addressing the remediation of problem resident behaviors and there remain few readily accessible tools to aid in the implementation of a remediation plan. The goal of the "Problem Resident Behavior Guide" is to provide specific strategies for resident remediation based on deficiencies identified within the framework of the EM milestones. The "Problem Resident Behavior Guide" is a written instructional manual that provides concrete examples of remediation strategies to address specific milestone deficiencies. The more than 200 strategies stem from the experiences of the authors who have professional experience at three different academic hospitals and emergency medicine residency programs, supplemented by recommendations from educational leaders as well as utilization of valuable education adjuncts, such as focused simulation exercises, lecture preparation, and themed ED shifts. Most recommendations require active participation by the resident with guidance by faculty to achieve the remediation expectations. The ACGME outcomes-based milestones aid in the identification of deficiencies with regards to resident performance without providing recommendations on remediation. The Problem Resident Behavior Guide can therefore have a significant impact by filling in this gap.

Driving Care Quality: Aligning Trainee Assessment and Supervision through Practical Application of Entrustable Professional Activities, Competencies, and Milestones

Carraccio C, Englander R, Holmboe ES, Kogan JR. Acad Med. 2016 Feb;91(2):199-203. doi: 10.1097/ACM.0000000000000985.

ABSTRACT:

To address the long-standing challenge of meaningful trainee assessment, the authors reviewed and expanded on the Accountable Assessment for Quality Care and Supervision (AAQCS) equation. The equation proposes that care quality is the product of the interaction between trainee performance (measured by workplace assessment) and supervision (required level of intervention to ensure care quality) in the context of the environment where the care occurs: Trainee performance × Appropriate supervision = Safe, effective patient-centered care. Assessing trainee performance and matching that performance to "appropriate" supervision, however, is fraught with challenges. The authors suggest a unifying framework that integrates entrustable professional activities (EPAs), competencies, and milestones to inform trainee assessment and supervision, thereby enabling the practical application of the AAQCS equation in the workplace. Because the unit of measure for an EPA is the outcome of whether the trainee can safely and effectively perform the professional activity without supervision, the proposed unifying framework directly aligns with the dependent variable in the AAQCS equation: care quality. The value of applying a unifying framework that integrates EPAs, competencies, and milestones to the AAQCS equation in the clinical learning environment lies in its ability to provide supervisors with a shared mental model of performance expectations for trainees, reducing unwanted variability and improving assessment accuracy; guidance for aligning performance milestones of trainees with the needed level of supervisor intervention to ensure care quality; and substrate for specific feedback to improve the trainee's professional development as a way to ensure future care quality.

A Milestone-Based Evaluation System-The Cure for Grade Inflation?

Kuo LE, Hoffman RL, Morris JB, Williams NN, Malachesky M, Huth LE, Kelz RR. J Surg Educ. 2015 Nov-Dec;72(6):e218-25.

PURPOSE:

Controversy exists over the optimal use of the Milestones in the process of resident Evaluation and feedback. We sought to evaluate the performance of a Milestones-based feedback system in comparison to a traditional model.

METHODS:

The traditional evaluation system (TES) consisted of a generic 16-item survey using a 5-point Likert scale ranging from 1 to 5, and a free-text comments section. The Milestones-based evaluation system (MBES) was launched in July 2014, ranging from 0 to 4. Individual milestones were mapped to rotations based on resident educational goals by postgraduate year (PGY). The MBES consisted of a survey with a maximum of 7 items, followed by a free-text comment section. Within each evaluation system, an overall composite score was calculated for each categorical general surgical resident. To scale the 2 systems for comparison, TES scores were adjusted downward by 1 point. Descriptive statistics were performed. Univariate analysis was performed with the Wilcoxon signed-rank test. A test for trend across PGY was used for the MBES only.

RESULTS:

In the traditional system, the median score was 3.66 (range: 3.2-4.0). There was no meaningful difference in the median score by PGY. In the new system, the median score was 2.69 (range: 1.5-3.7, $p < 0.01$). The median score differed across PGY and increased by PGY of training ($p < 0.01$). There was an increase in differences between median scores by PGY.

CONCLUSIONS:

On using the milestones to facilitate faculty evaluation of resident knowledge and skill, there was a trend in increasing score by PGY of training. In the MBES, scores could be used to better discriminate resident skill and knowledge levels and resulted in improved differentiation in scoring by PGY. The use of the milestones as a basis for evaluation enabled the program to provide more meaningful feedback to residents and represents an improvement in surgical education.

Emergency Medicine Residents Consistently Rate Themselves Higher than Attending Assessments on ACGME Milestones

Goldflam K, Bod J, Della-Giustina D, Tsyrluk A. West J Emerg Med. 2015 Nov;16(6):931-5. doi: 10.5811/westjem.2015.8.27247. Epub 2015 Nov 12.

INTRODUCTION:

In 2012 the Accreditation Council for Graduate Medical Education (ACGME) introduced the Next Accreditation System (NAS), which implemented milestones to assess the competency of residents and fellows. While attending evaluation and feedback is crucial for resident development, perhaps equally important is a resident's self-assessment. If a resident does not accurately self-assess, clinical and professional progress may be compromised. The objective of our study was to compare emergency medicine (EM) resident milestone evaluation by EM faculty with the same resident's self-assessment.

METHODS:

This is an observational, cross-sectional study that was performed at an academic, four-year EM residency program. Twenty-five randomly chosen residents completed milestone self-assessment using eight ACGME sub-competencies deemed by residency leadership as representative of core EM principles. These residents were also evaluated by 20 faculty members. The milestone levels were evaluated on a nine-point scale. We calculated the average difference between resident self-ratings and faculty ratings, and used sample t-tests to determine statistical significance of the difference in scores.

RESULTS:

Eighteen residents evaluated themselves. Each resident was assessed by an average of 16 attendings (min=10, max=20). Residents gave themselves statistically significant higher milestone ratings than attendings did for each sub-competency examined ($p < 0.0001$).

CONCLUSION:

Residents over-estimated their abilities in every sub-competency assessed. This underscores the importance of feedback and assessment transparency. More attention needs to be paid to methods by which residency leadership can make residents' self-perception of their clinical ability more congruent with that of their teachers and evaluators. The major limitation of our study is small sample size of both residents and attendings.

Development and Evaluation of Standardized Narrative Cases Depicting the General Surgery Professionalism Milestones

Rawlings A, Knox AD, Park YS, Reddy S, Williams SR, Issa N, Jameel A, Tekian A. Acad Med. 2015 Aug;90(8): 1109-15. doi: 10.1097/ACM.0000000000000739.

PURPOSE:

Residency programs now are required to use educational milestones, which has led to the need for new methods of assessment. The literature suggests that narrative cases are a promising tool to track residents' progress. This study demonstrates the process for developing and evaluating narrative cases representing the five levels of the professionalism milestones.

METHOD:

In 2013, the authors identified 28 behaviors in the Accreditation Council for Graduate Medical Education general surgery professionalism milestones. They modified previously published narrative cases to fit these behaviors. To evaluate the quality of these cases, the authors developed a 28-item, five-point scale instrument, which 29 interdisciplinary faculty completed. The authors compared the faculty ratings by narrative case and specialty with the authors' initial rankings of the cases by milestone level. They used t tests and analysis of variance to compare mean scores across specialties.

RESULTS:

The authors developed 10 narrative cases, 2 for each of the 5 milestone levels. Each case contained at least 20 of the 28 behaviors identified in the milestones. Mean faculty ratings matched the milestone levels. Reliability was good (G coefficient = 0.86, phi coefficient = 0.85), indicating consistency in raters' ability to determine the proper milestone level for each case.

CONCLUSIONS:

The authors demonstrate a process for using specialty-specific milestones to develop narrative cases that map to a spectrum of professionalism behaviors. This process can be applied to other competencies and specialties to facilitate faculty awareness of resident performance descriptors and provide a frame of reference for milestones assessment.

Development and Validation of an Assessment of Regional Anesthesia Ultrasound Interpretation Skills

Woodworth GE, Carney PA, Cohen JM, Kopp SL, Vokach-Brodsky LE, Horn JL, Missair A, Banks SE, Dieckmann NF, Maniker RB. *Reg Anesth Pain Med*. 2015 Jul-Aug;40(4):306-14. doi: 10.1097/AAP.0000000000000236.

BACKGROUND:

Interpretation of ultrasound images and knowledge of anatomy are essential skills for ultrasound-guided peripheral nerve blocks. Competency-based educational models promoted by the Accreditation Council for Graduate Medical Education require the development of assessment tools for the achievement of different competency milestones to demonstrate the longitudinal development of skills that occur during training.

METHODS:

A rigorous study guided by psychometric principles was undertaken to identify and validate the domains and items in an assessment of ultrasound interpretation skills for regional anesthesia. A survey of residents, academic faculty, and community anesthesiologists, as well as video recordings of experts teaching ultrasound-guided peripheral nerve blocks, was used to develop short video clips with accompanying multiple choice-style questions. Four rounds of pilot testing produced a 50-question assessment that was subsequently administered online to residents, fellows, and faculty from multiple institutions.

RESULTS:

Test results from 90 participants were analyzed with Item Response Theory model fitting indicating that a 47-item subset of the test fits the model well ($P = 0.11$). There was a significant linear relation between expected and predicted item difficulty ($P < 0.001$). Overall test scores increased linearly with higher levels of formal anesthesia training, regional anesthesia training, number of ultrasound-guided blocks performed per year, and a self-rating of regional anesthesia skill (all $P < 0.001$).

CONCLUSIONS:

This study provides evidence for the reliability, content validity, and construct validity of a 47-item multiple choice-style online test of ultrasound interpretation skills for regional anesthesia, which can be used as an assessment of competency milestone achievement in anesthesiology training.

Use of Emergency Medicine Milestones as Items on End-of-Shift Evaluations Results in Overestimates of Residents' Proficiency Level

Dehon E, Jones J, Puskarich M, Sandifer JP, Sikes K. J Grad Med Educ. 2015 Jun;7(2):192-6. doi: 10.4300/JGME-D-14-00438.1.

BACKGROUND:

The emergency medicine milestones were developed to provide more objective resident assessment than current methods. However, little is known about the best practices for applying the milestones in resident assessment.

OBJECTIVE:

We examined the utility of end-of-shift evaluations (ESEs) constructed using the milestones in resident assessment.

METHODS:

We developed 14 daily ESEs, each of which included 9 or 10 emergency medicine milestones. Postgraduate year (PGY)-1 and PGY-2 residents were assessed on milestone levels 1 through 3; PGY-3 and PGY-4 residents were assessed on levels 3 through 5. Each milestone was rated on a nominal scale (yes, no, or not applicable). The Clinical Competency Committee combined the ESE data with data from other assessments to determine each resident's proficiency level for the emergency medicine subcompetencies. We used descriptive statistics to summarize resident ESEs and milestone levels. We analyzed differences in ESE score across PGY levels using t tests and analyses of variance.

RESULTS:

Faculty completed 763 ESEs on 33 residents with a range of 2 to 54 (median=22) ESEs per resident. Faculty rarely (8%, 372 of 4633) rated a resident as not achieving a milestone on the ESEs. Analyses of variance revealed that ESE scores on level 3 milestones did not differ significantly by PGY level. There was poor agreement between ESE scores and Clinical Competency Committee ratings.

CONCLUSIONS:

The ESEs constructed using the milestones resulted in grade or milestone inflation. Our results do not support using milestones as a stand-alone assessment tool.

Realizing the Promise of Competency-Based Medical Education

Holmboe ES. Acad Med. 2015 Apr;90(4):411-3. doi: 10.1097/ACM.0000000000000515.

ABSTRACT

Competency-based medical education (CBME) places a premium on both educational and clinical outcomes. The Milestones component of the Next Accreditation System represents a fundamental change in medical education in the United States and is part of the drive to realize the full promise of CBME. The Milestones framework provides a descriptive blueprint in each specialty to guide curriculum development and assessment practices. From the beginning of the Outcomes project in 1999, the Accreditation Council for Graduate Medical Education and the larger medical education community recognized the importance of improving their approach to assessment. Work-based assessments, which rely heavily on the observations and judgments of clinical faculty, are central to a competency-based approach. The direct observation of learners and the provision of robust feedback have always been recognized as critical components of medical education, but CBME systems further elevate their importance. Without effective and frequent direct observation, coaching, and feedback, the full potential of CBME and the Milestones cannot be achieved. Furthermore, simply using the Milestones as end-of-rotation evaluations to "check the box" to meet requirements undermines the intent of an outcomes-based accreditation system. In this Commentary, the author explores these challenges, addressing the concerns raised by Williams and colleagues in their Commentary. Meeting the assessment challenges of the Milestones will require a renewed commitment from institutions to meet the profession's "special obligations" to patients and learners. All stakeholders in graduate medical education must commit to a professional system of self-regulation to prepare highly competent physicians to fulfill this social contract.

Milestone-Based Assessments Are Superior to Likert-Type Assessments in Illustrating Trainee Progression

Bartlett KW, Whicker SA, Bookman J, Narayan AP, Staples BB, Hering H, McGann KA. *Journal of Graduate Medical Education*, March 2015; doi:<http://dx.doi.org/10.4300/JGME-D-14-00389.1>

BACKGROUND:

The Pediatrics Milestone Project uses behavioral anchors, narrative descriptions of observable behaviors, to describe learner progression through the Accreditation Council for Graduate Medical Education competencies. Starting June 2014, pediatrics programs were required to submit milestone reports for their trainees semiannually. Likert-type scale assessment tools were not designed to inform milestone reporting, creating a challenge for Clinical Competency Committees.

OBJECTIVE:

To determine if milestone-based assessments better stratify trainees by training level compared to Likert-type assessments.

METHODS:

We compared assessment results for 3 subcompetencies after changing from a 5-point Likert scale to milestone-based behavioral anchors in July 2013. Program leadership evaluated the new system by (1) comparing PGY-1 mean scores on Likert-type versus milestone-based assessments; and (2) comparing mean scores on the Likert-type versus milestone-based assessments across PGY levels.

RESULTS:

Mean scores for PGY-1 residents were significantly higher on the prior year's Likert-type assessments than milestone-based assessments for all 3 subcompetencies (P, .01). Stratification by PGY level was not observed with Likert-type assessments (eg, interpersonal and communication skills 1 [ICS1] mean score for PGY-1, 3.99 versus PGY-3, 3.98; P 5 .98). In contrast, milestone-based assessments demonstrated stratification by PGY level (eg, the ICS1 mean score was 3.06 for PGY-1, 3.83 for PGY-2, and 3.99 for PGY-3; P, .01 for PGY-1 versus PGY-3). Significantly different means by trainee level were noted across 21 subcompetencies on milestone-based assessments (P, .01 for PGY-1 versus PGY-3).

CONCLUSIONS:

Initial results indicate milestone-based assessments stratify trainee performance by level better than Likert-type assessments. Average PGY-level scores from milestone-based assessments may ultimately provide guidance for determining whether trainees are progressing at the expected pace.

Impact on House Staff Evaluation Scores When Changing from a Dreyfus- to a Milestone-Based Evaluation Model: One Internal Medicine Residency Program's Findings

Friedman KA, Balwan S, Cacace F, Katona K, Sunday S, Chaudhry S. Med Educ Online. 2014 Nov 24;19:25185. doi: 10.3402/meo.v19.25185. eCollection 2014.

PURPOSE:

As graduate medical education (GME) moves into the Next Accreditation System (NAS), programs must take a critical look at their current models of evaluation and assess how well they align with reporting outcomes. Our objective was to assess the impact on house staff evaluation scores when transitioning from a Dreyfus-based model of evaluation to a Milestone-based model of evaluation. Milestones are a key component of the NAS.

METHOD:

We analyzed all end of rotation evaluations of house staff completed by faculty for academic years 2010-2011 (pre-Dreyfus model) and 2011-2012 (post-Milestone model) in one large university-based internal medicine residency training program. Main measures included change in PGY-level average score; slope, range, and separation of average scores across all six Accreditation Council for Graduate Medical Education (ACGME) competencies.

RESULTS:

Transitioning from a Dreyfus-based model to a Milestone-based model resulted in a larger separation in the scores between our three post-graduate year classes, a steeper progression of scores in the PGY-1 class, a wider use of the 5-point scale on our global end of rotation evaluation form, and a downward shift in the PGY-1 scores and an upward shift in the PGY-3 scores.

CONCLUSIONS:

For faculty trained in both models of assessment, the Milestone-based model had greater discriminatory ability as evidenced by the larger separation in the scores for all the classes, in particular the PGY-1 class.

The Milestones Passport: A Learner-Centered Application of the Milestone Framework to Prompt Real-Time Feedback in the Emergency Department

Yarris LM, Jones D, Kornegay JG, Hansen M. (2014). Journal of Graduate Medical Education: September 2014, Vol. 6, No. 3, pp. 555-560.

BACKGROUND:

In July 2013, emergency medicine residency programs implemented the Milestone assessment as part of the Next Accreditation System.

OBJECTIVE:

We hypothesized that applying the Milestone framework to real-time feedback in the emergency department (ED) could affect current feedback processes and culture. We describe the development and implementation of a Milestone-based, learner-centered intervention designed to prompt real-time feedback in the ED.

METHODS:

We developed and implemented the Milestones Passport, a feedback intervention incorporating subcompetencies, in our residency program in July 2013. Our primary outcomes were feasibility, including faculty and staff time and costs, number of documented feedback encounters in the first 2 months of implementation, and user-reported time required to complete the intervention. We also assessed learner and faculty acceptability.

RESULTS:

Development and implementation of the Milestones Passport required 10 hours of program coordinator time, 120 hours of software developer time, and 20 hours of faculty time. Twenty-eight residents and 34 faculty members generated 257 Milestones Passport feedback encounters. Most residents and faculty reported that the encounters required fewer than 5 minutes to complete, and 48% (12 of 25) of the residents and 68% (19 of 28) of faculty reported satisfaction with the Milestones Passport intervention. Faculty satisfaction with overall feedback in the ED improved after the intervention (93% versus 54%, $P = .003$), whereas resident satisfaction with feedback did not change significantly.

CONCLUSIONS:

The Milestones Passport feedback intervention was feasible and acceptable to users; however, learner satisfaction with the Milestone assessment in the ED was modest.

Programmatic Assessment of Level 1 Milestones in Incoming Interns

Hauff SR, Hopson LR, Losman E, Perry MA, Lypson ML, Fischer J, Santen SA. Acad Emerg Med. 2014 Jun;21(6):694-8. doi: 10.1111/acem.12393.

OBJECTIVES:

With the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System, emergency medicine (EM) residency programs will be required to report residents' progress through the EM milestones. The milestones include five progressively advancing skill levels, with Level 1 defining the skill set of a medical school graduate and Level 5, that of an attending physician. The ACGME stresses that multiple forms of assessment should be used to ensure capture of the multifaceted competencies. The objective of this study was to determine the feasibility and results of programmatic assessment of Level 1 milestones using multisource assessments for incoming EM interns in July.

METHODS:

The study population was interns starting in 2012 and 2013. Interns' Level 1 milestone assessment was done with four distinct methods: 1) the postgraduate orientation assessment (POA) by the Graduate Medical Education Office for all incoming interns (this multistation examination covers nine of the EM milestones and includes standardized patient cases, task completion, and computer-based stations); 2) direct observation of patient encounters by core faculty using a milestones-based clinical skills competency checklist; 3) the global monthly assessment at the end of the intern orientation month that was updated to reflect the EM milestones; and 4) faculty assessment during procedural labs. These occurred during the July orientation month that included the POA, clinical shifts, didactic sessions, and procedure labs.

RESULTS:

In the POA, interns were competent in 48% to 93% of the milestones assessed. Overall, competency was 70% to 80%, with low scores noted in aseptic technique (patient care Milestone 13 [PC13]) and written and verbal hand-off (interpersonal communications skills [ICS]2). In overall communication, 70% of interns demonstrated competency. In excess of 80% demonstrated competency in critical values interpretation (PC3), informed consent (PC9), pain assessment (PC11), and geriatric functional assessment (PC3). On direct observation, almost all Level 1 milestones were achieved (93% to 100%); however, only 78% of interns achieved competency in pharmacotherapy (PC5). On global monthly evaluations, all interns met Level 1 milestones.

CONCLUSIONS:

A multisource assessment of EM milestones is feasible and useful to determine Level 1 milestones achievement for incoming interns. A structured assessment program, used in conjunction with more traditional forms of evaluation such as global monthly evaluations and direct observation, is useful for identifying deficits in new trainees and may be able inform the creation of early intervention programs.

Operationalizing the Internal Medicine Milestones-An Early Status Report

Nabors C, Peterson SJ, Forman L, Stallings GW, Mumtaz A, Sule S, Shah T, Aronow W, Delorenzo L, Chandy D, Lehrman SG, Frishman WH, Holmboe E. J Grad Med Educ. 2013 Mar;5(1):130-7. doi: 10.4300/JGME-D-12-00130.1.

BACKGROUND:

The internal medicine milestones were developed to advance outcomes-based residency training and will play an important role in the next accreditation system.

INNOVATION:

As an element of our program's participation in the internal medicine educational innovations project, we implemented a milestones-based evaluation process in our general medicine and pulmonary-critical care rotations on July 1, 2010.

MEASURES:

Outcomes assessed included survey-rated acceptability to participating faculty, residents, and clinical competency committee members.

RESULTS:

Faculty and residents agreed that the milestones promoted a common understanding of what knowledge, skills, and attitudes should be displayed at particular points in residents' professional development and enhanced evaluators' ability to provide specific performance feedback. Most residents and faculty members agreed that the milestones promoted fairness and uniformity in the evaluation process. Clinical competency committee members agreed the milestones improved the quality of information available for deliberations and resulted in more uniform promotion standards. Faculty rated the use of too many milestones per form/tool at a mean of 7.3 (where 1 was minimally problematic, and 10 was maximally problematic) and the potential for evaluator fatigue (mean, 8.2) as the most significant challenges to the use of milestones. Eight of 12 faculty members would recommend milestones in other programs; 4 were uncertain.

CONCLUSIONS:

Despite logistical challenges, educators and trainees found that milestones promoted a common understanding of what knowledge, skills and attitudes should be displayed at particular stages of training; permitted greater specificity in performance feedback; and enhanced uniformity and fairness in promotion decisions.

The Pediatrics Milestones: Initial Evidence for their Use as Learning Road Maps for Residents

Schumacher DJ, Lewis KO, Burke AE, Smith ML, Schumacher JB, Pitman MA, Ludwig S, Hicks PJ, Guralnick S, Englander R, Benson B, Carraccio C. Acad Pediatr. 2013 Jan-Feb;13(1):40-7. doi: 10.1016/j.acap.2012.09.003. Epub 2012 Nov 17.

OBJECTIVE:

As the next step in competency-based medical education, the Pediatrics Milestone Project seeks to provide a learner-centered approach to training and assessment. To help accomplish this goal, this study sought to determine how pediatric residents understand, interpret, and respond to the Pediatrics Milestones.

METHODS:

Cognitive interviews with 48 pediatric residents from all training levels at 2 training programs were conducted. Each participant reviewed one Pediatrics Milestone document (PMD). Eight total Pediatrics Milestones, chosen for their range of complexity, length, competency domain, and primary author, were included in this study. Six residents, 2 from each year of residency training, reviewed each PMD. Interviews were transcribed and coded using inductive methods, and codes were grouped into themes that emerged.

RESULTS:

Four major themes emerged through coding and analysis: 1) the participants' degree of understanding of the PMDs is sufficient, often deep; 2) the etiology of participants' understanding is rooted in their experiences; 3) there are qualities of the PMD that may contribute to or detract from understanding; and 4) participants apply their understanding by noting the PMD describes a developmental progression that can provide a road map for learning. Additionally, we learned that residents are generally comfortable being placed in the middle of a series of developmental milestones. Two minor themes focusing on interest and practicality were also identified.

CONCLUSIONS:

This study provides initial evidence for the Pediatrics Milestones as learner-centered documents that can be used for orientation, education, formative feedback, and, ultimately, assessment.



Using Milestones to Guide Curriculum

Using Learning Analytics to Examine Achievement of Graduation Targets for Systems-Based Practice and Practice-Based Learning and Improvement: A National Cohort of Vascular Surgery Fellows

Smith BK, Luman A, Yamazaki K, Tekian A, Hamstra SJ, Holmboe E, Mitchell EL, Park YS. *Ann Vasc Surg.* 2021 Oct;76:463-471. doi: 10.1016/j.avsg.2021.03.046. Epub 2021 Apr 24. PMID: 33905852.

BACKGROUND:

Surgeons provide patient care in complex health care systems and must be able to participate in improving both personal performance and the performance of the system. The Accreditation Council for Graduate Medical Education (ACGME) Vascular Surgery Milestones are utilized to assess vascular surgery fellows' (VSF) achievement of graduation targets in the competencies of Systems Based Practice (SBP) and Practice Based Learning and Improvement (PBLI). We investigate the predictive value of semiannual milestones ratings for final achievement within these competencies at the time of graduation.

METHODS:

National ACGME milestones data were utilized for analysis. All trainees entering the 2-year vascular surgery fellowship programs in July 2016 were included in the analysis (n = 122). Predictive probability values (PPVs) were obtained for each SBP and PBLI sub-competencies by biannual review periods, to estimate the probability of VSFs not reaching the recommended graduation target based on their previous milestones ratings.

RESULTS:

The rate of nonachievement of the graduation target level 4.0 on the SBP and PBLI sub-competencies at the time of graduation for VSFs was 13.1-25.4%. At the first time point of assessment, 6 months into the fellowship program, the PPV of the SBP and PBLI milestones for nonachievement of level 4.0 upon graduation ranged from 16.3-60.2%. Six months prior to graduation, the PPVs across the 6 sub-competencies ranged from 14.6-82.9%.

CONCLUSIONS:

A significant percentage of VSFs do not achieve the ACGME Vascular Surgery Milestone targets for graduation in the competencies of SBP and PBLI, suggesting a need to improve curricula and assessment strategies in these domains across vascular surgery fellowship programs. Reported milestones levels across all time point are predictive of ultimate achievement upon graduation and should be utilized to provide targeted feedback and individualized learning plans to ensure graduates are prepared to engage in personal and health care system improvement once in unsupervised practice.

ACGME Milestones in Global Health: Need for Standardized Assessment of Global Health Training in Obstetrics/Gynecology Residency

Monestime GM, Baird I, Rebarber A, Shirazian T. *Int J Gynaecol Obstet.* 2021 Sep 3. doi: 10.1002/ijgo.13914. Epub ahead of print. PMID: 34478575.

ABSTRACT:

Collective interest in global health training during US obstetrics/gynecology (Ob/Gyn) residency has grown over the past decade. The benefits of participation in global health electives have been well described. This review seeks to determine what literature exists regarding the use of Accreditation Council for Graduate Medical Education (ACGME) Milestones in Ob/Gyn residency as an assessment tool to evaluate global health programs. The PubMed database was searched from July 14, 2020 to August 20, 2021, using six search phrases: "global health curriculum(s) and ACGME"; "international health and ACGME"; "global health and Ob/Gyn residency"; "international health and Ob/Gyn residency"; "global health and Ob/Gyn residents"; and "global health curriculum(s) and Ob/Gyn residency." Publications that described global health programming outside of residency, within other medical specialties, and/or at non-US institutions were excluded from this review. In total, 259 publications resulted from the preliminary search. Five articles described US global health residency training in Ob/Gyn in some capacity. Only one publication described a specific global health elective and its evaluation with respect to ACGME Milestones. Despite growing popularity of global health electives among residency programs, few are assessing the educational value of these offerings using ACGME Milestones or describing these efforts in the literature.

Accreditation Council for Graduate Medical Education Milestones for Emergency Medicine Residency Training Incorporated into First- and Second-Year Medical Student Elective

Y Cantwell C, B Lee J, Saadat S, Bove N, Sakaria S, Wiechmann W, Wray A, Toohey S. J Adv Med Educ Prof. 2021 Jul;9(3):136-143. doi: 10.30476/jamp.2021.88982.1360. PMID: 34277844; PMCID: PMC8273531.

INTRODUCTION:

As part of its Next Accreditation System, the Accreditation Council for Graduate Medical Education and the American Board of Emergency Medicine describe 6 competencies containing 23 sub-competencies graded by milestones ranging from level 1 (expected of an incoming intern) to level 5 (demonstrates abilities of an attending) that are used to track resident training progression. To the best of our knowledge, there have been no studies introducing a milestones-based curriculum to medical students prior to their introduction to the wards, so we sought to determine the effects that a pre-clinical Emergency Medicine Interest Group (EMIG) Milestones Elective would have on preparing the students interested in Emergency Medicine (EM) as a specialty to meet the level 1 milestones prior to their intern year.

METHODS:

The elective hosted 15 events throughout the academic year, and pre- and post-curriculum surveys were administered. Thirteen first- and second-year medical students at our institution who completed the elective self-reported their perception of preparedness for each level 1 milestone in the 19 sub-competencies. A repeated measures design was used through identical pre- and post-curriculum surveys to determine any changes in self-reported preparedness for meeting level 1 milestones after completing the elective using Wilcoxon Signed Ranks Test.

RESULTS:

There was a significant increase in the median scoring from 1 to 2 ($p=0.027$) in overall self-reported preparedness for meeting the level 1 milestones included in the elective, as well as significant increases in subcategories across competencies 1-4 outlined by the ACGME. There was no significant increase in preparedness for professionalism or interpersonal communication competencies. There was no significant increase in interest in EM as a result of the elective.

CONCLUSION:

Implementing a milestones-based curriculum during the pre-clinical years shows improved self-reported preparedness of students interested in pursuing EM for meeting level 1 milestones prior to residency. Additionally, a specialty-based elective such as this one offered through EMIG may further increase interest in the field during pre-clinical years.

The Emergency Medicine Milestones 2.0: Setting the Stage for 2025 and Beyond

Cooney RR, Murano T, Ring H, Starr R, Beeson MS, Edgar L. AEM Educ Train. 2021 Jul 1;5(3):e10640. doi: 10.1002/aet2.10640. PMID: 34471793; PMCID: PMC8325436.

INTRODUCTION:

Beginning in 1999, residents in emergency medicine have been expected to demonstrate competence in the six Accreditation Council on Graduate Medical Education (ACGME) Core Competencies. Expectations were further refined and clarified through the introduction of the Milestones in 2013. Emerging research and data from milestone reporting has illustrated the need for modification of the original milestones. Against this backdrop, the ACGME convened a committee to review and revise the original milestones.

METHODS:

The working group was convened in December 2018 and consisted of representatives from the American Board of Emergency Medicine, American Osteopathic Association, Council of Residency Directors in Emergency Medicine, Association of American Medical Colleges, ACGME-Emergency Medicine Review Committee, three community members, a resident member, and a public member. This group also included members from both academic and community emergency medicine programs. The group was overseen by the ACGME vice president for milestones development and met in person one time followed by four virtual sessions to revise and draft the Emergency Medicine Milestones and Supplemental Guide as part of the ACGME Milestones 2.0 Project.

RESULTS:

Using data from milestones reporting, needs assessment data, stakeholder interviews, and community commentary, the working group engaged in revisions and updates for the Emergency Medicine Milestones and created a supplemental guide to aid programs in the design of programmatic assessment for the milestones.

CONCLUSIONS:

The Emergency Medicine Milestones 2.0 provide updated specialty-specific, competency-based behavioral anchors to guide the assessment of residents, the design of curricula, and the advancement of emergency medicine training programs.

Assessing the Transition of Training in Health Systems Science From Undergraduate to Graduate Medical Education

Santen SA, Hamstra SJ, Yamazaki K, Gonzalo J, Lomis K, Allen B, Lawson L, Holmboe ES, Triola M, George P, Gorman PN, Skochelak S. *J Grad Med Educ.* 2021 Jun;13(3):404-410. doi: 10.4300/JGME-D-20-01268.1. Epub 2021 Jun 14. PMID: 34178266; PMCID: PMC8207938.

BACKGROUND:

The American Medical Association Accelerating Change in Medical Education (AMA-ACE) consortium proposes that medical schools include a new 3-pillar model incorporating health systems science (HSS) and basic and clinical sciences. One of the goals of AMA-ACE was to support HSS curricular innovation to improve residency preparation.

OBJECTIVE:

This study evaluates the effectiveness of HSS curricula by using a large dataset to link medical school graduates to internship Milestones through collaboration with the Accreditation Council for Graduate Medical Education (ACGME).

METHODS:

ACGME subcompetencies related to the schools' HSS curricula were identified for internal medicine, emergency medicine, family medicine, obstetrics and gynecology (OB/GYN), pediatrics, and surgery. Analysis compared Milestone ratings of ACE school graduates to non-ACE graduates at 6 and 12 months using generalized estimating equation models.

RESULTS:

At 6 months both groups demonstrated similar HSS-related levels of Milestone performance on the selected ACGME competencies. At 1 year, ACE graduates in OB/GYN scored minimally higher on 2 systems-based practice (SBP) subcompetencies compared to non-ACE school graduates: SBP01 (1.96 vs 1.82, 95% CI 0.03-0.24) and SBP02 (1.87 vs 1.79, 95% CI 0.01-0.16). In internal medicine, ACE graduates scored minimally higher on 3 HSS-related subcompetencies: SBP01 (2.19 vs 2.05, 95% CI 0.04-0.26), PBLI01 (2.13 vs 2.01; 95% CI 0.01-0.24), and PBLI04 (2.05 vs 1.93; 95% CI 0.03-0.21). For the other specialties examined, there were no significant differences between groups.

CONCLUSIONS:

Graduates from schools with training in HSS had similar Milestone ratings for most subcompetencies and very small differences in Milestone ratings for only 5 subcompetencies across 6 specialties at 1 year, compared to graduates from non-ACE schools. These differences are likely not educationally meaningful.

Development and Pilot Testing of Entrustable Professional Activities for US Anesthesiology Residency Training

Woodworth GE, Marty AP, Tanaka PP, Ambardekar AP, Chen F, Duncan MJ, Fromer IR, Hallman MR, Klesius LL, Ladlie BL, Mitchell SA, Miller Juve AK, McGrath BJ, Shepler JA, Sims C 3rd, Spofford CM, Van Cleve W, Maniker RB. *Anesth Analg*. 2021 Jun 1;132(6):1579-1591. doi: 10.1213/ ANE.0000000000005434. PMID: 33661789.

BACKGROUND:

Modern medical education requires frequent competency assessment. The Accreditation Council for Graduate Medical Education (ACGME) provides a descriptive framework of competencies and milestones but does not provide standardized instruments to assess and track trainee competency over time. Entrustable professional activities (EPAs) represent a workplace-based method to assess the achievement of competency milestones at the point-of-care that can be applied to anesthesiology training in the United States.

METHODS:

Experts in education and competency assessment were recruited to participate in a 6-step process using a modified Delphi method with iterative rounds to reach consensus on an entrustment scale, a list of EPAs and procedural skills, detailed definitions for each EPA, a mapping of the EPAs to the ACGME milestones, and a target level of entrustment for graduating US anesthesiology residents for each EPA and procedural skill. The defined EPAs and procedural skills were implemented using a website and mobile app. The assessment system was piloted at 7 anesthesiology residency programs. After 2 months, faculty were surveyed on their attitudes on usability and utility of the assessment system. The number of evaluations submitted per month was collected for 1 year.

RESULTS:

Participants in EPA development included 18 education experts from 11 different programs. The Delphi rounds produced a final list of 20 EPAs, each differentiated as simple or complex, a defined entrustment scale, mapping of the EPAs to milestones, and graduation entrustment targets. A list of 159 procedural skills was similarly developed. Results of the faculty survey demonstrated favorable ratings on all questions regarding app usability as well as the utility of the app and EPA assessments. Over the 2-month pilot period, 1636 EPA and 1427 procedure assessments were submitted. All programs continued to use the app for the remainder of the academic year resulting in 12,641 submitted assessments.

CONCLUSIONS:

A list of 20 anesthesiology EPAs and 159 procedural skills assessments were developed using a rigorous methodology to reach consensus among education experts. The assessments were pilot tested at 7 US anesthesiology residency programs demonstrating the feasibility of implementation using a mobile app and the ability to collect assessment data. Adoption at the pilot sites was variable; however, the use of the system was not mandatory for faculty or trainees at any site.

Competencies and Milestones for Bioethics Trainees: Beyond ASBH's Healthcare Ethics Certification and Core Competencies

Sawyer KE, Dundas N, Snyder A, Diekema DS. J Clin Ethics. 2021 Summer;32(2):127-148. PMID: 34129529.

ABSTRACT:

Clinical ethics training programs are responsible for preparing their trainees to be competent ethics consultants worthy of the trust of patients, families, surrogates, and healthcare professionals. While the American Society for Bioethics and Humanities (ASBH) offers a certification examination for healthcare ethics consultants, no tools exist for the formal evaluation of ethics trainees to assess their progress toward competency. Medical specialties accredited by the Accreditation Council for Graduate Medical Education (ACGME) use milestones to report trainees' progress along a continuum of professional development as a means of "operationalizing and implementing" medical competencies. Utilizing the Core Competencies for Healthcare Ethics Consultation and the ACGME and American Board of Pediatrics' (ABP) Pediatric Milestones Project, we developed milestones for 17 subcompetencies in clinical ethics consultation and academic bioethics. As the field of clinical ethics becomes more standardized, such tools will be needed to promote the development of robust training programs and to certify that their graduates are competent practitioners.

Stages of Milestones Implementation: A Template Analysis of 16 Programs Across 4 Specialties

Yaghmour NA, Poulin LJ, Bernabeo EC, Ekpenyong A, Li ST, Eden AR, Hauer KE, Tichter AM, Hamstra SJ, Holmboe ES. *J Grad Med Educ.* 2021 Apr;13(2 Suppl):14-44. doi: 10.4300/JGME-D-20-00900.1. Epub 2021 Apr 23. PMID: 33936531; PMCID: PMC8078079.

BACKGROUND:

Since 2013, US residency programs have used the competency-based framework of the Milestones to report resident progress and to provide feedback to residents. The implementation of Milestones-based assessments, clinical competency committee (CCC) meetings, and processes for providing feedback varies among programs and warrants systematic examination across specialties.

OBJECTIVE:

We sought to determine how varying assessment, CCC, and feedback implementation strategies result in different outcomes in resource expenditure and stakeholder engagement, and to explore the contextual forces that moderate these outcomes.

METHODS:

From 2017 to 2018, interviews were conducted of program directors, CCC chairs, and residents in emergency medicine (EM), internal medicine (IM), pediatrics, and family medicine (FM), querying their experiences with Milestone processes in their respective programs. Interview transcripts were coded using template analysis, with the initial template derived from previous research. The research team conducted iterative consensus meetings to ensure that the evolving template accurately represented phenomena described by interviewees.

RESULTS:

Forty-four individuals were interviewed across 16 programs (5 EM, 4 IM, 5 pediatrics, 3 FM). We identified 3 stages of Milestone-process implementation, including a resource-intensive early stage, an increasingly efficient transition stage, and a final stage for fine-tuning.

CONCLUSIONS:

Residency program leaders can use these findings to place their programs along an implementation continuum and gain an understanding of the strategies that have enabled their peers to progress to improved efficiency and increased resident and faculty engagement.

Aligning Geriatric Medicine Fellowships with the Program of All-Inclusive Care for the Elderly (PACE)

McNabney MK, Suh TT, Sellers V, Wilner D. Gerontol Geriatr Educ. 2021 Jan-Mar;42(1):2-12. doi: 10.1080/02701960.2018.1532891. Epub 2018 Dec 18. PMID: 30558514.

ABSTRACT:

Geriatric medicine fellowship programs provide comprehensive training to one-year clinical fellows and must demonstrate successful progression of competence among fellows by reporting on 23 milestones to the Accreditation Council for Graduate Medical Education (ACGME). The Program of All-inclusive Care for the Elderly (PACE) is a model of care located throughout the United States and can serve as a training venue for fellows. We surveyed 113 fellowship program directors with a response rate of 42% ($n = 48$). The purpose of the survey was to assess: (1) familiarity and access to PACE and (2) perceived value of PACE to the fellowship program with regard to training and ability to achieve success in the 23 reporting milestones. Milestones involving communication and team management skills were most consistently identified as very valuable with a PACE clinical rotation. We then convened a focus group of four PACE medical directors who developed a fellowship curriculum for use in training fellows at PACE. We discuss the limitations of our design as well as the opportunities to build on the strengths of that model as a training site for fellows.

Well-Being Curriculum for Anesthesiology Residents: Development, Processes, and Preliminary Outcomes

Janosy NR, Beacham A, Vogeli J, Brainard A. Paediatr Anaesth. 2021 Jan;31(1):103-111. doi: 10.1111/pan.14062. Epub 2020 Dec 12. PMID: 33145909.

ABSTRACT:

Physician burnout and healthcare worker stress are well-covered topics in both the medical and lay press. Burnout in physicians can start as early as medical school. Well-being initiatives, programming, and access to support for all medical professionals are of paramount importance. In 2014, the Accreditation Council for Graduate Medical Education (ACGME) Milestones for Resident/Fellow Education in Anesthesiology added Professionalism as a milestone. A subcategory of Professionalism includes: A responsibility to maintain personal, emotional, physical, and mental health. This subcategory charges all residency and fellowship programs with establishing a curriculum in well-being. The development, execution, and evaluation of these programs are left to the individual institutions. In this paper, the development, processes, and preliminary outcomes of a resident well-being curriculum are presented.

Association Between Entrustable Professional Activities and Milestones Evaluations: Real-time Assessments Correlate With Semiannual Reviews

Albright JB, Meier AH, Ruangvoravat L, VanderMeer TJ. *J Surg Educ.* 2020 Nov-Dec;77(6):e220-e228. doi: 10.1016/j.jsurg.2020.07.027. Epub 2020 Jul 31. PMID: 32747323.

OBJECTIVE:

Entrustable professional activities (EPAs) have been developed to refine competency-based education. The American Board of Surgery has initiated a 2-year pilot study to evaluate the impact of EPAs on the evaluation and feedback of surgical residents. The ACGME Milestones in Surgery is a semiannual competency-based evaluation program to measure resident progression through 16 professional attributes across 8 practice domains. The correlation between these 2 evaluation tools remains unclear. The purpose of this study is to evaluate this correlation through comparison of an EPA with the corresponding elements of the ACGME Milestones.

DESIGN:

From July, 2018 to October, 2019, all residents submitting EPA evaluations for gall bladder disease were evaluated for preoperative, intraoperative, and/or postoperative entrustability. The ratings were converted to a numerical rank from 0 to 4. Milestones scores from May 2019 and November 2019 were obtained for each resident, with scores ranging from 0 to 4. The gall bladder EPA incorporates the operative PC3 and MK2 and nonoperative PC1, PC2, and ICS3 components. Spearman rank correlation was conducted to evaluate the association between each resident's median EPA ranking and his/her milestones scores.

SETTING:

SUNY Upstate Medical University, Syracuse, NY, a university-based hospital.

PARTICIPANTS:

General surgery residents.

RESULTS:

Among 24 residents, 106 intraoperative EPA evaluations were. For both the May and November milestones, significant positive correlations were noted for PC3 (correlation coefficient $\rho = 0.690$, $p < 0.001$; $\rho = 0.876$, $p < 0.001$). Similarly, for MK2, a significant positive correlation was noted ($\rho = 0.882$, $p < 0.001$; $\rho = 0.759$, $p < 0.001$). Interestingly, significant positive correlations were also identified between the 3 nonoperative milestones and the intraoperative entrustability ranking.

CONCLUSIONS:

We observed significant correlations between EPAs for cholecystectomy and associated milestones evaluation scores. These findings indicate that EPAs may provide more timely and specific feedback than existing tools and, on aggregate, may improve upon existing formative feedback practices provided through the biannual evaluation of surgical residents.

Rheumatology Milestones 2.0: A Roadmap for Competency-Based Medical Training of Rheumatology Fellows in the 21st Century

Liebowitz JE, Torralba KD, Kolfenbach J, Marston B, Dua AB, O'Rourke KS, McKown K, Battistone MJ, Valeriano-Marcet J, Edgar L, McLean S, Gouze KR, Bolster MB. *Arthritis Care Res (Hoboken)*. 2020 Nov 12. doi: 10.1002/acr.24507. Epub ahead of print. PMID: 33181000.

OBJECTIVE:

Since 2014, rheumatology fellows have been assessed not only based on their ability to provide patient care and possess medical knowledge but also on their skill in serving as patient advocates, navigators of health systems, and members of a health care team. Such assessments have been carried out through the use of competency-based "milestones" from the Accreditation Council of Graduate Medical Education (ACGME). However, a needs assessment demonstrated interest in more context validity and subspecialty-relevance since the development of the ACGME Internal Medicine (IM) Subspecialty Reporting Milestones. The ACGME thus charged a working group to develop Rheumatology Milestones 2.0, as well as a Supplemental Guide to assist with implementation.

METHODS:

The Working Group, consisting of seven rheumatology program directors, two division directors, a community practice rheumatologist, a rheumatology fellow-in-training, and a public member who is a rheumatology patient, was overseen by the ACGME Vice President for Milestones Development and met through three 12-hour in-person meetings to compose the Rheumatology Specialty Milestones and Supplemental Guide within the ACGME Milestones 2.0 Project.

RESULTS:

Informed by the needs assessment data and stakeholders, the Working Group revised and adapted the ACGME IM Subspecialty Reporting Milestones to create a rheumatology-specific set of milestones and a Supplemental Guide for their implementation.

CONCLUSIONS:

The Rheumatology Milestones 2.0 provide a specialty-specific, competency-based evaluation tool that can be used by program directors, Clinical Competency Committees (CCC), and others to assess the competencies of rheumatology fellows during training and help measure readiness for independent practice.

The Implementation of ACGME 'Reporting Milestones' in Internal Medicine Postgraduate Year Training Program - Experience Sharing and Preliminary Outcome

Hsiao-Ju L, Jhong-Han W, Chia-Yu L, Pei-Jen T, Chiung-Yu C. 醫學教育/ Journal of Medical Education. 2020;(3):161. doi:10.6145/jme.202009_24(3).0005

PURPOSE:

Competency-based medical education has been the current trend of education, and milestones assessment is one of the means to practice it. We hereby shared our experience and preliminary results in applying reporting milestones in our postgraduate year (PGY) training program.

METHODS:

We translated the English version of 'reporting milestones' to Chinese one and built the electronic report worksheets on our web-system. Milestones assessments were conducted at the end of every month since August 2018. We analyzed the completion rate and the results of the assessments in the 2018 academic year by using IBM SPSS Statistics version 23.

RESULTS:

The completion rate of milestones assessments was 96.7% (175/181), of which the most frequent unassessed subcompetencies were patient care (PC)-4 and PC-5 (both n = 9). The mean levels of the subcompetencies ranged from 3.5 to 4 on a scale of 1-5. Our PGY physicians demonstrated better in subcompetencies systems-based practice (SBP)-1, practice-based learning and improvement (PBLI)-1, and PBLI-3 (mean levels 4.0 ± 0.4 , 4.0 ± 0.4 , 4.0 ± 0.5 , respectively), and worse in subcompetence SBP-3 (mean levels 3.5 ± 0.6) ($p < 0.05$ by ANOVA). The progress of all subcompetencies between the first and third months of rotation course was insignificant.

CONCLUSIONS:

We accomplished the reporting milestones assessments in our hospital. Our experience in implementing milestones can be as a reference for other hospitals. The learning outcomes from milestones assessments may be helpful to improve our PGY program.

North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Position Paper on Entrustable Professional Activities: Development of Pediatric Gastroenterology, Hepatology, and Nutrition Entrustable Professional Activities

Sauer CG, Robson J, Turmelle YP, Cerezo CS, Loomes KM, Huang JS, Quiros-Tejeira RE, Benkov KJ, Narkewicz MR, Leichtner A, Weinstein T. *J Pediatr Gastroenterol Nutr.* 2020 Jul;71(1):136-143. doi: 10.1097/MPG.0000000000002684.

ABSTRACT:

Quality training in pediatric gastroenterology, hepatology, and nutrition is essential for the future of our specialty from advancing the science through research to providing clinical care for children with gastrointestinal, hepatic and nutritional disorders. As educational theory has developed, both the American Board of Pediatrics (ABP) and the Accreditation Council for Graduate Medical Education (ACGME) have commissioned projects to better define training including core competencies, and milestones with the goal of competency-based assessment. Seeking to provide a clinical context for these competencies and milestones, the ABP commissioned a project for each pediatric subspecialty to develop entrustable professional activities (EPA) while at the same time developing EPAs that are common to all pediatric subspecialties. North American Society for Pediatric Gastroenterology, Hepatology, Nutrition (NASPGHAN) commissioned an EPA Task Force to develop the pediatric gastroenterology, hepatology and nutrition EPAs. This document serves as an introduction to EPAs, including their historical background, underlying educational theory, and the process used to develop the pediatric gastroenterology, hepatology and nutrition EPAs in the United States of America.

Linking Workplace-Based Assessment to ACGME Milestones: A Comparison of Mapping Strategies in Two Specialties

Kelleher M, Kinnear B, Wong SEP, O'Toole J, Warm E. Teach Learn Med. 2020 Apr-May;32(2):194-203. doi: 10.1080/10401334.2019.1653764. Epub 2019 Sep 18.

CONSTRUCT:

The construct that is assessed is competency in Pediatrics and Internal Medicine residency training. Background: The Accreditation Council for Graduate Medical Education (ACGME) created milestones to measure learner progression toward competence over time but not as direct assessment tools. Ideal measurement of resident performance includes direct observation and assessment of patient care skills in the workplace. Residency programs have linked these concepts by mapping workplace-based assessments to the milestones of ACGME subcompetencies. Mapping is a subjective process, and little is known about specific techniques or the resulting consequences of mapping program-specific assessment data to larger frameworks of competency.

APPROACH:

In this article, the authors compare and contrast the techniques used to link workplace-based assessments called Observable Practice Activities (OPAs) to ACGME subcompetencies in two large academic residency programs from different specialties (Internal Medicine and Pediatrics). Descriptive analysis explored the similarities and differences in the assessment data generated by mapping assessment items to larger frameworks of competency.

RESULTS:

Each program assessed the core competencies with similar frequencies. The largest discrepancy between the two subspecialties was the assessment of Medical Knowledge, which Internal Medicine assessed twice as often. Pediatrics also assessed the core competency Systems-based Practice almost twice as often as Internal Medicine. Both programs had several subcompetencies that were assessed more or less often than what appeared to be emphasized by the blueprint of mapping. Despite using independent mapping processes, both programs mapped each OPA to approximately three subcompetencies.

CONCLUSIONS:

Mapping workplace-based assessments to the ACGME subcompetencies allowed each program to see the whole of their curricula in ways that were not possible before and to identify existing curricular and assessment gaps. Although each program used similar assessment tools, the assessment data generated were different. The lessons learned in this work could inform other programs attempting to link their own workplace-based assessment elements to ACGME subcompetencies.

Lack of Telemedicine Training in Academic Medicine: Are We Preparing the Next Generation?

Pourmand A, Ghassemi M, Sumon K, Amini SB, Hood C, Sikka N. *Telemed J E Health*. 2020 Apr 15. doi: 10.1089/tmj.2019.0287. [Epub ahead of print]

BACKGROUND:

Telemedicine focuses on providing medical care to patients in remote locations using telecommunication technologies. It has been shown to be cost-effective, improve health outcomes, and enhance patient satisfaction. This study examines the extent to which medical students and resident physicians are exposed to telemedicine during training.

MATERIALS AND METHODS:

The authors accessed the American College of Graduate Medical Education (ACGME) Residency Milestones from specialties and subspecialties mentioned in the 2018 Milestones National Report and searched for key terms, including "Technology," "Telemedicine," "Telehealth," "EMR," "Electronic Medical Record," "EHR," "Electronic Health Record," "Electronics," and "Social Media." The authors also accessed the 2018 American Association of Medical Colleges (AAMC) "Curriculum Inventory and Reports" to retrieve data from surveys of medical schools that included telemedicine in required courses and electives for medical students from 2013 to 2018.

RESULTS:

From the 104 ACGME specialty milestones, only one specialty (Child and Adolescent Psychiatry) mentioned telehealth in its ACGME Milestone document. According to the AAMC data the number of medical schools surveyed increased every academic year from 140 in 2013/2014 to 147 in 2017/2018, telemedicine education in medical school increased significantly from 41% in 2013/2014 to 60% in 2017/2018 ($p = 0.0006$). However, the growth in telemedicine education plateaued from 56% in 2015/2016 to 60% in 2017/2018 ($p = 0.47$).

CONCLUSION:

Familiarizing medical students with telemedicine is essential; the next generation of health care providers should be equipped with knowledge of telemedicine as a valuable skill to serve populations that do not have direct access to quality medical care. Methods of implementing telemedicine education into more medical schools and residency programs merits further study.

Development of an Educational Curriculum for Spinal Cord Stimulation

Abd-Elseyed A, Abdallah R, Falowski S, Chaiban G, Burkey A, Slavin K, Aziz M, Raslan AM. *Neuromodulation*. 2020 Apr 13. doi: 10.1111/ner.13142. [Epub ahead of print]

BACKGROUND:

Spinal cord stimulators (SCSs) are used for treating chronic pain. The number of SCSs implanted each year is on the increase. The North American Neuromodulation Society (NANS) education committee aimed to develop a SCS curriculum as a tool to guide physicians at different training levels, based on the most recent evidence.

MATERIAL AND METHODS:

A multidisciplinary (anesthesiology, physical medicine, neurosurgery, and neurology), taskforce representing the education committee of the NANS met to develop a SCS curriculum following the Accreditation Council for Graduate Medical Education (ACGME) milestones. The task force used the best available evidence and knowledge to develop the curriculum. Once developed, the SCS curriculum was then approved by the NANS board.

RESULTS:

The task force developed a SCS training curriculum. Milestones included patient care and procedural skills, system-based practice, medical knowledge, interpersonal communication, practice based learning and professionalism. Each milestone was defined for three categories, early learner, advanced learner, and practitioner.

CONCLUSION:

A multidisciplinary task force of the NANS education committee developed a SCS training curriculum that defines ACGME milestones for basic learners, advanced learners, and practitioners.

Fellow-Led SICU Morbidity and Mortality Conferences Address Patient Safety, Quality Improvement, Interprofessional Cooperation and ACGME Milestones

Weingarten N, Issa N, Posluszny. Am J Surg. 2020 Feb;219(2):309-315. doi: 10.1016/j.amjsurg.2019.01.026. Epub 2019 Jan 28.

BACKGROUND:

Morbidity and mortality conferences (MMCs) promote patient safety, spur quality improvement (QI) projects, and enhance interprofessional cooperation. The use of MMCs to address the Accreditation Council for Graduate Medical Education's (ACGME's) six core competencies and specialty-specific milestones for surgical critical care (SCC) fellows has yet to be explored.

METHODS:

We developed a monthly, interprofessional, case-based MMC program managed by SCC fellows. We assessed participants' experiences through post-conference surveys and semi-structured interviews.

RESULTS:

After nine conferences, 95.1% of participants (n = 143) agree or strongly agree that the MMC improved their knowledge and clinical assessment skills. The MMC spurred two QI projects, increased interprofessional cooperation, and addressed all six ACGME core competencies and 16 specialty-specific milestones.

CONCLUSIONS:

Interprofessional, case-based MMCs are an effective educational tool for SCC fellowship programs. They promote patient safety, QI, and interprofessional cooperation, and address ACGME core competencies and specialty-specific milestones for SCC fellows.

A National Survey of Integrated Vascular Surgery Residents' Experiences with and Attitudes About Quality Improvement During Residency

Purnell SM, Wolf L, Millar MM, Smith BK. *J Surg Educ.* 2020 Jan - Feb;77(1):158-165. doi: 10.1016/j.jsurg.2019.09.003. Epub 2019 Dec 4.

BACKGROUND:

Integrated vascular surgery residency, or "0+5," programs provide education in the Accreditation Council for Graduate Medical Education (ACGME) competencies of Systems-Based Practice (SBP) and Practice-Based Learning and Improvement (PBLI), which include milestones related to quality improvement (QI). It is unclear what QI curricula are in place in 0+5 programs nationally or how 0+5 residents perceive the importance of QI.

OBJECTIVE:

The purpose of this study is to assess current 0+5 residents' knowledge, experiences with, and attitudes about QI.

DESIGN:

A survey was developed using the ACGME Common Program Requirements and Milestones pertaining to QI. All 0+5 residents from 2017 to 2018 academic year were emailed an electronic link to the survey. Descriptive statistics and cross-tabulations were calculated using Stata/MP version 13.1.

SETTING:

All 0+5 vascular surgery residency programs in the United State (n = 52).

PARTICIPANTS:

The survey was completed by 35% (n = 90/257) of 0+5 residents, representing 75% of 0+5 programs in the United States (n = 39/52).

RESULTS:

Forty-one percent of respondents felt that applying QI methods is very important and 33% felt that QI education is very important for their future work, however, just 13% felt very prepared to lead a QI initiative. Residents' perceptions of preparedness to lead QI projects and the importance they attached to QI education were significantly influenced by their participation in a QI project (p = 0.003 and p = 0.038 respectively). Finally, just 8% (n = 6) of residents responded correctly to all 13 knowledge-based questions and these residents felt better prepared to lead a QI initiative compared to those who answered incorrectly (p = 0.002).

CONCLUSIONS:

Most 0+5 residents report participation in a QI project during residency, however, few feel prepared to lead a QI initiative in practice. Furthermore, only half of PGY5 0+5 residents report achieving specific ACGME targets for graduation pertaining to QI. Current QI curricula in 0+5 programs may be inadequate in teaching fundamental QI concepts and achieving ACGME competency targets for graduation.

Development of a Novel Competency-Based Evaluation System for HIV Primary Care Training: the HIV Entrustable Professional Activities

Dunne D, Green M, Tetrault J, Barakat LA. J Gen Intern Med. 2020 Jan;35(1):331-335. doi: 10.1007/s11606-019-04956-1.

BACKGROUND:

There is an anticipated shortage of primary care providers trained to care for patients with HIV. The Yale School of Medicine developed and implemented a novel HIV training track within our Primary Care Internal Medicine Residency Program. A set of 12 Entrustable Professional Activities (EPAs) were developed to guide curriculum development and resident assessment.

AIM:

To describe the process of implementing a novel EPA-based curriculum for the HIV Primary Care Training Track including EPA-based trainee evaluation tools.

PARTICIPANTS/SETTINGS:

Two to three residents were enrolled annually from 2012 to 2017 (total n = 11). Training sites included the outpatient academic center HIV clinic and inpatient HIV ward.

PROGRAM DESCRIPTION:

An expert panel developed 12 HIV-specific EPAs. These were mapped to curricular and reporting internal medicine milestones. Curricular activities and evaluation tools were developed to guide EPA progress.

PROGRAM EVALUATION:

Graduating residents were ready for unsupervised practice in 91% of EPAs at the end of the 3-year program.

DISCUSSION:

Development of HIV-specific training EPAs was effective for driving curricular development and resident evaluation, and served as an effective method to communicate expectations to resident participants. These HIV-specific EPAs could serve as a useful template to enhance HIV education in academic settings.

Professionalism Milestones Assessments Used by Emergency Medicine Residency Programs: A Cross-sectional Survey

Stehman CR, Hochman S, Fernández-Frackelton M, Volz EG, Domingues R, Love JN, Soares W. West J Emerg Med. 2019 Dec 19;21(1):152-159. doi: 10.5811/westjem.2019.11.44456.

INTRODUCTION:

Professionalism is a vital component of quality patient care. While competency in professionalism is Accreditation Council for Graduate Medical Education (ACGME)-mandated, the methods used to evaluate professionalism are not standardized, calling into question the validity of reported measurements. We aimed to determine the type and frequency of methods used by United States (US) - based emergency medicine (EM) residencies to assess accountability (Acc) and professional values (PV), as well as how often graduating residents achieve competency in these areas.

METHODS:

We created a cross-sectional survey exploring assessment and perceived competency in Acc and PV, and then modified the survey for content and clarity through feedback from emergency physicians not involved in the study. The final survey was sent to the clinical competency committee (CCC) chair or program director (PD) of the 185 US-based ACGME-accredited EM residencies. We summarized results using descriptive statistics and Fisher's exact testing.

RESULTS:

A total of 121 programs (65.4%) completed the survey. The most frequently used methods of assessment were faculty shift evaluation (89.7%), CCC opinion (86.8%), and faculty summative evaluation (76.4%). Overall, 37% and 42% of residency programs stated that nearly all (greater than 95%) of their graduating residents achieve mastery of Acc and PV non-technical skills, respectively. Only 11.2% of respondents felt their programs were very effective at determining mastery of non-technical skills.

CONCLUSION:

EM residency programs relied heavily on faculty shift evaluations and summative opinions to determine resident competency in professionalism, with feedback from peers, administrators, and other staff less frequently incorporated. Few residency programs felt their current methods of evaluating professionalism were very effective.

Recommendations From the Society for the Advancement of Transplant Anesthesiology: Liver Transplant Anesthesiology Fellowship Core Competencies and Milestones

Nguyen-Buckley C, Wray CL, Zerillo J, Gilliland S, Aniskevich S, Nicolau-Raducu R, Planinsic R, Srinivas C, Pretto EA Jr, Mandell MS, Chadha RM. *Semin Cardiothorac Vasc Anesth*. 2019 Dec;23(4):399-408. doi: 10.1177/1089253219868918. Epub 2019 Aug 12.

ABSTRACT:

Liver transplantation is a complex procedure performed on critically ill patients with multiple comorbidities, which requires the anesthesiologist to be facile with complex hemodynamics and physiology, vascular access procedures, and advanced monitoring. Over the past decade, there has been a continuing debate whether or not liver transplant anesthesia is a general or specialist practice. Yet, as significant data have come out in support of dedicated liver transplant anesthesia teams, there is not a guarantee of liver transplant exposure in domestic residencies. In addition, there are no standards for what competencies are required for an individual seeking fellowship training in liver transplant anesthesia. Using the Accreditation Council for Graduate Medical Education guidelines for residency training as a model, the Society for the Advancement of Transplant Anesthesia Fellowship Committee in conjunction with the Liver Transplant Anesthesia Fellowship Task Force has developed the first proposed standardized core competencies and milestones for fellowship training in liver transplant anesthesiology.

The Case for Observation Medicine Education and Training in Emergency Medicine

Pena ME, Wheatley MA, Suri P, Mace SE, Kwan E, Baugh CW. AEM Educ Train. 2019 Dec 19;4(Suppl 1):S47-S56. doi: 10.1002/aet2.10413. eCollection 2020 Feb.

BACKGROUND:

Many hospitals have or will be opening an observation unit (OU), the majority managed by the emergency department (ED). Graduating emergency medicine (EM) residents will be expected to have the knowledge and skills necessary to appropriately identify and manage patients in this setting. Our objective is to examine the current state of observation medicine (OM) education and prevalence in EM training.

METHODS:

In a follow-up to the 2019 Society for Academic Emergency Medicine (SAEM) OM Interest Group meeting, we convened an expert panel of OM physicians who are members of both the SAEM OM Interest Group and the American College of Emergency Physicians Section of OM. The panel of six emergency physicians representing geographic diversity was formed. A structured literature review was performed yielding 16 educational publications and sources pertaining to OM education and training across all specialties.

REPORT ON THE EXISTING LITERATURE:

Only a small number of EM residencies have a required or elective OM rotation in an OU. An OM rotation in a protocol-driven ED OU gives residents experience managing patients in this setting and improves skills integral to EM and part of the EM milestones and Accreditation Council for Graduate Medical Education (ACGME) core competencies: reassessment, disposition decision making, risk stratification, team management, and practicing cost-appropriate care. Even without a formal rotation, multiple OM educational resources can be incorporated into EM resident education and didactics. Education research opportunity exists.

CONCLUSIONS:

This panel believes that OM is an important component of EM that should be incorporated into EM residency as the knowledge and skills learned such as risk stratification, disposition decision making, and team management augment those needed for the practice of EM. There is a distinct opportunity for EM educators to better equip their trainees for a career in EM by including OM education and experience in EM residency training.

Using an Entrustable Professional Activity to Assess Consultation Requests Called on an Internal Medicine Teaching Service

Kang AJ, Gielissen K, Windish D. MedEdPORTAL. 2019 Nov 22;15:10854. doi: 10.15766/mep_2374-8265.10854.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education's milestones require internal medicine residents to have competency in calling consults. Based on a literature review, we developed an Entrustable Professional Activity (EPA) to delineate the knowledge, skills, and attitudes required for a consultation request and, building on the EPA, implemented an assessment instrument to provide feedback to interns calling consultation requests and assess the quality of their consult questions and the level of supervision required in performing this milestone.

METHODS:

Assessments were done on internal medicine inpatient teaching services. Consultation requests were performed by interns and observed by residents using the assessment instrument. Feedback was provided to the interns. Interns then completed a self-reflection instrument based on the feedback.

RESULTS:

Twenty-six paired observations were collected over three 1-month rotations. There was a moderate positive correlation ($r = .43$) comparing resident and intern responses to how they felt about the intern's ability to make a consultation request. There was a strong positive correlation ($r = .65$) comparing resident opinion of how strong the intern's ability in calling a consult to how well the consult question used the PICO (patient, intervention, comparators, outcomes of interest) framework. Twenty-five out of 28 interns (89%) said they would make a change during their next consultation request due to feedback from their resident.

DISCUSSION:

Our EPA-based assessment instrument provided an opportunity to give interns feedback and to assess the quality of the consultation requests they made.

Qualitative Study of Independent Home Visits by Hospice Fellows: Addressing Gaps in ACGME Milestones by Fostering Reflection and Self-Assessment

Samala RV, Hoeksema LJ, Colbert CY. *Am J Hosp Palliat Care*. 2019 Oct;36(10):885-892. doi: 10.1177/1049909119836218. Epub 2019 Mar 13.

BACKGROUND:

With the rapid growth in the number of fellowship programs in Hospice and Palliative Medicine (HPM), many are in the process of developing ways to demonstrate that fellows are attaining educational milestones. Reflection and self-assessment are key components of 2 Accreditation Council for Graduate Medical Education (ACGME) competencies, practice-based learning and improvement, and systems-based practice, which have both been historically challenging to learn and assess.

OBJECTIVE:

This article describes results of a content analysis of narrative data collected from HPM fellows' self-assessments as they performed hospice home visits independently in a new clinical rotation.

DESIGN:

This was a prospective qualitative study.

SETTINGS/PARTICIPANTS:

Eight fellows completed 217 unsupervised hospice home visits from 2014 to 2016.

MEASUREMENTS:

Fellows completed weekly self-assessment forms, which captured both clinical visit information and practice data elicited from responses to open-ended reflection prompts.

RESULTS:

Analysis of 29 self-assessment forms generated 6 themes: patient- and family-centered care, self-efficacy, systems-based care, commitment to doing their best, catalyst for professional growth, and purpose and meaning in work. The fellows recognized numerous barriers distinct to providing care in homes. All fellows felt prepared to perform home visits throughout the rotation and after training.

CONCLUSIONS:

Narrative data collected during the independent home visit rotation provided evidence that HPM fellows detected gaps in their performance, planned for practice improvements in subsequent visits, and valued working within an interprofessional team. Built-in opportunities for fellows to reflect during training are critical in meeting ACGME milestones, and are integral to their professional development.

Milestones as a Guide for Academic Career Development

Blake GH, Kemmet RK, Jenkins J, Heidel RE, Wilson GA. Fam Med. 2019 Oct;51(9):760-765. doi: 10.22454/FamMed.2019.109290.

BACKGROUND AND OBJECTIVES:

Faced with a limited supply of applicants for faculty positions, increasing demands for residency faculty, and a growing number of programs, our program has increasingly filled ranks with recent residency graduates with broad scope but limited experience and training in academics. These early-career clinicians often require further mentorship as they seek advancement in clinical skills and development of teaching and scholarly activity skill sets.

METHODS:

To educate our recent residency graduates in teaching/scholarly activity skills, and to provide a career trajectory, we created a process to guide their maturation with milestones using the six core competencies from the Accreditation Council for Graduate Medical Education. The milestones consist of four levels of clinician/academic maturation. Each competence has goals and activities for each level of development. We validated the milestones using our physician faculty assessing time spent in academic medicine and academic rank.

RESULTS:

Faculty of higher academic rank scored higher in all competencies than faculty of lower academic rank. Correlation between systems-based practice and years in academics demonstrated statistical significance, and all other categories showed nonsignificant associations.

CONCLUSIONS:

The milestones are consistent with faculty academic development and career progression, and may serve as a guide for career advancement and as a guideline for professional progression for residency clinicians. Further testing for validation in other family medicine programs is necessary, but preliminary findings indicate this milestone project may be of service to our profession.

Building Provider-Caregiver Partnerships: Curricula for Medical Students and Residents

Blackie M, Baughman KR, Palmisano B, Sanders M, Sperling D, Scott E, Radwany S, Drost J, Thomas J. Acad Med. 2019 Oct;94(10):1483-1488. doi: 10.1097/ACM.0000000000002806.

PROBLEM:

A disconnect exists between caregivers and health care providers, resulting in fragmented communication, which increases caregiver stress and compromises patient care. Although providers have a responsibility to recognize caregiver burden, they receive scant training on issues important to caregivers.

APPROACH:

From 2014-2017, as part of the Building Caregiver Partnerships Through Interprofessional Education project—a collaborative effort between Northeast Ohio Medical University and Summa Health—the authors developed curricula to foster effective partnerships between health care providers and caregivers by exposing medical students and residents to highly personal caregiving narratives. The curricula center on a short film featuring four families representing diverse caregiving experiences. The authors crafted several discussion guides, case-based learning exercises, structured clinical encounters, team-based simulations, and clinical cases as companion educational tools for the film.

OUTCOMES:

Medical students reported the educational tools piloted to be valuable in broadening their understanding of caregivers' needs, while residents reported the educational tools piloted to also be valuable in improving their communication and building partnerships with caregivers. Undergraduate and graduate faculty reported finding the pilots valuable.

NEXT STEPS:

Future goals include conducting an outcome evaluation, based on ACGME milestones, to identify and examine the clinical outcomes to determine if communication increases and quality of care improves as a result of the project. The authors would also like to include caregivers in the evaluation. Finally, because caregiving is best addressed from a team approach, the authors would like to pilot the project at other health professions programs.

A Qualitative Study of Independent Home Visits by Hospice Fellows: Addressing Gaps in ACGME Milestones by Fostering Reflection and Self-Assessment

Samala RV, Hoeksema LJ, Colbert CY. *Am J Hosp Palliat Care*. 2019 Oct;36(10):885-892. doi: 10.1177/1049909119836218. Epub 2019 Mar 13.

BACKGROUND:

With the rapid growth in the number of fellowship programs in Hospice and Palliative Medicine (HPM), many are in the process of developing ways to demonstrate that fellows are attaining educational milestones. Reflection and self-assessment are key components of 2 Accreditation Council for Graduate Medical Education (ACGME) competencies, practice-based learning and improvement, and systems-based practice, which have both been historically challenging to learn and assess.

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This article describes results of a content analysis of narrative data collected from HPM fellows' self-assessments as they performed hospice home visits independently in a new clinical rotation.

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RESULTS:

Analysis of 29 self-assessment forms generated 6 themes: patient- and family-centered care, self-efficacy, systems-based care, commitment to doing their best, catalyst for professional growth, and purpose and meaning in work. The fellows recognized numerous barriers distinct to providing care in homes. All fellows felt prepared to perform home visits throughout the rotation and after training.

CONCLUSIONS:

Narrative data collected during the independent home visit rotation provided evidence that HPM fellows detected gaps in their performance, planned for practice improvements in subsequent visits, and valued working within an interprofessional team. Built-in opportunities for fellows to reflect during training are critical in meeting ACGME milestones, and are integral to their professional development.

Core Competencies for Pediatric Consultation-Liaison Psychiatry in Child and Adolescent Psychiatry Fellowship Training

Shaw RJ, Rackley S, Walker A, Fuchs DC, Meadows A, Dalope K, Pao M; Special Interest Study Group for Pediatric Consultation Liaison Psychiatry Core Competencies, Physically III Child Committee, American Academy of Child and Adolescent Psychiatry. *Psychosomatics*. 2019 Sep - Oct;60(5):444-448. doi: 10.1016/j.psym.2019.04.006. Epub 2019 May 3

BACKGROUND:

Learners developing competency-based skills, attitudes, and knowledge through the achievement of defined milestones is a core feature of competency-based medical education. In 2017, a special interest study group of the American Academy of Child and Adolescent Psychiatry convened a panel of specialists to describe pediatric consultation-liaison psychiatry (CLP) best educational practices during child and adolescent psychiatry fellowship.

OBJECTIVE:

The objective of this project was to develop a national consensus on pediatric CLP competencies to help guide training in this specialty.

METHODS:

An expert working group developed a list of candidate competences based on previously established educational outcomes for CLP (formerly Psychosomatic Medicine), child and adolescent psychiatry, and general psychiatry. A survey was distributed to members of the American Academy of Child and Adolescent Psychiatry Physically III Child Committee to determine child and adolescent psychiatry fellowship educational needs on pediatric CLP services and generate consensus regarding pediatric CLP competencies.

RESULTS:

Most survey respondents were supportive of the need for a national consensus on core competencies for pediatric CLP. Consensus from a panel of experts in the field of pediatric CLP generated a list of proposed core competencies that track the Accreditation Council for Graduate Medical Education's six core competencies.

CONCLUSIONS:

Consistent learning outcomes provide the foundation for further development of tools to support training in pediatric CLP. There is a need to develop further tools including outcome assessment instruments and self-directed learning materials that can be used to support lifelong learning.

A Review of Orthopedic Resident Outpatient Notes Are Perceptions of the EMR Reflected in Current Documentation Practices?

Phillips D, Fisher N, Karia R, Kalet A. Bull Hosp Jt Dis (2013). 2019 Sep;77(3):194-199.

INTRODUCTION:

Systems-based Practice 3 (SBP 3) in the orthopedic residency developmental milestones evaluates residents' knowledge, understanding, and utilization of the electronic medical record (EMR). In order to better assess SBP 3, we conducted a review of residents' clinical notes in order to quantify the current state of orthopedic residents' documentation in the EMR. The purpose of this study was to objectively evaluate orthopedic resident documentation in the EMR.

METHODS:

Orthopedic resident medical notes from a single orthopedic residency at one academic medical center were scored by faculty members who had directly observed the clinical encounter. These notes were then independently scored by one investigator (N.F.) using clinical content specific, objective criteria. Sixty-five medical records were reviewed. All 62 orthopedic residents anonymously completed an 84-question survey on the value of EMR utilization and documentation within the medical record.

RESULTS:

Many key elements necessary to diagnosing a patient's injury and developing a treatment plan were often omitted (e.g., "Mechanism of Injury" in 32.3% of records), and the majority of notes did not include "Decision Making and Patient Preference" (95.2%) or "Risks/Benefits of Surgery" (93.7%). However, 95.2% of residents agreed that their notes reflect their medical knowledge and 96.8% agreed that their notes reflect their clinical reasoning.

DISCUSSION:

The results of this objective review revealed significant deficits in orthopedic resident documentation not identified by faculty observers.

Focused Teaching Improves Medical Student Professionalism and Data Gathering Skills in the Emergency Department

Smith C, Likourezos A, Schiller J. *Cureus*. 2019 Sep 25;11(9):e5765. doi: 10.7759/cureus.5765.

INTRODUCTION:

Leaders in medical education have developed milestones and core competencies in an attempt to ensure that relational skills, such as communication and professionalism, are emphasized in addition to the usual skills of medical knowledge, data gathering, and emergency stabilization during students' emergency medicine (EM) medical education. Providers facile in each of these areas have better patient outcomes, patient experiences, and decreased incidence of malpractice cases. The authors attempted to demonstrate that by deliberate teaching of these skills during an EM medical student clerkship, students could significantly improve their clinical performance.

METHODS:

This prospective, randomized, single-blinded cohort study was performed at an academic, tertiary, urban ED to investigate the effects of a one-on-one preceptor shift on the clinical performance of fourth-year medical students. Students were randomized into two groups and assessed by pre- and post-intervention objective structured clinical encounters (OSCEs) with standardized patients (SPs) at weeks one and three. A crossover design was employed so that students in the control group participated in a preceptor shift after their second OSCE. Measurements were based on a five-point Likert scale assessment linked to early EM milestones as defined by the Accreditation Council on Graduate Medical Education (ACGME).

RESULTS:

The mean improvement in total overall score was significantly greater in the intervention group: 4.31 versus 2.57 (Cohen's $d = 0.57$, $p = 0.029$). When each milestone was assessed individually, students in the intervention group improved significantly in data gathering (Cohen's $d = 0.47$, $p = 0.048$) and professionalism (Cohen's $d = 0.66$, $p = 0.011$). There was a nonstatistically significant improvement for the intervention compared to control group in emergency management and communication skills. There was no improvement for either group in medical knowledge.

CONCLUSION:

A one-on-one preceptor shift can result in a statistically significant improvement in data gathering and professionalism skills as measured by OSCEs.

A Content Analysis of the ACGME Specialty Milestones to Identify Performance Indicators Pertaining to the Development of Residents as Educators

Michael SH, Rougas S, Zhang XC, Clyne B. Teach Learn Med. 2019 Aug-Sep;31(4):424-433. doi: 10.1080/10401334.2018.1560298. Epub 2019 Jan 22.

CONSTRUCT:

For curriculum development purposes, this study examined how the development of residents as educators is reflected in the Accreditation Council for Graduate Medical Education (ACGME) Milestones.

BACKGROUND:

Residents teach patients, families, medical students, physicians, and other health professionals during and beyond their training. Despite this expectation, it is unclear how the development of residents as educators is reflected in the specialty-specific Milestones.

APPROACH:

We performed a textual content analysis of 25 specialty Milestone documents available as downloads from the ACGME website in December 2015. Syntactical units of interest included developmental progressions that describe the development of educators over the course of residency training and 16 keyterms identified during the analysis. We then categorized the terms by associated Milestone level, ACGME core competency, and targeted learner(s).

RESULTS:

We identified 10 developmental progressions and 546 instances of the 16 key terms that describe the development of physician educators. The frequency of terms among specialties was quite variable (5-46 terms per specialty, Mdn = 21). The majority of education-related terms appeared at advanced Milestone levels; there were 139 (26%) such instances in Level 4 and 296 (54%) in Level 5. Education-related terms were identified in all six ACGME core competencies, with greatest frequency in Patient Care (157, 29%). Other residents were the learners most frequently targeted by education-related Milestones (211, 40%).

CONCLUSIONS:

The current ACGME Milestones largely imply that resident teaching is a high-level or aspirational goal, achieved without a clear or consistently assessed developmental progression. These findings run counter to the theoretical basis that underlies the development of the Milestones. Wide variation among specialties indicates lack of consensus around the ideal skill set of the resident educator and limits the utility of these documents for curriculum development in this domain.

A Milestone-Based Pediatric Intern Boot Camp: An Educational Intervention to Minimize the July Effect

Novosel A, van de Ridder M, Smith-King C, McLeod M, Triemstra J. *Academic Pediatrics*. 2019 Aug; (6). doi:10.1016/j.acap.2019.05.083.

INTRODUCTION:

The transition from student to intern is difficult and highlighted by performance missteps often referred to as the July Effect. Some pediatric institutions have implemented intern boot camps (IBC) to better prepare interns at the start of residency. Such pediatric boot camps described in the literature have not specifically targeted the ACGME/ABP Pediatric Milestones. We implemented an IBC that utilized these milestones to improve the interns' confidence, knowledge, and skills. Methods 19 new interns participated in the IBC at the HDVCH/MSU Pediatric Residency Program. We used Kerns Six-Step Approach as a conceptual framework and targeted 3 levels of Kirkpatrick's level of evaluation (reaction, learning, and behavior). A needs assessment from residents and faculty was used to identify specific milestones. We designed our IBC to include lectures, workshops and clinical experiences to target these milestones. A questionnaire containing 15-confidence (Likert Scale 1-5) and 10 knowledge-based questions was given before and after the IBC. The paired t-test was used to assess total confidence scores and pre/post knowledge measures. The sign test was used to compare individual confidence questions. Block 1 milestone evaluations were analyzed for pre-IBC (2016, 2017) and post-IBC interns (2018). Significance was assessed at $p < 0.05$.

RESULTS:

Interns demonstrated a significant improvement in their overall confidence score (Pre: 47.7 ± 4.1 , Post: 58.6 ± 5.3 ; $p < 0.001$). All individual confidence questions showed increases. Interns demonstrated a significant improvement in perceived pediatric knowledge on the post-IBC test (Pre: 5.2 ± 1.5 , Post: 6.8 ± 1.3 ; $p = 0.004$). Block 1 evaluations from 7/2018 did not show improved evaluations when compared to pre-IBC cohorts.

CONCLUSIONS:

Incoming interns demonstrated a significant improvement in confidence and perceived knowledge of the targeted pediatric milestones after participating in the IBC. Our innovative approach of targeting pediatric milestones in an IBC suggests that such a targeted curriculum helps the difficult transition for interns.

Program Director Minimum Milestone Expectations of Pediatric Residents before Ready to Supervise Others and Before Graduation

Li S-TT. 56. *Academic Pediatrics*. Aug 2019;19(6):e26. doi:10.1016/j.acap.2019.05.070.

BACKGROUND:

In 2013, the Accreditation Council for Graduate Medical Education (ACGME) began requiring program directors (PDs) to report Milestone levels for every resident semiannually. Our prior 2015 survey found that few PDs had minimum Milestone level expectations before residents are ready to supervise (20%) or ready to graduate (20%).

OBJECTIVE:

Characterize present day model for pediatric PD minimum Milestone expectations for residents before being ready to supervise and graduate.

METHODS:

Cross-sectional survey in Spring 2018 of pediatric PDs on their program Milestone expectations before residents are ready to supervise and graduate. At programs with no established Milestone expectations, PDs indicated expectations they considered for use in their program. Descriptive analyses were used to explore PD minimum expectations by level of training.

RESULTS:

Response rate was 46.2% (93/201). Few programs have minimum Milestone levels before residents are ready to supervise (22.6%; 21/93) or graduate (36.6%; 34/93). Minimum expectations before a resident was ready to supervise were highest for trustworthiness (Prof5), professional conduct (Prof3), professionalization (Prof2), transfer of care (PC3), organize and prioritize (PC2), humanism (Prof1), and help-seeking (Prof4), where most PDs felt that Level 2.5 was the minimum expectation. PD expectations for supervising residents were lowest for learning activities (PBLI2) and advocacy (SBP2), where the majority of PDs felt that there was no minimum or that Level 1 was sufficient. Minimum expectations for graduates were highest for diagnostic/therapeutic decisions (PC4), develop management plans (PC5), gather information (PC1), organize and prioritize (PC2), professionalization (Prof2), and trustworthiness (Prof5), where >70% of PDs felt that Level 3.0 was the minimum (Figure). PD expectations for graduating residents were lowest for quality improvement (PBLI3), advocacy, learning activities, and evidence-based medicine (MK), where >40% of PDs felt that Level 2.5 was the minimum.

CONCLUSIONS:

Five years after the ACGME required Milestone reporting, only a minority of PDs have established minimum Milestones before residents are ready to supervise or ready to graduate. However, more PDs have minimum Milestone levels before residents are ready to graduate than in 2015 (36.6% vs 20%) and PDs recognize the relative importance of different competencies in establishing readiness to supervise and readiness to graduate.

An Examination of Advocacy Education in Residency Training

Black CC, Motta A. Arch Pathol Lab Med. 2019 Jul 17. doi: 10.5858/arpa.2019-0116-EP.

CONTEXT:

Pathology-related advocacy is best when performed directly by pathologists. Practicing advocacy is included in the Milestones 2.0 and should be introduced during residency training.

OBJECTIVE:

To understand advocacy education in residency training we surveyed pathologists to ask what training they had in residency, what resources were available, and what experiences were most impressionable.

DESIGN:

Two types of inquiry were performed. First, a survey to program graduates asking about leadership and advocacy activities during training and about leadership and advocacy activities since graduation. Secondly, focused email and telephone inquiries were made to 12 pathologists-4 in practice for more than 20 years, 4 within the first 10 years of practice, and to 4 PGY4 (postgraduate year 4) residents-asking what training and experiences were available to them, and how they became motivated to become active in practice.

RESULTS:

Our results showed that resources available outside of the home program have changed through the years and more national resident groups are available that were not available in the past. These groups may educate trainees in leadership and advocacy. Internally, opportunities to shadow faculty at interdepartmental leadership meetings, as well as selection of the Chief Resident, are enduring tools for honing these skills.

CONCLUSIONS:

Teaching advocacy in training is important and part of the Accreditation Council for Graduate Medical Education core requirements as well as a level 5 Milestone. Education may require a balance of internal and external resources, since different programs may offer different opportunities. Shadowing during real advocacy events was the most impressionable experience.

An Emergency Medicine Milestone-Based Simulation Curriculum: Acute Ischemic Stroke

Turner-Lawrence D, Hang BS, Shah P, Levasseur K. MedEdPORTAL. 2019 Jun 18;15:10829. doi: 10.15766/mep_2374-8265.10829.

INTRODUCTION:

The emergency medicine (EM) resident's ability to make independent decisions in the setting of acute ischemic stroke has been reduced as a result of the involvement of multidisciplinary teams. This simulation was created to give EM residents the opportunity to independently manage the early stages of ischemic stroke and its complications.

METHODS:

A solo learner was presented with a 55-year-old male with complaints consistent with an acute stroke. The resident had to calculate stroke severity; coordinate hospital resources; discuss risks, benefits, and alternatives to thrombolysis; and deal with subsequent complications. The learner had to keep a broad differential for sudden change in mental status and consider alternative interventions. Strategies to decrease intracranial pressure needed to be implemented while obtaining neurosurgical consultation. Debriefing included discussion of expected actions in the context of the Accreditation Council for Graduate Medical Education (ACGME) milestones. Residents' review of their video performance added additional self-reflection.

RESULTS:

A total of 69 PGY 3 EM residents independently participated in this simulation over a 5-year period. Thirty-two completed a postsimulation evaluation. Nearly all learners felt that this case reflected an actual patient encounter and increased their confidence in managing stroke. The milestone-based feedback tool was completed with all learners. Anticipated actions linked to Level 1 and 2 milestones were regularly achieved while acquisition of Level 3 and 4 actions varied.

DISCUSSION:

Case actions were uniquely characterized by the ACGME milestones, which helped to delineate learners' knowledge gaps and provided concrete areas for improvement.

Multilevel Quality Improvement Teams: An Alternative Approach for Surgical Academic Training Programs to Meet ACGME Core Competency Milestones

Hajjar-Nejad MJ, Kubicki N, Morales D, Kavic SM. J Surg Educ. 2019 May-Jun;76(3):785-794. doi: 10.1016/j.jsurg.2018.10.006. Epub 2018 Nov 22.

BACKGROUND:

Quality improvement (QI) activities are an integral part of residency training. We started the process to implement team-based, multilevel QI project streams within our academic surgical residency by studying resident perceptions.

OBJECTIVE:

Our residency carried out 6 QI projects in line with the American Council for Graduate Medical Education competencies. A resident survey was completed in 2016 to measure resident perceptions of an individual versus team-based QI project approach.

METHODS:

This was a descriptive study looking at resident's preference for team projects and ongoing projects within the training program. We started in 2014 utilizing Wait's Team Action Projects in surgery paradigm to conduct 6 QI projects. After initiation of projects, we allotted 2 full years to pass prior to assessing resident perceptions via a 12-item survey.

RESULTS:

Notably, this was a descriptive study aiming to capture resident perceptions on team-based QI and the foundational elements necessary to create and sustain such projects by integrating into our curriculum from the intern year. In 2016, 40 residents completed surveys (72.7% response rate), all (100%) opined that they preferred team-based approaches over individual ones, and 75% were on board to move forward with only a team-based approach in the future.

CONCLUSIONS:

This was a pivotal start to adopting a team-based QI project strategy in the future and laid a solid foundation to build upon. We found residents in our program desire to work within teams early on to develop effective solutions to clinical problems. Residents perceived that the team-based model resulted in an improved resident experience with the QI process and improved patient care. We hope to publish a series of articles updating our progress as we move forward in this endeavor.

The Implementation of an Introductory Surgical Pathology Didactic Series to Transition First Year Residents and Facilitate Upper Level Resident Teaching

Mehr CR, Montone KT, Schwartz LE. *Adv Anat Pathol*. 2019 May;26(3):210-214. doi: 10.1097/PAP.000000000000229.

ABSTRACT:

The increasing complexity of the practice of pathology and health care in general requires that pathology residents acquire a vast number of skills during their training. This has been reflected by the broad range of skills addressed in the Accreditation Council for Graduate Medical Education (ACGME) milestones. In order to address some of these milestones, our residency program instituted an introductory didactic series in surgical pathology that focused on 2 objectives. First, the didactics provided basic grossing and histology training to first year residents transitioning from medical school. Second, the sessions allowed upper level residents to refine their teaching and communication skills at the microscope and therefore served as an important career development tool. Surveys of both first year residents and the upper level residents that led these sessions confirm the utility of these didactics and the use of upper level residents to teach junior trainees. In addition, these sessions led to a dramatic increase in RISE scores among first year trainees. An introductory series with upper level residents leading slide sessions could easily be replicated at other institutions and provide similar benefits.

Development of Curricular Milestones for Hospice and Palliative Medicine Fellowship Training in the US

Gustin JL, Yang HB, Radwany SM, Okon TR, Morrison LJ, Levine SK, Hwang JM, Buckholz GT, Barnett MD, Verbeck N, Landzaat LH. *J Pain Symptom Manage*. 2019 May;57(5):1009-1017.e6. doi: 10.1016/j.jpainsymman.2019.02.013. Epub 2019 Feb 18.

CONTEXT:

A physician workgroup of the American Academy of Hospice and Palliative Medicine sought to define curricular milestones (CMs) for hospice and palliative medicine (HPM) Fellowship Programs. The developed list of CMs would serve as components upon which to organize curriculum and standardize what to teach during training. These would complement entrustable professional activities previously developed by this group and new specialty-specific reporting milestones (RMs) for HPM developed through the Accreditation Council for Graduate Medical Education.

OBJECTIVES:

The objective of this study was to develop and vet CMs for HPM fellowships in the U.S.

METHODS:

A draft of CMs was developed through an iterative consensus group process with repeated cycles of drafting, analyzing, and revising by a broadly representative expert workgroup who then gained input from HPM educators at a national meeting workshop. The CM draft was subsequently revised and then vetted through a national survey to 203 fellowship educators. Respondents were asked to "keep," "revise," or "exclude" each proposed CM with space for comments. An agreement of 75% among respondents was set as the criteria a priori for keeping a CM. Eighty-four of the 203 potential respondents participated in the survey. All items met the minimum agreement level of 75% or greater recommending keeping the CM. Greater than 85% of the respondents agreed to keep 19 of the 22 CMs with no revisions. Comments for revisions on other CMs were primarily related to changes in language and formatting, not conceptual underpinnings.

CONCLUSION:

A group consensus method strengthened by inclusion of a national survey to HPM fellowship educators resulted in a CM document that is both carefully developed and broadly vetted. Along with entrustable professional activities and new specialty-specific RMs, these CMs offer educators and trainees tools to create more comprehensive curricula and behaviorally based assessment tools for HPM fellowships and their stakeholders.

Psychotherapy Competency Milestones: An Exploratory Pilot of CBT and Psychodynamic Psychotherapy Skills Acquisition in Junior Psychiatry Residents

Ravitz P, Lawson A, Fefergrad M, Rawkins S, Lancee W, Maunder R, Leszcz M, Kivlighan DM Jr. *Acad Psychiatry*. 2019 Feb;43(1):61-66. doi: 10.1007/s40596-018-0940-4. Epub 2018 Jun 1.

OBJECTIVE:

Psychiatry residents train in Psychodynamic Psychotherapy and Cognitive Behavioral Therapy (CBT), evidence-supported treatments used in mental health care that can facilitate clinical reasoning, foster therapeutic alliances, and improve clinical outcomes. However, empirically derived milestones are needed to evaluate competency. This exploratory pilot examined changes over 1 year of training in junior psychiatry residents' competency milestone elements in Psychodynamic Psychotherapy and CBT.

METHODS:

Seventy-nine randomly selected audio-recorded sessions from differing phases of Psychodynamic Psychotherapy and CBT with five junior residents and ten patients were rated using the Psychotherapy Process Q-sort (PQS).

RESULTS:

In both treatments, patient engagement with attention to in-session emotions improved. In CBT, residents were directive, supported patients' self-efficacy, emphasized patients' accepting responsibility for their problems, discussed homework such as thought records, and focused on termination in the concluding sessions. In Psychodynamic Psychotherapy, residents attended to emotional arousal and linked patients' feelings or perceptions to past situations or behavior. Growth and hierarchical linear modeling differentiated these treatments, with CBT v. Psychodynamic adherence to PQS modality-specific ideal elements being 52% v.19%.

CONCLUSION:

Teaching and observation using empirically derived observable psychotherapy practice behaviors is feasible and can be used to assess milestone elements for competency-based education of psychiatry trainees.

Towards a Consensus for Musculoskeletal Ultrasonography Education in Physical Medicine & Rehabilitation: A National Poll of Residency Directors

Bockbrader MA, Thompson RD, Way DP, Colachis SC, Siddiqui IJ, Luz J, Borg-Stein J, O'Connor K, Kohler MJ, Bahner DP. *Am J Phys Med Rehabil.* 2019;98(8):715-724.
doi:10.1097/PHM.0000000000001195.

OBJECTIVES:

To evaluate integration of musculoskeletal ultrasonography (MSKUS) education in Physical Medicine & Rehabilitation (PM&R) training programs in 2014-15, when the American Academy of Physical Medicine & Rehabilitation and Accreditation Council for Graduate Medical Education (ACGME) Residency Review Committee both recognized it as a fundamental component of physiatric practice; to identify common MSKUS components of PM&R residency curricula; and to identify common barriers to integration.

DESIGN:

Survey of 78 ACGME-accredited PM&R residency programs.

RESULTS:

The 2015 survey response rate was over 50%, and respondents were representative of programs across the U.S. Most programs (80%) reported teaching MSKUS, while a minority (20%) required mastery of ultrasonography skills for graduation. Ultrasonography curricula varied, though most programs agreed that the scope of resident training in PM&R should include diagnostic and interventional MSKUS, especially for key joints (shoulder, elbow, knee, wrist, hip, and ankle) and nerves (median, ulnar, fibular, tibial, radial, and sciatic). Barriers to teaching included insufficient expertise of instructors, poor access to equipment, and lack of a structured curriculum.

CONCLUSION:

MSKUS has become a required component of PM&R residency training. Based on survey responses and expert recommendations, we propose a structure for MSKUS curricular standards and milestones for trainee competency.

Craniofacial Skills: A 2-Site Validation of Assessments to Aid Plastic Surgery Resident Milestone Achievement in Technical Skills and Instrument Knowledge

Grunzweig KA, Son J, Kumar AR. J Craniofac Surg. 2019;(6):1678. doi: 10.1097/SCS.00000000000005412. SCS.00000000000005412.

BACKGROUND:

Plastic surgery evaluates residents on milestones. This study defines a model of education including pre and post-test assessments paired with didactics intended for evaluating residents in the unique technical skills of craniofacial surgery.

METHODS:

At the first institution, instrument identification, and time/accuracy of burr hole placement, craniotomy, and plating on Saw Bones Craniofacial Models were tested before and after a 7.5-hour craniofacial orthognathic surgery workshop. At the second institution, this was refined, removing plating, eliminating assessment of timing, and shortening didactics to standard osteotomies, instrument names, and common surgical approaches. The study population consisted of junior, mid-level, and senior residents on 2 different University craniofacial services.

RESULTS:

Participant performance was analyzed by level of training: junior, midlevel and senior resident. In the first iteration, resident times improved significantly for all 4 tasks (P=0.008, 0.035, 0.035, 0.016).

Resident accuracy improved significantly for instrument naming (P=0.003). Except for instrument naming, resident year did not impact improvement (timing: P=0.062, 0.310, 0.125, 0.334; accuracy: P=0.029, 0.664, 0.717, 0.306). In the second iteration, resident accuracy improved for all tasks (instrument naming P=0.00002, burr holes P=0.0031, craniotomy P=0.08). There was no difference in rate of improvement between resident cohorts.

CONCLUSION:

The task-based assessment with resident education on basic craniofacial surgery skills, standard osteotomies, and instrument names directed resident learning and assessed resident knowledge. With the removal of time as a metric, all tasks improved in accuracy. The craniofacial skills task-assessment successfully evaluated milestone attainment in a reproducible model

Application Factors Associated with Clinical Performance during Pediatric Internship: A 5-Year Single Center Retrospective Cohort Study

Gross C J, O'Halloran C, Deshpande S, Lux S, Sectish T, Michelson C, Winn A, Sox C. 64. *Academic Pediatrics*. 2019;(6). doi:10.1016/j.acap.2019.05.078.

BACKGROUND:

The specific components of an application to residency that predict clinical performance during training in pediatrics remain unknown.

METHODS:

Retrospective cohort study of all pediatric interns who matched into the Boston Combined Residency Program from 2013-2017. Demographics, subspecialty track, medical school ranking, USMLE scores, advanced degrees, clerkship grades, Alpha-Omega-Alpha (AOA) and Gold Humanism Honor Society membership, interview day performance, letters of recommendation (LOR) strength, and number of publications were extracted from application materials. The primary outcome was clinical performance at the end of internship, measured as a weighted average of existing ACGME pediatric milestones scores. Linear mixed effects modeling with random effects for grading committee and match year was used to identify factors independently associated with clinical performance. Variables with p-values <0.2 in bivariate analysis were included in the final model.

RESULTS:

223 interns were included in the study. In the model (Table 1), higher average LOR score ($B=.07$, $p=.01$), having a master's degree ($B=.19$, $p=.03$), and not having a PhD ($B=.13$, $p=.03$) were associated with more advanced clinical performance at the end of pediatric internship. AOA membership, medical school ranking, public medical school attendance, time off prior to medical school, number of clerkship honors, and interview score were included in the model, but not significant predictors of clinical performance. The fixed effects explained 15% of the variance in milestones score, while the random effects (match year and grading committee) explained 8% of the variance (marginal $R^2=.15$, conditional $R^2=.23$).

CONCLUSIONS:

Strong letters of recommendation, having a master's degree and not having a PhD are associated with more advanced clinical performance during pediatric internship. However, much of the variance in clinical performance remains unexplained by quantifiable application variables.

Does Orthopaedic Resident Efficiency Improve with Respect to Decreased Fluoroscopic Times in Tibial Intramedullary Nailing? A Measure of an ACGME Milestone

Bradburn K, Patel JH, Cannada LK. Current Orthopaedic Practice. 2019;(2):129. doi:10.1097/BCO.0000000000000733.

BACKGROUND:

Intramedullary nailing of tibial fractures is a surgical milestone from the Accreditation Council for Graduate Medical Education (ACGME). Our purpose was to evaluate if fluoroscopic time decreased with increasing resident experience and could be used as a measure of this milestone.

METHODS:

Current Procedural Terminology (CPT) codes were used to identify patients who underwent intramedullary nailing of tibial shaft fractures under the direction of fellowship-trained trauma attending staff. The data collected included patient demographics, fracture classification, fluoroscopic imaging total time, and the post-graduate years (PGY) of orthopaedic residency of the operating resident.

Exclusions of patients included concomitant fluoroscopic procedures, inadequate records, or surgeries involving primary assisting residents with less than PGY-2 experience. We compared overall groups between half years and looked at individual resident years for each of the continuous variables.

RESULTS:

When residents were grouped as senior (PGY-4 and PGY-5) or junior (PGY-2 and PGY-3), seniors used significantly less fluoroscopy than juniors (207.39asec vs. 258.30asec, $P=0.018$). In the first half of the academic year, PGY-2 residents completed tibial nailing slowest in terms of fluoroscopic usage ($P=0.003$). PGY-4 residents completed tibial nailing faster in terms of fluoroscopic usage than other years ($P=0.031$). In the second half of the academic year, PGY-5 residents used significantly less fluoroscopy than PGY-2 residents ($P=0.035$).

CONCLUSIONS:

As the ACGME currently has no measurement for resident progress and efficiency regarding tibial shaft intramedullary nailing, our data indicate that fluoroscopic measurements may be useful in assessing resident proficiency.

Case-Based Simulation Empowering Pediatric Residents to Communicate about Diagnostic Uncertainty

Olson ME, Borman-Shoap E, Mathias K, Barnes TL, Olson APJ. *Diagnosis (Berl)*. 2018 Nov 27;5(4): 243-248. doi: 10.1515/dx-2018-0025.

ABSTRACT:

Background Uncertainty is ubiquitous in medical practice. The Pediatrics Milestones from the Accreditation Council on Graduate Medical Education state that advanced learners should acknowledge and communicate about clinical uncertainty. If uncertainty is not acknowledged, patient care may suffer. There are no described curricula specifically aimed to improve learners' ability to acknowledge and discuss clinical uncertainty. We describe an educational intervention designed to fill this gap. Methods Second-year pediatric residents engaged in a two-phase simulation-based educational intervention designed to improve their ability to communicate about diagnostic uncertainty with patients and caregivers. In each phase, residents engaged in two simulated cases and debriefs. Performance was assessed after each simulated patient encounter using standardized metrics, along with learner perceptions of the experience. Results Residents' skills in communicating with patients and families about diagnostic uncertainty improved after this intervention (mean score post 3.84 vs. 3.28 pre on a five-point Likert scale, $p < 0.001$). Residents rated the experience as relevant, challenging and positive. Conclusions This prospective study suggests that a simulation-based intervention was effective in improving resident physicians' skills in communicating about diagnostic uncertainty with patients and families. Further study is needed to determine how learners perform in real clinical environments.

Advancing Simulation-Based Education in Pain Medicine

Singh N, Nielsen AA, Copenhaver DJ, Sheth SJ, Li CS, Fishman SM. Pain Med. 2018 Sep 1;19(9):1725-1736. doi: 10.1093/pm/pnx344.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) has recently implemented milestones and competencies as a framework for training fellows in Pain Medicine, but individual programs are left to create educational platforms and assessment tools that meet ACGME standards.

OBJECTIVES:

In this article, we discuss the concept of milestone-based competencies and the inherent challenges for implementation in pain medicine. We consider simulation-based education (SBE) as a potential tool for the field to meet ACGME goals through advancing novel learning opportunities, engaging in clinically relevant scenarios, and mastering technical and nontechnical skills.

RESULTS:

The sparse literature on SBE in pain medicine is highlighted, and we describe our pilot experience, which exemplifies a nascent effort that encountered early difficulties in implementing and refining an SBE program.

CONCLUSIONS:

The many complexities in offering a sophisticated simulated pain curriculum that is valid, reliable, feasible, and acceptable to learners and teachers may only be overcome with coordinated and collaborative efforts among pain medicine training programs and governing institutions.

Long-Term Retention of Musculoskeletal Ultrasound Training during Residency

Irwin RW, Smith J, Issenberg SB. Am J Phys Med Rehabil. 2018 Jul;97(7):523-530. doi: 10.1097/PHM.0000000000000924.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Physical Medicine and Rehabilitation (ABPMR) developed milestones for evaluation of resident physicians that include proper musculoskeletal ultrasound (MSUS) examination of major joints. To date, there have been no published data demonstrating acquisition and retention of these skills and correlation with the milestone evaluation. The investigators developed and implemented a curriculum in musculoskeletal ultrasound examination for Physical Medicine and Rehabilitation (PM&R) residents at a large academic medical center. The investigators chose six joints for training and evaluation: ankle, elbow, hip, knee, shoulder and wrist/hand. The program included: 1) didactic lectures on anatomy and ultrasound technique; 2) peer-led demonstrations of the procedure on a standardized patient (SP); 3) individual practice on SPs; 4) faculty observation and feedback; 5) review sessions and additional practice; and, 6) assessment of skills in an objective structured clinical examination (OSCE). From 2013-2017, 30 PM&R residents were trained and evaluated. The results, based on OSCE scores, showed that the majority of residents achieved the appropriate level of competency for their year. A blended, standardized curriculum in MSUS instruction with assessment by an OSCE, can be used to evaluate MSUS skills, and can help align this education with residency milestones.

Comprehensive Health Care Economics Curriculum and Training in Radiology Residency

Keiper M, Donovan T, DeVries M. J Am Coll Radiol. 2018 Jun;15(6):900-904. doi: 10.1016/j.jacr.2018.02.022. Epub 2018 May 2.

PURPOSE:

To investigate the ability to successfully develop and institute a comprehensive health care economics skills curriculum in radiology residency training utilizing didactic lectures, case scenario exercises, and residency mini retreats.

METHODS:

A comprehensive health care economics skills curriculum was developed to significantly expand upon the basic ACGME radiology residency milestone System-Based Practice, SBP2: Health Care Economics requirements and include additional education in business and contract negotiation, radiology sales and marketing, and governmental and private payers' influence in the practice of radiology.

RESULTS:

A health care economics curriculum for radiology residents incorporating three phases of education was developed and implemented. Phase 1 of the curriculum constituted basic education through didactic lectures covering System-Based Practice, SBP2: Health Care Economics requirements. Phase 2 constituted further, more advanced didactic lectures on radiology sales and marketing techniques as well as government and private insurers' role in the business of radiology. Phase 3 applied knowledge attained from the initial two phases to real-life case scenario exercises and radiology department business miniretreats with the remainder of the radiology department.

CONCLUSION:

A health care economics skills curriculum in radiology residency is attainable and essential in the education of future radiology residents in the ever-changing climate of health care economics. Institution of more comprehensive programs will likely maximize the long-term success of radiology as a specialty by identifying and educating future leaders in the field of radiology.

Introducing a Curriculum in Ethics and Professionalism for Dermatology Residencies

Stoff BK, Grant-Kels JM, Brodell RT, Paller AS, Perlis CS, Mostow E, Pariser D, Bercovitch L. J Am Acad Dermatol. 2018 May;78(5):1032-1034. doi: 10.1016/j.jaad.2017.04.1121.

ABSTRACT:

There is general agreement on what constitutes ethical reasoning and professional behavior, but standardized methods to teach these skills in dermatology residency are currently unavailable. We introduce a model curriculum designed to impart the knowledge and skills to meet the Accreditation Council for Graduate Medical Education Dermatology Milestones for Professionalism over a 3-year cycle.

Development of Hospice and Palliative Medicine Knowledge and Skills for Emergency Medicine Residents: Using the Accreditation Council for Graduate Medical Education Milestone Framework

Shoenberger J, Lamba S, Goett R, DeSandre P, Aberger K, Bigelow S, Brandtman T, Chan GK, Zalenski R, Wang D, Rosenberg M, Jubanyik K. AEM Educ Train. 2018 Mar 22;2(2):130-145. doi: 10.1002/aet2.10088. eCollection 2018 Apr.

OBJECTIVES:

Emergency medicine (EM) physicians commonly care for patients with serious life-limiting illness. Hospice and palliative medicine (HPM) is a subspecialty pathway of EM. Although a subspecialty level of practice requires additional training, primary-level skills of HPM such as effective communication and symptom management are part of routine clinical care and expected of EM residents. However, unlike EM residency curricula in disciplines like trauma and ultrasound, there is no nationally defined HPM curriculum for EM resident training. An expert consensus group was convened with the aim of defining content areas and competencies for HPM primary-level practice in the ED setting. Our overall objective was to develop HPM milestones within a competency framework that is relevant to the practice of EM.

METHODS:

The American College of Emergency Physicians Palliative Medicine Section assembled a committee that included academic EM faculty, community EM physicians, EM residents, and nurses, all with interest and expertise in curricular design and palliative medicine.

RESULTS:

The committee peer reviewed and assessed HPM content for validity and importance to EM residency training. A topic list was developed with three domains: provider skill set, clinical recognition of HPM needs, and logistic understanding related to HPM in the ED. The group also developed milestones in HPM-EM to identify relevant knowledge, skills, and behaviors using the framework modeled after the Accreditation Council for Graduate Medical Education (ACGME) EM milestones. This framework was chosen to make the product as user-friendly and familiar as possible to facilitate use by EM educators.

CONCLUSIONS:

Educators in EM residency programs now have access to HPM content areas and milestones relevant to EM practice that can be used for curriculum development in EM residency programs. The HPM-EM skills/competencies presented herein are structured in a familiar milestone framework that is modeled after the widely accepted ACGME EM milestones.

Thresholds and Interpretations: How Clinical Competency Committees Identify Pediatric Residents with Performance Concerns

Schumacher DJ, Michelson C, Poynter S, Barnes MM, Li ST, Burman N, Sklansky DJ, Thoreson L, Calaman S, King B, Schwartz A; APPD LEARN CCC Study Group, Elliott S, Sharma T, Gonzalez Del Rey J, Bartlett K, Scott-Vernaglia SE, Gibbs K, McGreevy JF, Garfunkel LC, Gellin C, Frohna JG. *Med Teach*. 2018 Jan;40(1):70-79. doi: 10.1080/0142159X.2017.1394576.

BACKGROUND:

Clinical competency committee (CCC) identification of residents with performance concerns is critical for early intervention.

METHODS:

Program directors and 94 CCC members at 14 pediatric residency programs responded to a written survey prompt asking them to describe how they identify residents with performance concerns. Data was analyzed using thematic analysis.

RESULTS:

Six themes emerged from analysis and were grouped into two domains. The first domain included four themes, each describing a path through which residents could meet or exceed a concern threshold: 1) written comments from rotation assessments are foundational in identifying residents with performance concerns, 2) concerning performance extremes stand out, 3) isolated data points may accumulate to raise concern, and 4) developmental trajectory matters. The second domain focused on how CCC members and program directors interpret data to make decisions about residents with concerns and contained 2 themes: 1) using norm- and/or criterion-referenced interpretation, and 2) assessing the quality of the data that is reviewed.

CONCLUSIONS:

Identifying residents with performance concerns is important for their education and the care they provide. This study delineates strategies used by CCC members across several programs for identifying these residents, which may be helpful for other CCCs to consider in their efforts.

Trapped as a Group, Escape as a Team: Applying Gamification to Incorporate Teambuilding Skills through an 'Escape Room' Experience

Zhang XC, Lee H, Rodriguez C, Rudner J, Chan TM, Papanagnou D. *Cureus*. 2018;10(3):e2256. doi:10.7759/cureus.2256. DOI 10.7759/cureus.2256

ABSTRACT:

Teamwork, a skill critical for quality patient care, is recognized as a core competency by the Accreditation Council for Graduate Medical Education (ACGME). To date, there is no consensus on how to effectively teach these skills in a forum that engages learners, immerses members in life-like activities, and builds both trust and rapport. Recreational 'Escape Rooms' have gained popularity in creating a life-like environment that rewards players for working together, solving puzzles, and completing successions of mindbending tasks in order to effectively 'escape the room' in the time allotted. In this regard, escape rooms share many parallels with the multitasking and teamwork that is essential for a successful emergency department (ED) shift. A pilot group of nine emergency medicine (EM) residents and one senior EM faculty member underwent a commercial escape room as part of a teambuilding exercise in January 2018. The escape room required participants to practice teamwork, communication, task delegation, and critical thinking to tackle waves of increasingly complex puzzles, ranging from hidden objects, physical object assembly (i.e., jigsaw puzzles), and symbol matching. Activities required members to recognize and utilize the collective experiences, skills, knowledge base, and physical abilities of the group. After the game, players underwent a structured 'game-master' debriefing facilitated by an employee of the commercial escape room; this was followed by a postevent survey facilitated by a faculty member, which focused on participants' feelings, experiences, and problem-solving techniques. Escape rooms afford learners the opportunity to engage in an activity that rewards teamwork and effective leadership through experiences that directly link to specific ACGME milestones and educational learning theories. EM participants were engaged in the activity and felt that the escape room reproduced an environment analogous to the ED. The debriefing that followed the activity provided a satisfactory conclusion to the experience; but learners preferred a more organized debriefing format that provided them with constructive and specific feedback on their performance.

Appraising Medical Literature: The Effect of a Structured Journal Club Curriculum Using the Lancet Handbook of Essential Concepts in Clinical Research on Resident Self-Assessment and Knowledge in Milestone-Based Competencies

Lentscher JA, Batig AL. *Mil Med.* 2017 Nov;182(11):e1803-e1808. doi: 10.7205/MILMED-D-17-00059.

BACKGROUND:

Training in literature appraisal and statistical interpretation is one of the residency training requirements outlined by the Accreditation Council for Graduate Medical Education. Frequently, a journal club format is used to teach this competency although this teaching modality is not standardized or well studied in regard to its efficacy.

METHODS:

This study sought to determine the effect of a structured journal club curriculum that incorporated The Lancet Handbook of Essential Concepts in Clinical Research on objective and self-assessed knowledge pertaining to study design and interpretation. The study was a retrospective observational study evaluating the effect of a structured journal club curriculum using the Lancet text with pre- and postimplementation assessment using a resident self-assessment survey. The study examined a monthly journal club curriculum that covered 1 topic/chapter from the assigned text, paired with a contemporary article to highlight the chapter topic. Resident self-assessed and objective knowledge was evaluated and compared using a survey taken before and after the curriculum change. The study was completed during 1 academic year at Madigan Army Medical Center in Tacoma, Washington, an academic military medical training and tertiary care center. Study surveys were distributed to all 17 obstetrics and gynecology residents throughout the 4 residency training years. Of the 17 potential participants, 13 (76%) participated in the precurriculum assessment and 14 (82%) participated after its completion.

FINDINGS:

There was no significant improvement in resident self-assessed knowledge following curriculum implementation. There was a trend toward improved objective knowledge pertaining to study design and interpretation after curriculum completion, but this was not statistically significant.

DISCUSSION:

There is a lack of standardized and well-studied methods to teach residents how to evaluate and appraise medical literature and research. The Lancet Handbook of Essential Concepts in Clinical Research may be a useful tool to teach some of these tenets in the residency training environment, but this limited study did not prove this assertion.

IMPACT:

There is a dearth of proven and well-studied means to teach the tenets of study design, statistical interpretation, and critical literature appraisal to trainees with any consistency or validity. This study demonstrated a trend toward better objective knowledge related to study design, interpretation, and understanding after a change in our training curriculum that implemented The Lancet Handbook of Essential Concepts in Clinical Research into the monthly journal club curriculum. Resident self-rated knowledge and proficiency in their abilities to understand research and study design were not significantly changed with the curriculum.

RECOMMENDATIONS:

Better evidence is needed to guide future educational curricula directed toward teaching the competency of medical literature review and appraisal.

A Competency-Based Simulation Curriculum for Surgical Resident Trauma Resuscitation Skills

Moorman ML, Capizzani TR, Feliciano MA, French JC. *Int J Crit Illn Inj Sci*. 2017 Oct- Dec;7(4):241-247. doi: 10.4103/IJCIIS.IJCIIS_12_17.

BACKGROUND:

Evidence-based curricula for nonprocedural simulation training in general surgery are lacking. Residency programs are required to implement simulation training despite this shortcoming. The goal of this project was the development of a simulation curriculum that measurably improves milestone performance and replaces traditional experienced-based training with a competency-based model.

MATERIALS AND METHODS:

SimMan 3G[®] (Laerdal Medical, Wappingers Falls, NY, USA) was utilized for simulation. Needs assessment targeted trauma and shock resuscitation. Scenario design applied deliberate practice methodology. Learner performance data included items such as identification of shock physiology, resuscitation products used, volume delivered, use of resuscitation end-points, and knowledge of massive transfusion. Characteristics essential for a successful program were tabulated.

RESULTS:

Forty-eight residents in postgraduate year (PGY) 2-5 participated representing 100% of the 48 eligible for the training. Senior residents (PGY 4 and 5) demonstrated near universal improvement. Junior residents (PGY 2 and 3) improved in some areas but showed more skill decay between sessions. Overall, milestone performance improved with each training session, and resident feedback was universally positive.

CONCLUSIONS:

This prototype curriculum improved surgical resident competency in shock resuscitation in a simulated patient care environment. It can be modified to accommodate centers with fewer resources and can be implemented by clinical faculty. The essential characteristics of a successful program are identified.

Creation and Evaluation of a Laboratory Administration Curriculum for Pathology Residents

Guarner J; Hill C; Amukele, T. American Journal of Clinical Pathology. Oct 2017, Vol. 148 Issue 4, p368-373. 6p.

OBJECTIVES:

A clinical laboratory management (CLM) curriculum that can objectively assess the Accreditation Council for Graduate Medical Education pathology systems-based practice milestones and can provide consistent resident training across institutions is needed.

METHODS:

Faculty at Emory University created a curriculum that consists of assay verification exercises and interactive, case-based online modules. Beta testing was done at Emory University and Johns Hopkins. Residents were required to obtain a score of more than 80% in the online modules to achieve levels 3 to 4 in the milestones. In addition, residents shadowed a laboratory director, performed an inspection of a laboratory section, and completed training in human subjects research and test utilization.

RESULTS:

Fourteen residents took and evaluated the laboratory administration curriculum. The printed certificates from the modules were used for objective faculty evaluation of mastery of concepts. Of all the activities the residents performed during the rotation, the online modules were ranked most helpful by all residents. A 25-question knowledge assessment was performed before and after the rotation and showed an average increase of 8 points ($P = .0001$).

CONCLUSIONS:

The multimodal CLM training described here is an easily adoptable, objective system for teaching CLM. It was well liked by residents and provided an objective measurement of mastery of concepts for faculty.

Development of a Global Health Milestones Tool for Learners in Emergency Medicine: A Pilot Project

Douglass KA, Jacquet GA, Hayward AS, Dreifuss BA, Tupesis JP, Acerra J, Bloem C, Brenner J, DeVos E, Douglass K, Dreifuss B, Hayward AS, Hilbert SL, Jacquet GA, Lin J, Muck A, Nasser S, Oteng R, Powell NN, Rybarczyk MM, Schmidt J, Svenson J, Tupesis JP, Yoder K. *AEM Educ Train.* 2017 Sep 11;1(4):269-279. doi: 10.1002/aet2.10046. eCollection 2017 Oct.

OBJECTIVES:

In medical education and training, increasing numbers of institutions and learners are participating in global health experiences. Within the context of competency-based education and assessment methodologies, a standardized assessment tool may prove valuable to all of the aforementioned stakeholders. Milestones are now used as the standard for trainee assessment in graduate medical education. Thus, the development of a similar, milestone-based tool was undertaken, with learners in emergency medicine (EM) and global health in mind.

METHODS:

The Global Emergency Medicine Think Tank Education Working Group convened at the 2016 Society for Academic Medicine Annual Meeting in New Orleans, Louisiana. Using the Interprofessional Global Health Competencies published by the Consortium of Universities for Global Health's Education Committee as a foundation, the working group developed individual milestones based on the 11 stated domains. An iterative review process was implemented by teams focused on each domain to develop a final product.

RESULTS:

Milestones were developed in each of the 11 domains, with five competency levels for each domain. Specific learning resources were identified for each competency level and assessment methodologies were aligned with the milestones framework. The Global Health Milestones Tool for learners in EM is designed for continuous usage by learners and mentors across a career.

CONCLUSIONS:

This Global Health Milestones Tool for learners in EM may prove valuable to numerous stakeholders. The next steps include a formalized pilot program for testing the tool's validity and usability across training programs, as well as an assessment of perceived utility and applicability by collaborating colleagues working in training sites abroad.

A Taxonomy of Perioperative Surgical Learning: Trending Resident Skill Acquisition

Hardaway JC, Basson MD2, Ali M, Davis AT, Haan PS, Gupta RN, Peshkepija AN, Nebeker CA, McLeod MK, Osmer RL, Anderson CI; MSU GOAL Consortium. Am J Surg. 2017 Feb;213(2):260-267. doi: 10.1016/j.amjsurg. 2016.09.045. Epub 2016 Oct 8.

BACKGROUND:

Resident and curriculum evaluation require tracking surgical resident operative performance, yet what and when to measure remains unclear.

METHODS:

From a multi-institutional database, we reviewed 611 resident/surgeon-paired assessments of ACGME Milestones and modified OPRS ratings for different cases and postgraduate years.

RESULTS:

Faculty Milestone ratings increased with each PGY ($p < 0.001$) and correlated with resident self-ratings (ICC = 0.83). Mean OPRS scores increased in small increments with substantial intra-year variability. Progression among individual OPRS subcategories was not apparent from more global analyses. Interestingly, male faculty offered lower ratings than female faculty.

CONCLUSIONS:

Milestones and modified mean OPRS ratings suggest residents are learning, yet lack sufficient discrimination for promotion or curricular analysis. Differential progression through OPRS subcategories suggests a taxonomy of surgical learning that can be tailored to focus on different skills at each point in the training continuum. The effect of faculty gender on resident ratings awaits further study.

Milestone Assessment of Minimally Invasive Surgery in Pediatric Urology Fellowship Programs

Smith PH 3rd, Carpenter M, Herbst KW, Kim C. J Pediatr Urol. 2017 Feb;13(1):110.e1-110.e6. doi: 10.1016/j.jpuro.2016.08.012. Epub 2016 Sep 15

INTRODUCTION:

Minimally invasive surgery has become an important aspect of Pediatric Urology fellowship training. In 2014, the Accreditation Council for Graduate Medical Education published the Pediatric Urology Milestone Project as a metric of fellow proficiency in multiple facets of training, including laparoscopic/robotic procedures.

OBJECTIVE:

The present study assessed trends in minimally invasive surgery training and utilization of the Milestones among recent Pediatric Urology fellows.

STUDY DESIGN:

Using an electronic survey instrument, Pediatric Urology fellowship program directors and fellows who completed their clinical year in 2015 were surveyed. Participants were queried regarding familiarity with the Milestone Project, utilization of the Milestones, robotic/laparoscopic case volume and training experience, and perceived competency with robotic/laparoscopic surgery at the start and end of the fellowship clinical year according to Milestone criteria. Responses were accepted between August and November 2015.

RESULTS:

Surveys were distributed via e-mail to 35 fellows and 30 program directors. Sixteen fellows (46%) and 14 (47%) program directors responded. All fellows reported some robotic experience prior to fellowship, and 69% performed >50 robotic/laparoscopic surgeries during residency. Fellow robotic/laparoscopic case volume varied: three had 1-10 cases (19%), four had 11-20 cases (25%), and nine had >20 cases (56%). Supplementary or robotic training modalities included simulation (9), animal models (6), surgical videos (7), and courses (2). Comparison of beginning and end of fellowship robotic/laparoscopic Milestone assessment (Summary Fig.) revealed scores of <3 in (10) 62% of fellow self-assessments and 10 (75%) of program director assessments. End of training Milestone scores >4 were seen in 12 (75%) of fellow self-assessment and eight (57%) of program director assessments.

DISCUSSION:

An improvement in robotic/laparoscopic Milestone scores by both fellow self-assessment and program director assessment was observed during the course of training; however, 43% of program directors rated their fellow below the graduation target of a Milestone score of 4.

CONCLUSION:

The best ways to teach minimally invasive surgery in fellowship training must be critically considered.

Practical Implications for an Effective Radiology Residency Quality Improvement Program for Milestone Assessment

Leddy R, Lewis M, Ackerman S, Hill J, Thacker P, Matheus M, Tipnis S, Gordon L. *Acad Radiol.* 2017 Jan;24(1):95-104. doi: 10.1016/j.acra.2016.08.018. Epub 2016 Oct 18.

ABSTRACT:

Utilization of a radiology resident-specific quality improvement (QI) program and curriculum based on the Accreditation Council for Graduate Medical Education (ACGME) milestones can enable a program's assessment of the systems-based practice component and prepare residents for QI implementation post graduation. This article outlines the development process, curriculum, QI committee formation, and resident QI project requirements of one institution's designated radiology resident QI program. A method of mapping the curriculum to the ACGME milestones and assessment of resident competence by postgraduate year level is provided. Sample projects, challenges to success, and lessons learned are also described. Survey data of current trainees and alumni about the program reveal that the majority of residents and alumni responders valued the QI curriculum and felt comfortable with principles and understanding of QI. The most highly valued aspect of the program was the utilization of a resident education committee. The majority of alumni responders felt the residency quality curriculum improved understanding of QI, assisted with preparation for the American Board of Radiology examination, and prepared them for QI in their careers. In addition to the survey results, outcomes of resident project completion and resident scholarly activity in QI are evidence of the success of this program. It is hoped that this description of our experiences with a radiology resident QI program, in accordance with the ACGME milestones, may facilitate the development of successful QI programs in other diagnostic radiology residencies.

New Roadmap for the Journey from Internist to Rheumatologist

Criscione-Schreiber LG, Brown CR, O'Rourke KS, et al. *Arthritis Care & Research*. 2017;69(6):769-775. doi:10.1002/acr.23151.

OBJECTIVE:

Measurement is necessary to gauge improvement. US training programs have not previously used shared standards to assess trainees' mastery of the knowledge, skills, and attitudes necessary to practice rheumatology competently. In 2014, the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System began requiring semiannual evaluation of all medicine subspecialty fellows on 23 internal medicine subspecialty reporting milestones. Since these reporting milestones are not subspecialty specific, rheumatology curricular milestones were needed to guide rheumatology fellowship training programs and fellows on the training journey from internist to rheumatologist.

METHODS:

Rheumatology curricular milestones were collaboratively composed by expanding the internal medicine reporting milestones to delineate the specific targets of rheumatology fellowship training within 6 ACGME core competencies. The 2006 American College of Rheumatology core curriculum for rheumatology training programs was updated.

RESULTS:

A total of 80 rheumatology curricular milestones were created, defining progressive learning through training; most focus on patient care and medical knowledge. The core curriculum update incorporates the new curricular milestones and rheumatology entrustable professional activities.

CONCLUSION:

Rheumatology curricular milestones are now available for implementation by rheumatology fellowship training programs, providing a clear roadmap for specific training goals and a guide to track each fellow's achievement over a 2-year training period. The comprehensive core curriculum delineates the essential breadth of knowledge, skills, and attitudes that define rheumatology, and provides a guide for educational activities during fellowship training. These guiding documents are now used to train and assess fellows as they prepare for independent rheumatology practice as the next generation of rheumatologists.

Making Milestones: Development and Implementation of a Formal Socioeconomic Curriculum in a Neurosurgical Residency Training Program

Youngerman BE, Zacharia BE, Hickman ZL, Bruce JN, Solomon RA, Benzil DL. Neurosurgery. 2016 Sep;79(3): 492-8. doi: 10.1227/NEU.0000000000001126.

BACKGROUND:

Improved training in the socioeconomic aspects of medicine is a priority of the Accreditation Council for Graduate Medical Education and the American Board of Neurological Surgeons. There is evidence that young neurosurgeons feel ill equipped in these areas and that additional education would improve patient care.

OBJECTIVE:

To present our experience with the introduction of a succinct but formal socioeconomic training course to the residency curriculum at our institution.

METHODS:

A monthly series of twelve 1-hour interactive modules was designed to address the pertinent Accreditation Council for Graduate Medical Education-American Board of Neurological Surgeons outcomes-based educational milestones. Slide-based lectures provided a comprehensive overview of social, legal, and business issues, and a monthly forum for open discussion allowed residents to draw on their applied experience. Residents took a 20-question pre- and postcourse knowledge assessment, as well as feedback surveys at 6 and 12 months.

RESULTS:

Residents were able to participate in the lectures, with an overall attendance rate of 91%. Residents felt that the course goals and objectives were well defined and communicated (4.88/5) and rated highly the content, quality, and relevance of the lectures (4.94/5). Performance on the knowledge assessment improved from 58% to 66%.

CONCLUSION:

Our experience demonstrates the feasibility of including a formal socioeconomic course in neurosurgical residency training with positive resident feedback and achievement of outcomes-based milestones. Extension to a 2-year curriculum cycle may allow the course to cover more material without compromising other residency training goals. Online modules should also be explored to allow for wider and more flexible participation.

What's New in 10 Years? A Revised Cardiothoracic Curriculum for Diagnostic Radiology Residency with Goals and Objectives Related to General Competencies

Nguyen ET, Ackman JB, Rajiah P, Little B, Wu C, Bueno JM, Gilman MD, Christensen JD, Madan R, Laroia AT, Lee C, Kanne JP, Collins J. Acad Radiol. 2016 Jul;23(7):911-8. doi: 10.1016/j.acra.2016.01.022. Epub 2016 May 27.

ABSTRACT:

This is a cardiothoracic curriculum document for radiology residents meant to serve not only as a study guide for radiology residents but also as a teaching and curriculum reference for radiology educators and radiology residency program directors. This document represents a revision of a cardiothoracic radiology resident curriculum that was published 10 years ago in Academic Radiology. The sections that have been significantly revised, expanded, or added are (1) lung cancer screening, (2) lung cancer genomic profiling, (3) lung adenocarcinoma revised nomenclature, (4) lung biopsy technique, (5) nonvascular thoracic magnetic resonance, (6) updates to the idiopathic interstitial pneumonias, (7) cardiac computed tomography updates, (8) cardiac magnetic resonance updates, and (9) new and emerging techniques in cardiothoracic imaging. This curriculum was written and endorsed by the Education Committee of the Society of Thoracic Radiology. This curriculum operates in conjunction with the Accreditation Council for Graduate Medical Education (ACGME) milestones project that serves as a framework for semiannual evaluation of resident physicians as they progress through their training in an ACGME-accredited residency or fellowship programs. This cardiothoracic curriculum document is meant to serve not only as a more detailed guide for radiology trainees, educators, and program directors but also complementary to and guided by the ACGME milestones.

Teaching the Healthcare Economics Milestones to Radiology Residents: Our Pilot Curriculum Experience

Prober AS, Mehan WA Jr, Bedi HS. Acad Radiol. 2016 Jul;23(7):885-8. doi: 10.1016/j.acra.2016.02.014. Epub 2016 Apr 1.

RATIONALE AND OBJECTIVES:

Since July 2013, the Accreditation Council for Graduate Medical Education (ACGME) has required radiology residency programs to implement a set of educational milestones to track residents' educational advancement in six core competencies, including Systems-based Practice. The healthcare economics subcompetency of Systems-based Practice has traditionally been relatively neglected, and given the new increased ACGME oversight, will specifically require greater focused attention.

MATERIALS AND METHODS:

A multi-institutional health-care economics pilot curriculum combining didactic and practical components was implemented across five residency programs. The didactic portion included a package of online recorded presentations, reading, and testing materials developed by the American College of Radiology (ACR's) Radiology Leadership Institute. The practical component involved a series of local meetings led by program faculty with the production of a deliverable based on research of local reimbursement for a noncontrast head computed tomography. The capstone entailed the presentation of each program's deliverable during a live teleconference webcast with a Radiology Leadership Institute content expert acting as moderator and discussion leader.

RESULTS:

The pilot curriculum was well received by residents and faculty moderators, with 100% of survey respondents agreeing that the pilot met its objective of introducing how reimbursement works in American radiology in 2015 and how business terminology applies to their particular institutions.

CONCLUSION:

A health-care economics curriculum in the style of a Massive Open Online Course has strong potential to serve as many residency programs' method of choice in meeting the health-care economics milestones.

Have First-Year Emergency Medicine Residents Achieved Level 1 on Care-Based Milestones?

Weizberg M, Bond MC, Cassara M, Doty C, Seamon J. J Grad Med Educ. 2015 Dec;7(4):589-94

BACKGROUND:

Residents in Accreditation Council for Graduate Medical Education accredited emergency medicine (EM) residencies were assessed on 23 educational milestones to capture their progression from medical student level (Level 1) to that of an EM attending physician (Level 5). Level 1 was conceptualized to be at the level of an incoming postgraduate year (PGY)-1 resident; however, this has not been confirmed.

OBJECTIVES:

Our primary objective in this study was to assess incoming PGY-1 residents to determine what percentage achieved Level 1 for the 8 emergency department (ED) patient care-based milestones (PC 1- 8), as assessed by faculty. Secondary objectives involved assessing what percentage of residents had achieved Level 1 as assessed by themselves, and finally, we calculated the absolute differences between self- and faculty assessments.

METHODS:

Incoming PGY-1 residents at 4 EM residencies were assessed by faculty and themselves during their first month of residency. Performance anchors were adapted from ACGME milestones.

RESULTS:

Forty-one residents from 4 programs were included. The percentage of residents who achieved Level 1 for each subcompetency on faculty assessment ranged from 20% to 73%, and on self-assessment from 34% to 92%. The majority did not achieve Level 1 on faculty assessment of milestones PC-2, PC-3, PC-5a, and PC-6, and on self-assessment of PC-3 and PC-5a. Self-assessment was higher than faculty assessment for PC-2, PC-5b, and PC-6.

CONCLUSIONS:

Less than 75% of PGY-1 residents achieved Level 1 for ED care-based milestones. The majority did not achieve Level 1 on 4 milestones. Self-assessments were higher than faculty assessments for several milestones.

Gearing Up for Milestones in Surgery: Will Simulation Play a Role?

Gardner AK, Scott DJ, Hebert JC, Mellinger JD, Frey-Vogel A, Ten Eyck RP, Davis BR, Sillin LF 3rd, Sachdeva AK. *Surgery*. 2015 Nov;158(5):1421-7. doi: 10.1016/j.surg.2015.03.039. Epub 2015 May 23.

BACKGROUND:

The Consortium of American College of Surgeons-Accredited Education Institutes was created to promote patient safety through the use of simulation, develop new education and technologies, identify best practices, and encourage research and collaboration.

METHODS:

During the 7th Annual Meeting of the Consortium, leaders from a variety of specialties discussed how simulation is playing a role in the assessment of resident performance within the context of the Milestones of the Accreditation Council for Graduate Medical Education as part of the Next Accreditation System.

CONCLUSION:

This report presents experiences from several viewpoints and supports the utility of simulation for this purpose.

Fostering and Assessing Professionalism and Communication Skills in Neurosurgical Education

Fontes RB, Selden NR, Byrne RW. J Surg Educ. 2014 Nov-Dec;71(6):e83-9. doi: 10.1016/j.jsurg.2014.06.016. Epub 2014 Aug 29.

INTRODUCTION:

Incorporation of the 6 ACGME core competencies into surgical training has proven a considerable challenge particularly for the two primarily behavioral competencies, professionalism and interpersonal and communication skills. We report on experience with two specific interventions to foster the teaching and continuous evaluation of these competencies for neurosurgery residents.

MATERIAL AND METHODS:

In 2010, the Society of Neurological Surgeons (SNS) organized the first comprehensive Neurosurgery Boot Camp courses, held at six locations throughout the US and designed to assess and teach not only psychomotor skills but also components of all six Accreditation Council for Graduate Medical Education (ACGME) core competencies. These courses are comprised of various educational methodologies, including online material, faculty lectures, clinical scenario and group discussions, manual skills stations, and pre- and post-course assessments. Resident progress in each of the 6 ACGME competencies is now tracked using the neurosurgical Milestones, developed by the ACGME in collaboration with the SNS. In addition, the Milestones drafting group for neurosurgery has formulated a milestone-compatible evaluation system to directly populate Milestone reports. These evaluations utilize formative, summative, and 360-degree evaluations that are considered by a faculty core competency committee in finalizing milestones levels for each resident.

RESULTS:

Initial attendance at the 2010 Boot Camp course was 94% of the incoming resident class and in subsequent years, 100%. Pre- and post-course surveys demonstrated a significant and sustained increase in knowledge. The value of these courses has been recognized by the ACGME, which requires Boot Camp or equivalent participation prior to acting with indirect supervision during clinical activities. Neurosurgery was one of 7 early Milestone adopter specialties, beginning use in July, 2013. Early milestone data will establish benchmarks prior to utilization for "high stake" decisions such as promotion, graduation, and termination.

CONCLUSIONS:

The full impact of the neurosurgical Boot Camps and Milestones on residency education remains to be measured, although published data from the first years of the Boot Camp Courses demonstrate broad acceptance and early effectiveness. A complementary junior resident course has now been introduced for rising second-year residents. The Milestones compatible evaluation system now provides for multi-source formative and summative evaluation of neurosurgical residents within the new ACGME reporting rubric. Combined with consensus milestone assignments, this system provides new specificity and objectivity to resident evaluations. The correlation of milestone level assignments with other measurements of educational outcome awaits further study.

Entrustable Professional Activities and Curricular Milestones for Fellowship Training in Pulmonary and Critical Care Medicine: Report of a Multisociety Working Group

Fessler HE, Addrizzo-Harris D, Beck JM, Buckley JD, Pastores SM, Piquette CA, Rowley JA, Spevetz A. *Chest*. 2014 Sep;146(3):813-834. doi: 10.1378/chest.14-0710.

ABSTRACT:

This article describes the curricular milestones and entrustable professional activities for trainees in pulmonary, critical care, or combined fellowship programs. Under the Next Accreditation System of the Accreditation Council for Graduate Medical Education (ACGME), curricular milestones compose the curriculum or learning objectives for training in these fields. Entrustable professional activities represent the outcomes of training, the activities that society and professional peers can expect fellowship graduates to be able to perform unsupervised. These curricular milestones and entrustable professional activities are the products of a consensus process from a multidisciplinary committee of medical educators representing the American College of Chest Physicians (CHEST), the American Thoracic Society, the Society of Critical Care Medicine, and the Association of Pulmonary and Critical Care Medicine Program Directors. After consensus was achieved using the Delphi process, the document was revised with input from the sponsoring societies and program directors. The resulting lists can serve as a roadmap and destination for trainees, program directors, and educators. Together with the reporting milestones, they will help mark trainees' progress in the mastery of the six ACGME core competencies of graduate medical education.

Teaching Ultrasound Professionalism

Hashimoto BE, Kasales C, Wall D, McDowell J, Lee M, Hamper UM. Ultrasound Q. 2014 Jun;30(2):91-5. doi: 10.1097/RUQ.0000000000000063.

ABSTRACT:

Professionalism is part of the milestone program instituted by the Accreditation Council for Graduate Medical Education and the American Board of Radiology. A unique feature of ultrasound professionalism is the relationship between the radiologist and the sonographer. Because this relationship is important for sonographic quality and ultimately patient outcome, residents should be trained to achieve an optimal professional relationship with sonographers. This article describes milestones for ultrasound professionalism and suggests methods of implementation.

Playing with Curricular Milestones in the Educational Sandbox: Q-Sort Results from an Internal Medicine Educational Collaborative

Meade LB, Caverzagie KJ, Swing SR, Jones RR, O'Malley CW, Yamazaki K, Zaas AK. Acad Med. 2013 Aug;88(8):1142-8. doi: 10.1097/ACM.0b013e31829a3967.

PURPOSE:

In competency-based medical education, the focus of assessment is on learner demonstration of predefined outcomes or competencies. One strategy being used in internal medicine (IM) is applying curricular milestones to assessment and reporting milestones to competence determination. The authors report a practical method for identifying sets of curricular milestones for assessment of a landmark, or a point where a resident can be entrusted with increased responsibility.

METHOD:

Thirteen IM residency programs joined in an educational collaborative to apply curricular milestones to training. The authors developed a game using Q-sort methodology to identify high-priority milestones for the landmark "Ready for indirect supervision in essential ambulatory care" (EsAMB). During May to December 2010, the programs' ambulatory faculty participated in the Q-sort game to prioritize 22 milestones for EsAMB. The authors analyzed the data to identify the top 8 milestones.

RESULTS:

In total, 149 faculty units (1-4 faculty each) participated. There was strong agreement on the top eight milestones; six had more than 92% agreement across programs, and five had 75% agreement across all faculty units. During the Q-sort game, faculty engaged in dynamic discussion about milestones and expressed interest in applying the game to other milestones and educational settings.

CONCLUSIONS:

The Q-sort game enabled diverse programs to prioritize curricular milestones with interprogram and interparticipant consistency. A Q-sort exercise is an engaging and playful way to address milestones in medical education and may provide a practical first step toward using milestones in the real-world educational setting.

Applying the Milestones in an Internal Medicine Residency Program Curriculum: A Foundation for Outcomes-Based Learner Assessment under the Next Accreditation System

Lowry BN, Vansaghi LM, Rigler SK, Stites SW. Acad Med. 2013 Nov;88(11):1665-9. doi: 10.1097/ACM.0b013e3182a8c756.

ABSTRACT:

In 2010, University of Kansas Medical Center internal medicine residency program leaders concluded that their competency-based curriculum and evaluation system was not sufficient to promote accurate assessment of learners' performance and needed revision to meet the requirements of the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System (NAS). Evaluations of learners seldom referenced existing curricular goals and objectives and reflected an "everyone is exceptional, no one is satisfactory" view. The authors identified the American Board of Internal Medicine and ACGME's Developmental Milestones for Internal Medicine Residency Training as a published standard for resident development. They incorporated the milestones into templates, a format that could be modified for individual rotations. A milestones-based curriculum for each postgraduate year of training and every rotation was then created, with input from educational leaders within each division in the Department of Internal Medicine and with the support of the graduate medical education office. In this article, the authors share their implementation process, which took approximately one year, and discuss their current work to create a documentation system for direct observation of entrustable professional activities, with the aim of providing guidance to other programs challenged with developing an outcomes-based curriculum and assessment system within the time frame of the NAS.

The Pediatrics Milestones: Initial Evidence for their Use as Learning Road Maps for Residents

Schumacher DJ, Lewis KO, Burke AE, Smith ML, Schumacher JB, Pitman MA, Ludwig S, Hicks PJ, Guralnick S, Englander R, Benson B, Carraccio C. *Acad Pediatr*. 2013 Jan-Feb;13(1):40-7. doi: 10.1016/j.acap.2012.09.003. Epub 2012 Nov 17.

OBJECTIVE:

As the next step in competency-based medical education, the Pediatrics Milestone Project seeks to provide a learner-centered approach to training and assessment. To help accomplish this goal, this study sought to determine how pediatric residents understand, interpret, and respond to the Pediatrics Milestones.

METHODS:

Cognitive interviews with 48 pediatric residents from all training levels at 2 training programs were conducted. Each participant reviewed one Pediatrics Milestone document (PMD). Eight total Pediatrics Milestones, chosen for their range of complexity, length, competency domain, and primary author, were included in this study. Six residents, 2 from each year of residency training, reviewed each PMD. Interviews were transcribed and coded using inductive methods, and codes were grouped into themes that emerged.

RESULTS:

Four major themes emerged through coding and analysis: 1) the participants' degree of understanding of the PMDs is sufficient, often deep; 2) the etiology of participants' understanding is rooted in their experiences; 3) there are qualities of the PMD that may contribute to or detract from understanding; and 4) participants apply their understanding by noting the PMD describes a developmental progression that can provide a road map for learning. Additionally, we learned that residents are generally comfortable being placed in the middle of a series of developmental milestones. Two minor themes focusing on interest and practicality were also identified.

CONCLUSIONS:

This study provides initial evidence for the Pediatrics Milestones as learner-centered documents that can be used for orientation, education, formative feedback, and, ultimately, assessment.



Rationale for Milestones

The Anesthesiology Milestones 2.0: An Improved Competency-Based Assessment for Residency Training

Ambardekar AP, Walker KK, McKenzie-Brown AM, Brennan K, Jackson C, Edgar L, Ellinas H, Long TR, Trombetta CE, Laskey MG, Wargo BW, Dainer RJ, Draconi CS, Mitchell JD. *Anesth Analg*. 2021 Aug 1;133(2):353-361. doi: 10.1213/ANE.0000000000005499. PMID: 33764340.

ABSTRACT:

The evolution of medical education, from a time-based to a competency-based platform, began nearly 30 years ago and continues to slowly take shape. The development of valid and reproducible assessment tools is the first step. Medical educators across specialties acknowledge the challenges and remain motivated to develop a relevant, generalizable, and measurable system. The Accreditation Council for Graduate Medical Education (ACGME) remains committed to its responsibility to the public by assuring that the process and outcome of graduate medical education in the nation's residency programs produce competent, safe, and compassionate doctors. The Milestones Project is the ACGME's current strategy in the evolution to a competency-based system, which allows each specialty to develop its own set of subcompetencies and 5-level progression, or milestones, along a continuum of novice to expert. The education community has now had nearly 5 years of experience with these rubrics. While not perfect, Milestones 1.0 provided important foundational information and insights. The first iteration of the Anesthesiology Milestones highlighted some mismatch between subcompetencies and current and future clinical practices. They have also highlighted challenges with assessment and evaluation of learners, and the need for faculty development tools. Committed to an iterative process, the ACGME assembled representatives from stakeholder groups within the Anesthesiology community to develop the second generation of Milestones. This special article describes the foundational data from Milestones 1.0 that was useful in the development process of Milestones 2.0, the rationale behind the important changes, and the additional tools made available with this iteration.

ACGME Diagnostic Radiology Milestones 2.0: the Time is Now

Grayev A, Catanzano TM, Sarkany D, Winkler N, Gaetke-Udager K, Mian A, Frederick J, Jordan SG. Acad Radiol. 2020 Dec 5:S1076-6332(20)30672-3. doi: 10.1016/j.acra.2020.11.020. Epub ahead of print.
PMID: 33293257.

ABSTRACT:

The Accreditation Council for Graduate Medical Education oversees graduate medical education in the United States. Designed to provide broad based training in all aspects of imaging, the diagnostic radiology residency program must provide educational experiences that not only provide technical, professional, and patient centered training, but also meet accreditation standards. With the breadth of material to cover during training, carefully orchestrated educational experiences must be planned. This manuscript offers residency program leaders resources to meet the challenges of the new Accreditation Council for Graduate Medical Education Diagnostic Radiology Milestones 2.0 and highlights potential opportunities for future educational endeavors.

Sleep Medicine Milestones 2.0: designed for our field

Dredla BK, Edgar L, Samman H, Bagai K, Mohon R, Malkani R, Doo K, Zeidler M, Weir I, Kapur V, Shelgikar AV. J Clin Sleep Med. 2020 Nov 2. doi: 10.5664/jcsm.8962. Epub ahead of print. PMID: 33135628.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) published the first sleep medicine milestones in 2015. However, these milestones were the same among all internal medicine fellowship programs; they were not specific to the specialty. Based on stakeholder feedback, the ACGME called for the creation of specialty-specific milestones. Herein, we outline the history of ACGME reporting milestones, identification of knowledge, skills, and attitudes that define the practice of sleep medicine, and creation of the supplemental guide and sleep medicine-specific milestones (Sleep Medicine Milestones 2.0) to assess developmental progression during fellowship training.

Thoracic surgery milestones 2.0: Rationale and revision

Mitzman B, Beller JP, Edgar L. *J Thorac Cardiovasc Surg.* 2020 Nov;160(5):1399-1404. doi: 10.1016/j.jtcvs.2019.12.132. Epub 2020 Mar 31. PMID: 32245669.

In 1999, the American Board of Medical Specialties and Accreditation Council for Graduate Medical Education (ACGME) jointly approved 6 core competencies aimed at providing a framework for developmental areas important for physicians in training. These were later launched as part of the Outcomes Project in 2001. The aim of this joint project was to improve the quality of graduate medical education through the avoidance of overspecialization while providing key developmental areas relevant to all specialties. The competencies include patient care and procedural skills, medical knowledge, professionalism, systems-based practice, interpersonal and communication skills, and practice-based learning and improvement. However, when first introduced, programs struggled with overall implementation of the competencies into individual training pathways and their application to different specialties. Many were unsure how to appropriately integrate the competencies into already- used evaluation models. In 2009, the ACGME introduced Milestones as part of the Next Accreditation System. To build on the initial competencies, subcompetencies were selected addressing a specific disease or discipline specific element. Milestones were developed as individual elements for each subcompetency. These milestones included a trajectory for a trainee to follow throughout their growth, with specific examples for the trainee's specialty. The expectation was that programs would identify and implement a variety of tools to assess their trainee's progress in acquiring these milestones. The actual tools used were left to the discretion of the programs. Twice each year, programs were required to report to the ACGME the progress their trainees were making in achieving their milestones. The ACGME is now in the process of updating the milestones as part of the Milestones 2.0 project. Thoracic Surgery is among the first subspecialty groups to near completion of the process. In the following, we describe the foundation for this work with the history of the initial milestone development and ongoing work for Milestones 2.0.

Developing microsurgical milestones for psychomotor skills in neurological surgery residents as an adjunct to operative training: the home microsurgery laboratory

Abecassis IJ, Sen RD, Ellenbogen RG, Sekhar LN. J Neurosurg. 2020 Sep 4;1-11. doi: 10.3171/2020.5. JNS201590. Epub ahead of print. PMID: 32886917.

OBJECTIVE:

A variety of factors contribute to an increasingly challenging environment for neurological surgery residents to develop psychomotor skills in microsurgical technique solely from operative training. While adjunct training modalities such as cadaver dissection and surgical simulation are embraced and practiced at our institution, there are no formal educational milestones defined to help residents develop, measure, and advance their microsurgical psychomotor skills in a stepwise fashion when outside the hospital environment. The objective of this report is to describe an efficient and convenient "home microsurgery lab" (HML) assembled and tested by the authors with the goal of supporting a personalized stepwise advancement of microsurgical psychomotor skills.

METHODS:

The authors reviewed the literature on previously published simulation practice models and designed adjunct learning modules utilizing the HML. Five milestones were developed for achieving proficiency with each graduated exercise, referencing the Accreditation Council for Graduate Medical Education (ACGME) guidelines. The HML setup was then piloted with 2 neurosurgical trainees.

RESULTS:

The total cost for assembling the HML was approximately \$850. Techniques for which training was provided included microinstrument handling, tissue dissection, suturing, and microanastomoses. Five designated competency levels were developed, and training exercises were proposed for each competency level.

CONCLUSIONS:

The HML offers a unique, entirely home-based, affordable adjunct to the operative neurosurgical education mandated by the ACGME operative case logs, while respecting resident hospital-based education hours. The HML provides surgical simulation with specific milestones, which may improve confidence and the microsurgical psychomotor skills required to perform microsurgery, regardless of case type.

Best Approaches to Evaluation and Feedback in Post-Graduate Medical Education

Perkins SQ, Dabaja A, Atiemo H. Curr Urol Rep. 2020 Aug 13;21(10):36. doi: 10.1007/s11934-020-00991-2. PMID: 32789759.

PURPOSE OF REVIEW:

The objectives of this literature review are to appraise current approaches and assess new technologies that have been utilized for evaluation and feedback of residents, with focus on surgical trainees.

RECENT FINDINGS:

In 1999, the Accreditation Council for Graduate Medical Education introduced the Milestone system as a tool for summative evaluation. The organization allows individual program autonomy on how evaluation and feedback are performed. In the past, questionnaire evaluations and informal verbal feedback were employed. However, with the advent of technology, they have taken a different shape in the form of crowdsourcing, mobile platforms, and simulation. Limited data is available on new methods but studies show promise citing low cost and positive impact on resident education. No one "best approach" exists for evaluation and feedback. However, it is apparent that a multimodal approach that is based on the ACGME Milestones can be effective and aid in guiding programs.

Competency-based Medical Education for the Clinician-Educator: The Coming of Milestones Version 2

Torralla KD, Jose D, Katz JD. Clin Rheumatol. 2020 Jun;39(6):1719-1723. doi: 10.1007/s10067-020-04942-7. Epub 2020 Feb 13.

ABSTRACT:

Competency-based medical education is emphasized by institutions overseeing medical school and postgraduate training worldwide. The high rate of preventable errors in medicine underscores this need. Expanding physician competency beyond the domains of patient care and medical knowledge towards goals that emphasize a more holistic view of the healthcare system is one aspect of this emphasis. The Accreditation Council on Graduate Medical Education (ACGME), which oversees postgraduate training programs in the USA, has recently expanded to oversee training programs internationally. The original ACGME Milestones effort unveiled in 2013 was met with skepticism. Nevertheless, other outcomes-based education programs worldwide, including the CanMEDS framework (Canada), Tomorrow's Doctor (UK), and Scottish Doctor (Scotland), have suggested that milestones do offer advantages. Missing from the milestone rollout, however, was collaborative buy-in from multiple stakeholders such as from clinician-educators. Consequently, Milestones version 2 is in development. Specifically, these will address the need for specialty-specific milestones, and the usage of harmonized milestones. A concise history of the push towards outcomes-based medical education is presented and contextualized for physicians who must embrace the transition from teacher-based to learner-based outcomes.

Linking Workplace-Based Assessment to ACGME Milestones: A Comparison of Mapping Strategies in Two Specialties

Kelleher M, Kinnear B, Wong SEP, O'Toole J, Warm E. *Teach Learn Med.* 2020 Apr-May;32(2):194-203. doi: 10.1080/10401334.2019.1653764. Epub 2019 Sep 18.

CONSTRUCT:

The construct that is assessed is competency in Pediatrics and Internal Medicine residency training. Background: The Accreditation Council for Graduate Medical Education (ACGME) created milestones to measure learner progression toward competence over time but not as direct assessment tools. Ideal measurement of resident performance includes direct observation and assessment of patient care skills in the workplace. Residency programs have linked these concepts by mapping workplace-based assessments to the milestones of ACGME subcompetencies. Mapping is a subjective process, and little is known about specific techniques or the resulting consequences of mapping program-specific assessment data to larger frameworks of competency.

APPROACH:

In this article, the authors compare and contrast the techniques used to link workplace-based assessments called Observable Practice Activities (OPAs) to ACGME subcompetencies in two large academic residency programs from different specialties (Internal Medicine and Pediatrics). Descriptive analysis explored the similarities and differences in the assessment data generated by mapping assessment items to larger frameworks of competency.

RESULTS:

Each program assessed the core competencies with similar frequencies. The largest discrepancy between the two subspecialties was the assessment of Medical Knowledge, which Internal Medicine assessed twice as often. Pediatrics also assessed the core competency Systems-based Practice almost twice as often as Internal Medicine. Both programs had several subcompetencies that were assessed more or less often than what appeared to be emphasized by the blueprint of mapping. Despite using independent mapping processes, both programs mapped each OPA to approximately three subcompetencies.

CONCLUSIONS:

Mapping workplace-based assessments to the ACGME subcompetencies allowed each program to see the whole of their curricula in ways that were not possible before and to identify existing curricular and assessment gaps. Although each program used similar assessment tools, the assessment data generated were different. The lessons learned in this work could inform other programs attempting to link their own workplace-based assessment elements to ACGME subcompetencies.

Statement From the Society for the Advancement of Transplant Anesthesia: White Paper Advocating Desirable Milestones and Competencies for Anesthesiology Fellowship Training in the Field of Lung Transplantation

Wilkey BJ, Abrams BA, Del Rio JM, Kertai MD, Subramaniam K, Srinivas C, Peng YG, Berrio-Valencia M, Martin AK. *Semin Cardiothorac Vasc Anesth.* 2020 Mar;24(1):104-114. doi: 10.1177/1089253219867695. Epub 2019 Aug 8.

ABSTRACT:

The clinical, educational, and research facets of lung transplantation have advanced significantly since the first lung transplant in 1963. The formation of the International Society for Heart and Lung Transplantation (ISHLT) and subsequent Registry has forged a precedent of collaborative teamwork that has significantly affected current lung transplantation outcomes. The Society for the Advancement of Anesthesia (SATA) is dedicated to developing educational platforms for all facets of transplant anesthesia. Additionally, we believe that the anesthetic training for lung transplantation has not kept pace with other advances in the field. As such, SATA presents for consideration these educational milestones and competencies for anesthetic fellowship training in the field of lung transplantation. The proposed milestones were designed on the framework of 6 core competencies created by the Accreditation Council on Graduate Medical Education. The milestones were identified by combining the expert opinion of our Thoracic Transplant Committee, our experience as educators, and literature review. We offer this White Paper to the anesthesiology and transplant communities as a starting point for the discussion and evolution of perioperative anesthetic care in the field of lung transplantation.

Cytopathology Milestones: Can You Get to Level 5?

Dyhdalo KS, Oshilaja O, Chute DJ, Booth CN, Suchy P, Smith K, Procop GW, Reynolds JP. J Am Soc Cytopathol. 2020 Mar 30. pii: S2213-2945(20)30046-6. doi: 10.1016/j.jasc.2020.03.002. [Epub ahead of print]

INTRODUCTION:

ACGME Milestones describe 6 areas of proficiency, indicating readiness for practice. Each is divided into 5 levels of mastery; Level 1 (new trainees) through Levels 4 (graduation) and 5 (aspirational). Milestones reporting began Spring 2016. We used Milestones to assess graduated fellows.

MATERIALS AND METHODS:

We conducted phone interviews with previous fellows and collected demographic information including practice setting. We asked graduates if they fulfilled each example of mastery and recorded their answers.

RESULTS:

A total of 22 fellows graduated from 2010 to 2017; 15 responded (10 academic, 5 private). Milestones in which nearly all respondents performed well (Level 4+) were: PC1, MK1, SBP2, SBP4, PROF1-4, ICS1-3. Some were more challenging (PC2, MK2, SBP1/3/5, PBL1). For PC2, 2 respondents achieved Level 1 (did not perform fine-needle aspirations). For MK2, 2 respondents achieved Level 1 (did not evaluate Papanicolaou). For SBP1, 80% in private practice achieved Level 5; 50% in academics achieved Level 3. For SBP3, 80% in private practice achieved Level 4+; 100% in academics achieved maximum Level 2. For SBP5, 60% of all respondents achieved maximum Level 3; only 1 achieved Level 5.

CONCLUSIONS:

Many Milestones are attainable. Eleven of 18 yielded Level 4+ from most respondents. Three (PC2, MK1, MK2) yielded rare Level 1 due to scope of practice. Others (SBP1, SBP3) reflect more of an all-or-nothing phenomenon. For SBP5, most respondents achieved Level 3; only 1 achieved Level 5. Some Milestones are highly dependent on practice setting, and others remain aspirational.

A National Survey of Integrated Vascular Surgery Residents' Experiences With and Attitudes About Quality Improvement During Residency

Purnell SM, Wolf L, Millar MM, Smith BK. *J Surg Educ.* 2020 Jan - Feb;77(1):158-165. doi: 10.1016/j.jsurg.2019.09.003. Epub 2019 Dec 4

BACKGROUND:

Integrated vascular surgery residency, or "0+5," programs provide education in the Accreditation Council for Graduate Medical Education (ACGME) competencies of Systems-Based Practice (SBP) and Practice-Based Learning and Improvement (PBLI), which include milestones related to quality improvement (QI). It is unclear what QI curricula are in place in 0+5 programs nationally or how 0+5 residents perceive the importance of QI.

OBJECTIVE:

The purpose of this study is to assess current 0+5 residents' knowledge, experiences with, and attitudes about QI.

DESIGN:

A survey was developed using the ACGME Common Program Requirements and Milestones pertaining to QI. All 0+5 residents from 2017 to 2018 academic year were emailed an electronic link to the survey. Descriptive statistics and cross-tabulations were calculated using Stata/MP version 13.1.

SETTING:

All 0+5 vascular surgery residency programs in the United State (n = 52).

PARTICIPANTS:

The survey was completed by 35% (n = 90/257) of 0+5 residents, representing 75% of 0+5 programs in the United States (n = 39/52).

RESULTS:

Forty-one percent of respondents felt that applying QI methods is very important and 33% felt that QI education is very important for their future work, however, just 13% felt very prepared to lead a QI initiative. Residents' perceptions of preparedness to lead QI projects and the importance they attached to QI education were significantly influenced by their participation in a QI project (p = 0.003 and p = 0.038 respectively). Finally, just 8% (n = 6) of residents responded correctly to all 13 knowledge-based questions and these residents felt better prepared to lead a QI initiative compared to those who answered incorrectly (p = 0.002).

CONCLUSIONS:

Most 0+5 residents report participation in a QI project during residency, however, few feel prepared to lead a QI initiative in practice. Furthermore, only half of PGY5 0+5 residents report achieving specific ACGME targets for graduation pertaining to QI. Current QI curricula in 0+5 programs may be inadequate in teaching fundamental QI concepts and achieving ACGME competency targets for graduation.

Orthopaedic Surgery Residency Milestones: Initial Formulation and Future Directions

Ames SE, Ponce BA, Marsh JL, Hamstra SJ. J Am Acad Orthop Surg. 2020 Jan 1;28(1):e1-e8. doi: 10.5435/JAAOS-D-18-00786.

ABSTRACT:

Milestones specific to orthopaedic surgical training document individual resident progress through skill development in multiple dimensions. Residents increasingly interact with and are assessed by surgeons in both academic and private practice environments. Milestones describe the skills that support competence. One of the primary goals of milestones is to provide continuous data for educational quality improvement of residency programs. They provide a dialogue between surgeons who supervise residents or fellows and the program's Clinical Competency Committee throughout a resident's education. The orthopaedic milestones were developed jointly by the Accreditation Council for Graduate Medical Education and the American Board of Orthopaedic Surgery. The working team was designed with broad representation within the specialty. The milestones were introduced to orthopaedic residencies in 2013. Orthopaedics is a 5-year training program; the first comprehensive longitudinal data set is now available for study. This summary provides historical perspective on the development of the milestones, state of current milestone implementation, attempts to establish validity, challenges with the milestones, and the development of next-generation assessment tools.

Urology Milestones 2.0: The Future Looks Bright

Hamawy KJ, Edgar L. *Curr Urol Rep*. 2019 Nov 28;20(12):85. doi: 10.1007/s11934-019-0946-9.

ABSTRACT:

One of the major functions of the Accreditation Council for Graduate Medical Education (ACGME) is to accredit all approved residency programs. This accreditation system is based on both common and program-specific requirements that form the foundation of all ACGME-accredited training programs. Embedded within the program requirements are the essential elements of the Competencies and Milestones. In this review article, we hope to provide the reader with an overview of the current Milestones and a preview of what lies ahead.

RECENT FINDINGS:

Milestones for resident education were implemented approximately 7 years ago. The milestones were intended to create a logical trajectory of professional growth which could be measured and tracked for each sub-specialty. However, substantial variability in both content and developmental progression was seen in many specialties. The ACGME has been actively reviewing the Milestones to insure that there exists harmony across all specialties. Much has been learned about the milestones since their implementation. As educators, we need to provide a robust and reproducible system for all to use. The future of resident education, Milestones 2.0, will provide the necessary groundwork for a more user friendly system that will allow adequate evaluation of our trainees.

Core Competencies for Pediatric Consultation-Liaison Psychiatry in Child and Adolescent Psychiatry Fellowship Training

Shaw RJ, Rackley S, Walker A, Fuchs DC, Meadows A, Dalope K, Pao M; Special Interest Study Group for Pediatric Consultation Liaison Psychiatry Core Competencies, Physically Ill Child Committee, American Academy of Child and Adolescent Psychiatry. *Psychosomatics*. 2019 Sep - Oct;60(5):444-448. doi: 10.1016/j.psych.2019.04.006. Epub 2019 May 3

BACKGROUND:

Learners developing competency-based skills, attitudes, and knowledge through the achievement of defined milestones is a core feature of competency-based medical education. In 2017, a special interest study group of the American Academy of Child and Adolescent Psychiatry convened a panel of specialists to describe pediatric consultation-liaison psychiatry (CLP) best educational practices during child and adolescent psychiatry fellowship.

OBJECTIVE:

The objective of this project was to develop a national consensus on pediatric CLP competencies to help guide training in this specialty.

METHODS:

An expert working group developed a list of candidate competences based on previously established educational outcomes for CLP (formerly Psychosomatic Medicine), child and adolescent psychiatry, and general psychiatry. A survey was distributed to members of the American Academy of Child and Adolescent Psychiatry Physically Ill Child Committee to determine child and adolescent psychiatry fellowship educational needs on pediatric CLP services and generate consensus regarding pediatric CLP competencies.

RESULTS:

Most survey respondents were supportive of the need for a national consensus on core competencies for pediatric CLP. Consensus from a panel of experts in the field of pediatric CLP generated a list of proposed core competencies that track the Accreditation Council for Graduate Medical Education's six core competencies.

CONCLUSIONS:

Consistent learning outcomes provide the foundation for further development of tools to support training in pediatric CLP. There is a need to develop further tools including outcome assessment instruments and self-directed learning materials that can be used to support lifelong learning.

Milestones on the Plastic Surgery In-Service Training Examination

Ganesh Kumar N, Marwaha J, Drolet BC. J Surg Educ. 2019 Sep - Oct;76(5):1370-1375. doi: 10.1016/j.jsurg.2019.03.014. Epub 2019 Apr 5.

BACKGROUND:

The Plastic Surgery Milestones Project was implemented in 2014 to establish standards for competency based resident education. In restructuring educational activities under the Milestones, various pedagogical tools have been revised. However, these standards have not yet been applied to the Plastic Surgery In-Service Training Examination. The purpose of this study was to determine the representation of the various components of the Plastic Surgery Milestones Project, on the In-Service Training Examination.

METHODS:

All questions from the 2014 - 2018 In-Service Examinations were evaluated within the framework of the current Plastic Surgery Milestones. Using content analysis, each Examination question was mapped to a single Milestone. Descriptive analysis of Milestone subject area and Core Competency breakdown, as well as year to year trends, were performed.

RESULTS:

Of the 1,150 questions analyzed, there was an unequal representation of individual Milestones (0-7.4%). Of the 36 Plastic Surgery Milestones, 10 represented more than 50% of the PSITEs while 8 Milestones had less than 1% representation. The most common subject area was Head and Neck (12.7%) and least common was Reconstruction of the Trunk and Perineum. Among Core Competencies, more than half (50.4%) tested Patient Care while Interpersonal and Communication Skills was the lowest represented, 0.2%.

CONCLUSIONS:

The Plastic Surgery In-Service Examination tests a variable proportion of Milestones. Currently, the PSITE is not well integrated with competency based education in spite of a shift towards such a training model. Going forward, the PSITE may include an associated Milestone with each question in order to better incorporate Competencies into this important annual evaluation metric.

Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Education Milestones for Resident Education

Sharma D, Easdown LJ, Zolyomi A, Ayrian E, Wheeler PJ, Edelman G, Mahla ME; Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Milestones Task Force. *J Neurosurg Anesthesiol.* 2019 Jul;31(3):337-341. doi: 10.1097/ANA.0000000000000586.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) has introduced competency-based assessments (milestones) for resident education. However, the existing milestones for Anesthesiology are not specific to Neuroanesthesiology. The Society for Neuroscience in Anesthesiology & Critical Care (SNACC) commissioned a task force to adapt the ACGME anesthesiology milestones for use in Neuroanesthesiology training, and to provide recommendations for implementing milestones.

METHODS:

A 7-member expert task force supported by an advisory committee developed the initial milestones by consensus. Written permission was given by the ACGME. The milestones were refined following 3-month pilot use in 14 departments across the United States and inputs from SNACC members. Final milestones were approved by the SNACC Board of Directors.

RESULTS:

Twelve Neuroanesthesiology-specific milestones in 5 major ACGME domains are recommended; these were identified as most pertinent to this subspecialty rotation. These pertain to patient care (7 milestones), medical knowledge (2 milestones), practice-based learning and improvement (1 milestone), and interpersonal and communication skills (2 milestones). Each milestone was described in detail, with clear outline of expectations at various levels of training.

CONCLUSIONS:

The SNACC Neuroanesthesiology milestones provide a framework for reviewing resident performance and are expected to facilitate improved use of ACGME milestones during Neuroanesthesiology subspecialty training. The task force recommends that the target should be to accomplish level 4 or higher milestones by the end of residency training. Individual programs should decide the implications of a resident not meeting the expected milestones.

Resident Education in Complex Obstetric Procedures: Are We Adequately Preparing Tomorrow's Obstetricians?

Dotters-Katz SK, Gray B, Heine RP, Propst K. Am J Perinatol. 2019 Jun 25. doi: 10.1055/s-0039-1692714.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) milestones for obstetrics and gynecology (OB/GYN) residents include obstetrical technical skills. We sought to describe resident experience with surgical obstetrics and comfort performing procedures independently postgraduation.

STUDY DESIGN:

An anonymous 27-question e-survey was sent to OB/GYN residents in United States in March 2018, using the Council of Resident Education in Obstetrics and Gynecology coordinator listserv. Complex obstetric procedures included: forceps-assisted vaginal delivery (FAVD) and vacuum-assisted vaginal delivery (VAVD), cerclage, breech second twin, breech delivery, perineal repairs, and cesarean hysterectomy. Technical skill questions included experience as primary surgeon, comfort performing procedures independently, and for 4th year residents- comfort performing procedures postresidency. Demographic information was queried.

Descriptive statistics was used to analyze responses.

RESULTS:

A total of 417 residents completed the survey. Respondents were 88% female, 75% from academic programs, and 48% postgraduate year 3 and 4. Among all residents, many had been primary surgeon in operative vaginal deliveries (51% FAVD, 72% VAVD), fewer for breech vaginal delivery (21%), breech second twin (34%), cesarean hysterectomy (21%), and 4th degree repairs (37%). All 4th-year respondents stated that they would feel comfortable performing either VAVD or FAVD postresidency. Note that 17, 33, 28, and 74% would not feel comfortable performing a 4th degree repair, cesarean hysterectomy, breech second twin, and breech vaginal delivery, respectively, postresidency.

CONCLUSION:

Despite ACGME recommendations, data suggest that many graduating residents may not be comfortable with these complex procedures.

Development of Curricular Milestones for Hospice and Palliative Medicine Fellowship Training in the US

Gustin JL, Yang HB, Radwany SM, Okon TR, Morrison LJ, Levine SK, Hwang JM, Buckholz GT, Barnett MD, Verbeck N, Landzaat LH. *J Pain Symptom Manage*. 2019 May;57(5):1009-1017.e6. doi: 10.1016/j.jpainsymman.2019.02.013. Epub 2019 Feb 18.

CONTEXT:

A physician workgroup of the American Academy of Hospice and Palliative Medicine sought to define curricular milestones (CMs) for hospice and palliative medicine (HPM) Fellowship Programs. The developed list of CMs would serve as components upon which to organize curriculum and standardize what to teach during training. These would complement entrustable professional activities previously developed by this group and new specialty-specific reporting milestones (RMs) for HPM developed through the Accreditation Council for Graduate Medical Education.

OBJECTIVES:

The objective of this study was to develop and vet CMs for HPM fellowships in the U.S.

METHODS:

A draft of CMs was developed through an iterative consensus group process with repeated cycles of drafting, analyzing, and revising by a broadly representative expert workgroup who then gained input from HPM educators at a national meeting workshop. The CM draft was subsequently revised and then vetted through a national survey to 203 fellowship educators. Respondents were asked to "keep," "revise," or "exclude" each proposed CM with space for comments. An agreement of 75% among respondents was set as the criteria a priori for keeping a CM. Eighty-four of the 203 potential respondents participated in the survey. All items met the minimum agreement level of 75% or greater recommending keeping the CM. Greater than 85% of the respondents agreed to keep 19 of the 22 CMs with no revisions. Comments for revisions on other CMs were primarily related to changes in language and formatting, not conceptual underpinnings.

CONCLUSION:

A group consensus method strengthened by inclusion of a national survey to HPM fellowship educators resulted in a CM document that is both carefully developed and broadly vetted. Along with entrustable professional activities and new specialty-specific RMs, these CMs offer educators and trainees tools to create more comprehensive curricula and behaviorally based assessment tools for HPM fellowships and their stakeholders.

Use of Emergency Department Pharmacists in Emergency Medicine Resident Milestone Assessment

Bedy SC, Goddard KB, Stille JAW, Sampson CS. West J Emerg Med. 2019 Mar;20(2):357-362. doi: 10.5811/westjem.2018.10.37958. Epub 2018 Dec 5.

INTRODUCTION:

The use of competency-based milestones for emergency medicine (EM) was mandated by the Accreditation Council for Graduate Medical Education in 2013. However, clinical competency committees (CCC) may lack diverse, objective data to assess these new competencies. To remedy the lack of objective data when assessing the pharmacotherapy sub-competency (PC5) we introduced a unique approach that actively involves departmental clinical pharmacists in determining the milestone level achieved by the resident.

METHODS:

Our pharmacists assess the pharmacotherapy knowledge of the residents through multiple methods: direct observation of orders, communication with the residents while performing patient care within the emergency department (ED), and real-time chart review. This observation occurs informally on a daily basis in the ED and is incorporated into the routine work of the pharmacist. The pharmacists use the PC5 sub-competency as their standard evaluation tool in this setting to keep all assessments consistent.

RESULTS:

Since our residency program introduced pharmacist assessment of resident pharmacotherapy knowledge, the CCC has conducted seven biannual meetings. Of the 120 separate PC5 sub-competency assessments made during those meetings there was 100% agreement between the pharmacist's assessment and the CCC's final assessment of the trainee. A survey of the CCC members concluded that the pharmacists' assessments were useful and aided in accurate resident evaluation.

CONCLUSION:

The use of ED pharmacists in assessing the pharmacotherapy sub-competency provides important information used in resident assessment of the PC5 milestone.

ACGME Milestones within Subspecialty Training Programs: One Institution's Experience

Heath JK, Dine CJ. J Grad Med Educ. 2019 Feb;11(1):53-59. doi: 10.4300/JGME-D-18-00308.1.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Milestones were created as a criterion-based framework to promote competency-based education during graduate medical education. Despite widespread implementation across subspecialty programs, extensive validity evidence supporting the use of milestones within fellowship training is lacking.

OBJECTIVE:

We assessed the construct and response process validity of milestones in subspecialty fellowship programs in an academic medical center.

METHODS:

From 2014-2016, we performed a single center retrospective cohort analysis of milestone data from fellows across 5 programs. We analyzed summary statistics and performed multivariable linear regression to assess change in milestone ratings by training year and variability in ratings across fellowship programs. Finally, we examined a subset of Professionalism and Interpersonal and Communication Skills subcompetencies from the first 6 months of training to identify the proportion of fellows deemed "ready for independent practice" in these domains.

RESULTS:

Milestone data were available for 68 fellows, with 75933 unique subcompetency ratings. Multivariable linear regression, adjusted for subcompetency and subspecialty, revealed an increase of 0.17 (0.16-0.19) in ratings with each postgraduate year level increase ($P < .005$), as well as significant variation in milestone ratings across subspecialties. For the Professionalism and Interpersonal and Communication Skills domains, mean ratings within the first 6 months of training were 3.78 and 3.95, respectively.

CONCLUSIONS:

We noted a minimal upward trend of milestone ratings in subspecialty training programs, and significant variability in implementing milestones across differing subspecialties. This may suggest possible difficulties with the construct validity and response process of the milestone system in certain medical subspecialties.

Transforming Resident Assessment: An Analysis Using Deming's System of Profound Knowledge

Warm EJ, Kinnear B, Kelleher M, Sall D, Holmboe E. Acad Med. 2019 Feb;94(2):195-201. doi: 10.1097/ACM.0000000000002499.

ABSTRACT:

W. Edwards Deming, in his System of Profound Knowledge, asserts that leaders who wish to transform a system should understand four essential elements: appreciation for a system, theory of knowledge, knowledge about variation, and psychology. The Accreditation Council for Graduate Medical Education (ACGME) introduced the milestones program as a part of the Next Accreditation System to create developmental language for the six core competencies and facilitate programmatic assessment within graduate medical education systems. Viewed through Deming's lens, the ACGME can be seen as the steward of a large system, with everyone who provides assessment data as workers in that system. The authors use Deming's framework to illustrate the working components of the assessment system of the University of Cincinnati College of Medicine's internal medicine residency program and draw parallels to the macrocosm of graduate medical education. Successes and failures in transforming resident assessment can be understood and predicted by identifying the system and its aims, turning information into knowledge, developing an understanding of variation, and appreciating the psychology of motivation of participants. The authors offer insights from their experience for educational leaders who wish to apply Deming's elements to their own assessment systems, with questions to explore, pitfalls to avoid, and practical approaches in doing this type of work.

Integration of Entrustable Professional Activities with the Milestones for Emergency Medicine Residents

Hart D, Franzen D, Beeson M, Bhat R, Kulkarni M, Thibodeau L, Weizberg M, Promes S, West J
Emerg Med. 2019 Jan;20(1):35-42. doi: 10.5811/westjem.2018.11.38912. Epub 2018 Nov 30.

INTRODUCTION:

Medical education is moving toward a competency-based framework with a focus on assessment using the Accreditation Council for Graduate Medical Education Milestones. Assessment of individual competencies through milestones can be challenging. While competencies describe characteristics of the person, the entrustable professional activities (EPAs) concept refers to work-related activities. EPAs would not replace the milestones but would be linked to them, integrating these frameworks. Many core specialties have already defined EPAs for resident trainees, but EPAs have not yet been created for emergency medicine (EM). This paper describes the development of milestone-linked EPAs for EM.

METHODS:

Ten EM educators from across North America formed a consensus working group to draft EM EPAs, using a modified Glaser state-of-the-art approach. A reactor panel with EPA experts from the United States, Canada and the Netherlands was created, and an iterative process with multiple revisions was performed based on reactor panel input. Following this, the EPAs were sent to the Council of Residency Directors for EM (CORD-EM) listserv for additional feedback.

RESULTS:

The product was 11 core EPAs that every trainee from every EM program should be able to perform independently by the time of graduation. Each EPA has associated knowledge, skills, attitudes and behaviors (KSAB), which are either milestones themselves or KSABs linked to individual milestones. We recognize that individual programs may have additional focus areas or work-based activities they want their trainees to achieve by graduation; therefore, programs are also encouraged to create additional program-specific EPAs.

CONCLUSION:

This set of 11 core, EM-resident EPAs can be used as an assessment tool by EM residency programs, allowing supervising physicians to document the multiple entrustment decisions they are already making during clinical shifts with trainees. The KSAB list within each EPA could assist supervisors in giving specific, actionable feedback to trainees and allow trainees to use this list as an assessment-for-learning tool. Linking each KSAB to individual EM milestones allows EPAs to directly inform milestone assessment for clinical competency committees. These EPAs serve as another option for workplace-based assessment, and are linked to the milestones to create an integrated framework.

Surgical Equipment and Medication Price Awareness amongst Obstetrician Gynecologists

Nguyen M, Gray K, Steck-Bayat K, Mahnert N. Surgical Equipment and Medication Price Awareness Amongst Obstetrician Gynecologists [16P]. *Obstetrics and Gynecology*. 2019;174. doi:10.1097/01.AOG.0000558904.75557.d6.

INTRODUCTION:

Milestones established in 2013 by the Accreditation Council for Graduate Medical Education (ACGME) supports the addition of a systems-based practice milestone to assess residents' incorporation of cost awareness into clinical judgment and decision making. Minimal formal education is provided to residents regarding costs related to medications and devices. The primary aim of this study was to evaluate teaching faculty and obstetrical learners accuracy at estimating the costs of common obstetrical devices and medications.

METHODS:

After an IRB was approved, an anonymous survey was distributed to OB/GYN residents and attendings with teaching privileges at University affiliated Banner Health hospitals in Arizona. Participants were asked to provide demographic data and rate statements related to cost awareness pertaining to patient care in addition to estimates of cost of commonly used of surgical equipment and medications based on images. Statistical analyses was then performed on the data.

RESULTS:

The subjective survey showed that the majority of respondents felt that cost was important in the selection of surgical devices/items, that surgical device pricing should be transparent, and that their personal knowledge on prices of surgical devices/medications at the institution was below average or poor. The statistical analysis was consistent with this assessment as the majority of respondents were not able to accurately estimate the pricing of items within a 10% range.

CONCLUSION:

At academic institutions, where cost awareness is expected to be a part of residency training, better methods to educate teaching attendings and residents should be considered to make ACGME milestone assessments more accurate and meaningful.

Competencies, Milestones, and a Level of Supervision Scale for Entrustable Professional Activities for Scholarship

Mink RB, Myers AL, Turner DA, Carraccio CL. Acad Med. 2018 Nov;93(11):1668-1672. doi: 10.1097/ACM.0000000000002353.

PROBLEM:

Scholarship is an important element of both undergraduate and graduate medical education, and scholarly activity is required for all pediatric fellows. However, despite the creation of entrustable professional activities (EPAs) for scholarship, the specific progressive levels of performance and the appropriate level of supervision for a given performance level have not been defined. The authors developed competencies and milestones for the scholarship EPA to provide a framework for assessment across the continuum; a level of supervision scale was also developed.

APPROACH:

The Vitae Researcher Development Framework served as a template to create the competencies and milestones for the scholarship EPA. Beginning in September 2015 and using a modified Delphi approach, three distinct drafts were circulated to individuals with expertise in various types of scholarship until broad agreement was achieved. Then, in October 2016, the Steering Committee of the Subspecialty Pediatrics Investigator Network created a level of supervision scale, modeled after one it had previously developed.

OUTCOMES:

Eight competencies were identified as important in making entrustment decisions related to scholarship. For each competency, five milestone levels that span the continuum from novice to expert were created. A supervision scale with five progressive levels of entrustment was also created.

NEXT STEPS:

Next steps include a study to obtain validity evidence for the supervision scale and determine the correlation between milestone and supervision levels. These competencies, milestones, and supervision levels can potentially serve as a roadmap for trainees and junior faculty and also play a role in the assessment of physician-scientists.

Ten Commandments for Neonatal-Perinatal Medicine Fellows

Chabra S, Sawyer T. J Med Educ Curric Dev. 2018 Sep 19;5:2382120518798639. doi: 10.1177/2382120518798639. eCollection 2018 Jan-Dec.

ABSTRACT:

The transformation of a general pediatrician into a neonatologist requires rigorous training in a diverse range of core skills during neonatal-perinatal medicine fellowship. This training includes the care of high-risk newborn infants, as well as interdisciplinary communication with care team members and families in the neonatal intensive care unit. In addition, neonatal-perinatal medicine fellows need to acquire competency in key procedural skills, including neonatal resuscitation techniques, to be able to safely practice neonatology without direct supervision on graduation. Although there is much general advice available to help residents and fellows navigate training, there is little specific advice or guidance for neonatal fellows. In this *Perspective*, we present 10 commandments for neonatal fellows. The commandments include (1) cherish your patients and their families, (2) know your limits and seek help when needed, (3) understand competency-based medical education, (4) remember the 6 core competencies, (5) review your specialty milestones, (6) have an individualized learning plan, (7) seek out feedback, (8) honor your attendings and nurses, (9) appreciate the importance of teamwork, and (10) do not take thyself in vain. These commandments were developed based on the experience of the authors, working closely with neonatal fellows over several decades. The commandments are present not as unbreakable rules, but rather as words of advice from 2 neonatologists who, having completed their neonatal fellowship, want to help guide others do the same. We believe that this resource will be useful to fellowship programs and neonatal-perinatal fellows.

Competency Crosswalk: A Multispecialty Review of the Accreditation Council for Graduate Medical Education Milestones Across Four Competency Domains

Edgar L, Roberts S, Yaghmour N, Hunderfund AL, Hamstra SJ, Conforti L, Holmboe ES. Acad Med. 2018 Jul;93(7):1035-1041. doi: 10.1097/ACM.0000000000002059.

PURPOSE:

To identify common and overlapping themes among the interpersonal and communication skills (ICS), practice-based learning and improvement (PBLI), professionalism (PROF), and systems-based practice (SBP) milestones of the transitional year and 26 specialties.

METHOD:

In May 2017, milestones were accessed from the Accreditation Council for Graduate Medical Education specialties website. A thematic analysis of the ICS, PBLI, PROF, and SBP milestones was performed to determine unique and common themes across these competencies and across specialties. Keywords from the common program requirements were initially applied as codes to the milestones. Codes were then grouped into common themes.

RESULTS:

Twenty-two themes were identified: 15 (68%) were unique to a given competency (3 related to ICS, 4 related to PBLI, 5 related to PROF, and 3 related to SBP), and 7 (32%) appeared in the milestones of more than one core competency. Eleven themes (50%) were used by 20 or more specialties, and 6 themes (27%) by 10 or fewer specialties. No theme was present across all specialties.

CONCLUSIONS:

The ICS, PBLI, PROF, and SBP milestones contain multiple themes with areas of overlap among these four competencies and substantial variability across specialties. This variability may create differential expectations of residents across specialties, complicate faculty development, and make sharing assessment tools difficult. The thematic analysis provides important insights into how individual specialties interpret and operationalize the ICS, PBLI, PROF, and SBP competency domains and can inform future revisions of milestones to enable harmonization and shared understanding of these competencies across specialties where appropriate.

Evaluating Surgical Residents' Patient-Centered Communication Skills: Practical Alternatives to the "Apprenticeship Model"

Newcomb A, Trickey AW, Lita E, Dort J. J Surg Educ. 2018 May - Jun;75(3):613-621. doi: 10.1016/j.jsurg.2017.09.011. Epub 2017 Oct 7.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) requires residency programs to assess communication skills and provide feedback to residents. We aimed to develop a feasible data collection process that generates objective clinical performance information to guide training activities, inform ACGME milestone evaluations, and validate assessment instruments.

DESIGN:

Residents care for patients in the surgical clinic and in the hospital, and participate in a communication curriculum providing practice with standardized patients (SPs). We measured perception of resident communication using the 14-item Communication Assessment Tool (CAT), collecting data from patients at the surgery clinic and surgical wards in the hospital, and from SP encounters during simulated training scenarios. We developed a handout of CAT example behaviors to guide patients completing the communication assessment.

SETTING:

Independent academic medical center.

PARTICIPANTS:

General surgery residents.

RESULTS:

The primary outcome is the percentage of total items patients rated "excellent;" we collected data on 24 of 25 residents. Outpatient evaluations resulted in significantly higher scores (mean 84.5% vs. 68.6%, $p < 0.001$), and female patients provided nearly statistically significantly higher ratings (mean 85.2% vs. 76.7%, $p = 0.084$). In multivariate analysis, after controlling for patient gender, visit reason, and race, (1) residents' CAT scores from SPs in simulation were independently associated with communication assessments in their concurrent patient population ($p = 0.017$), and (2) receiving CAT example instructions was associated with a lower percentage of excellent ratings by 9.3% ($p = 0.047$).

CONCLUSIONS:

Our data collection process provides a model for obtaining meaningful information about resident communication proficiency. CAT evaluations of surgical residents by the inpatient population had not previously been described in the literature; our results provide important insight into relationships between the evaluations provided by inpatients, clinic patients, and SPs in simulation. Our example behaviors guide shows promise for addressing a common concern, minimizing ceiling effects when measuring physician-patient communication.

Teaching and Assessing Professionalism in Radiology: Resources and Scholarly Opportunities to Contribute to Required Expectations

Kelly AM, Mullan PB. Acad Radiol. 2018 May;25(5):599-609. doi: 10.1016/j.acra.2018.01.008. Epub 2018 Mar 1.

ABSTRACT:

Teaching and assessing trainees' professionalism now represents an explicit expectation for Accreditation Council Graduate Medical Education-accredited radiology programs. Challenges to meeting this expectation include variability in defining the construct of professionalism; limits of traditional teaching and assessment methods, used for competencies historically more prominent in medical education, for professionalism; and emerging expectations for credible and feasible professionalism teaching and assessment practices in the current context of health-care training and practice. This article identifies promising teaching resources and methods that can be used strategically to augment traditional teaching of the cognitive basis for professionalism, including role modeling, case-based scenarios, debriefing, simulations, narrative medicine (storytelling), guided discussions, peer-assisted learning, and reflective practice. This article also summarizes assessment practices intended to promote learning, as well as to inform how and when to assess trainees as their professional identities develop over time, settings, and autonomous practice, particularly in terms of measurable behaviors. This includes assessment tools (including mini observations, critical incident reports, and appreciative inquiry) for authentic assessment in the workplace; engaging multiple sources (self-peer, other health professionals, and patients) in assessment; and intentional practices for trainees to take responsibility for seeking our actionable feedback and reflection. This article examines the emerging evidence of the feasibility and value added of assessment of medical competency milestones, including professionalism, coordinated by the Accreditation Council Graduate Medical Education in radiology and other medical specialties. Radiology has a strategic opportunity to contribute to scholarship and inform policies in professionalism teaching and assessment practices.

The American Society of Hematology and ASCO Curricular Milestones for Assessment of Fellows in Hematology/Oncology: Development, Reflection, and Next Steps

Collichio F, Muchmore EA. Am Soc Clin Oncol Educ Book. 2018 May 23;(38):887-893. doi: 10.1200/EDBK_201773.

ABSTRACT:

The American Society of Hematology (ASH)/ASCO Curricular Milestones is a tool for assessment and teaching for fellows in hematology/oncology. The expectations of the Next Accreditation System of the Accreditation Council of Graduate Medical Education (ACGME) was developed over years from the creation of the six core competencies in 1999 to the current data-driven outcomes-based system. The current internal medicine subspecialty milestones (ACGME reporting milestones) follow the general rubric of the general internal medicine milestones. The ASH/ASCO curricular milestones were developed from the foundational elements of the specialty, and they are interwoven with the ACGME reporting milestones. The 2017 ACGME Milestones Report shows that the milestones display progression in performance through clear anchors. Educational outcomes are available in many specialties. The internal medicine subspecialties have been given the opportunity to update the ACGME reporting milestones. The ACGME has acknowledged that these milestones may be different for each of the specialties. The program committees of ASH and ASCO agree that revision of the ACGME reporting milestones would decrease the overlap of domains, lack of clarity, and negative language that is present in version 1.0. ASH and ASCO are working with the ACGME and American Board of Internal Medicine (ABIM) to develop Curricular Milestones, version 2.0.

Competency-Based Medical Education and the Ghost of Kuhn: Reflections on the Messy and Meaningful Work of Transformation.

Holmboe ES. Acad Med. 2018 Mar;93(3):350-353. doi: 10.1097/ACM.0000000000001866.

ABSTRACT:

The transition, if not transformation, to outcomes-based medical education likely represents a paradigm shift struggling to be realized. Paradigm shifts are messy and difficult but ultimately meaningful if done successfully. This struggle has engendered tension and disagreements, with many of these disagreements cast as either-or polarities. There is little disagreement, however, that the health care system is not effectively achieving the triple aim for all patients. Much of the tension and polarity revolve around how more effectively to prepare students and residents to work in and help change a complex health care system. Competencies were an initial attempt to facilitate this shift by creating frameworks of essential abilities needed by physicians. However, implementation of competencies has proven to be difficult. Entrustable professional activities (EPAs) in undergraduate and graduate medical education and Milestones in graduate medical education are recent concepts being tried and studied as approaches to guide the shift to outcomes. Their primary purpose is to help facilitate implementation of an outcomes-based approach by creating shared mental models of the competencies, which in turn can help to improve curricula and assessment. Understanding whether and how EPAs and Milestones effectively facilitate the shift to outcomes has been and will continue to be an iterative and ongoing reflective process across the entire medical education community using lessons from implementation and complexity science. In this Invited Commentary, the author reflects on what got the community to this point and some sources of tension involved in the struggle to move to outcomes-based education.

Using an Alumni Survey to Target Improvements in an Emergency Medicine Training Programme

Gaeta T, Mahalingam G, Pyle M, Dam A, Visconti A. Emerg Med J. 2018 Mar;35(3):189-191. doi: 10.1136/emered-2017-206692. Epub 2017 Oct 21.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education (ACGME) is the governing body responsible for accrediting graduate medical training programme in the USA. The Emergency Medicine Milestones (EM-Milestones) were developed by the ACGME and American Board of Emergency Medicine as a guide and monitoring tool for the knowledge, skills, abilities and experiences to be acquired during training. Alumni surveys have been reported as a valuable resource for training programme to identify areas for improvement; however, there are few studies regarding programme improvement in emergency medicine. We aimed to use the EM- Milestones, adapted as an alumni self-assessment survey, to identify areas for training programme improvement.

METHODS:

This study was conducted at an urban, academic affiliated, community hospital in New York city with an emergency medicine training programme consisting of 30 residents over 3 years. Alumni of our emergency medicine training programme were sent an EM-Milestones-based self- assessment survey. Participants evaluated their ability in each EM-Milestones subcompetency on a Likert scale. Data were analysed using descriptive statistics.

RESULTS:

Response rate was 74% (69/93). Alumni reported achieving the target performance in 5/6 general competencies, with Systems-Based Practice falling below the target performance. The survey further identified 6/23 subcompetencies (Pharmacotherapy, Ultrasound, Wound Management, Patient Safety, Systems-Based Management and Technology) falling below the target performance level.

DISCUSSION:

Alumni self-evaluation of competence using the EM-Milestones provides valuable information concerning confidence to practice independently; these data, coupled with regular milestone evaluation of existing trainees, can identify problem areas and provide a blueprint for targeted programme improvement.

Are Surgical Milestone Assessments Predictive of In-Training Examination Scores?

Kimbrough MK, Thrush CR, Barrett E, Bentley FR, Sexton KW. J Surg Educ. 2018 Jan - Feb;75(1):29-32. doi: 10.1016/j.jsurg.2017.06.021. Epub 2017 Jul 5.

OBJECTIVES:

With the recent utilization of Accreditation Council for Graduate Medical Education developmental milestones as part of resident evaluation, we sought to explore whether milestone-based ratings were associated with American Board of Surgery In-Training Examination (ABSITE) scores.

METHODS:

Mid-year milestone ratings were obtained from the Accreditation Council for Graduate Medical Education Accreditation Database System for years 2014, 2015, and 2016 for all postgraduate years 1-5 general surgery residents in our program and paired with ABSITE scores (n = 69) from January of the following year. Linear regression was used to assess predictor importance of milestones on both ABSITE percentage correct scores and ABSITE percentile scores.

RESULTS:

Minimal to small positive correlations were observed between milestones and ABSITE percentile scores ($r = 0.09-0.25$), while moderately large correlations were observed between milestones and percentage correct scores ($r = 0.65-0.76$). The Medical Knowledge 1 (MK1) milestone significantly predicted ABSITE percentage correct scores, and explained 60% of the variance (adjusted $R^2 = 0.603$). MK1 also significantly predicted ABSITE percentile scores, although weaker in magnitude, with MK1 explaining 20% of the variance (adjusted $R^2 = 0.197$). Postgraduate year level and other milestones were not influential predictors of ABSITE scores.

CONCLUSIONS:

The mid-year MK1 milestone rating was predictive of ABSITE scores and may serve as a useful marker for Clinical Competency Committees to identify residents who could benefit from additional support to prepare for the ABSITE, although given the small exploratory nature of this study, additional research is still needed.

Examination to Assess the Clinical Examination and Documentation of Spine Pathology among Orthopedic Residents

Haglin JM, Zeller JL, Egol KA, Phillips DP. Spine J. 2017 Dec;17(12):1830-1836. doi: 10.1016/j.spinee.2017.06.009. Epub 2017 Jun 13.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) guidelines requires residency programs to teach and evaluate residents in six overarching "core competencies" and document progress through educational milestones. To assess the progress of orthopedic interns' skills in performing a history, physical examination, and documentation of the encounter for a standardized patient with spinal stenosis, an objective structured clinical examination (OSCE) was conducted for 13 orthopedic intern residents, following a 1-month boot camp that included communications skills and curriculum in history and physical examination. Interns were objectively scored based on their performance of the physical examination, communication skills, completeness and accuracy of their electronic medical record (EMR), and their diagnostic conclusions gleaned from the patient encounter.

PURPOSE:

The purpose of this study was to meaningfully assess the clinical skills of orthopedic post-graduate year (PGY)-1 interns. The findings can be used to develop a standardized curriculum for documenting patient encounters and highlight common areas of weakness among orthopedic interns with regard to the spine history and physical examination and conducting complete and accurate clinical documentation.

STUDY SETTING:

A major orthopedic specialty hospital and academic medical center.

METHODS:

Thirteen PGY-1 orthopedic residents participated in the OSCE with the same standardized patient presenting with symptoms and radiographs consistent with spinal stenosis. Videos of the encounters were independently viewed and objectively evaluated by one investigator in the study. This evaluation focused on the completeness of the history and the performance and completion of the physical examination. The standardized patient evaluated the communication skills of each intern with a separate objective evaluation. Interns completed these same scoring guides to evaluate their own performance in history, physical examination, and communications skills. The interns' documentation in the EMR was then scored for completeness, internal consistency, and inaccuracies.

RESULTS:

The independent review revealed objective deficits in both the orthopedic interns' history and the physical examination, as well as highlighted trends of inaccurate and incomplete documentation in the corresponding medical record. Communication skills with the patient did not meet expectations. Further, interns tended to overscore themselves, especially with regard to their performance on the physical examination ($p < .0005$). Inconsistencies, omissions, and inaccuracies were common in the corresponding medical notes when compared with the events of the patient encounter. Nine of the 13 interns (69.2%) documented at least one finding that was not assessed or tested in the clinical encounter, and four of the 13 interns (30.8%) included inaccuracies in the medical record, which contradicted the information collected at the time of the encounter.

CONCLUSIONS:

The results of this study highlighted significant shortcomings in the completeness of the interns' spine history and physical examination, and the accuracy and completeness of their EMR note. The study

provides a valuable exercise for evaluating residents in a multifaceted, multi-milestone manner that more accurately documents residents' clinical strengths and weaknesses. The study demonstrates that orthopedic residents require further instruction on the complexities of the spinal examination. It validates a need for increased systemic support for improving resident documentation through comprehensive education and evaluation modules.

Forensic Psychiatry Milestones: Experience after 1 Year

Stolar A, Candilis PJ, Frierson RL, Edgar L. Acad Psychiatry. 2017 Dec;41(6):789-792. doi: 10.1007/s40596-017-0739-8. Epub 2017 Jul 6.

OBJECTIVE:

In 1999, the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties identified six core competencies for medical practice. In 2013, the milestones were introduced to demonstrate these educational outcomes across each specialty. This study represents the first examination of the sub-specialty Forensic Psychiatry Milestones.

METHODS:

Members of the Association of Directors of Forensic Psychiatry Fellowships were surveyed. Areas of inquiry included whether milestones assisted in identifying areas of deficiency in fellows or programs, whether the graduation milestones matched the goals of training, and what changes were planned, or had been made, based on their implementation.

RESULTS:

Twenty-six of 35 programs responded, for a response rate of 74%. The majority found the milestones somewhat or very useful, half found the graduation-level milestones matched the program's graduation goals, and a significant majority reported that the milestones assisted in identifying improvements, change, or intended change. In choosing terms to describe the milestones, however respondents chose a variety of negative or neutral terms, rather than positive ones.

CONCLUSIONS:

The milestones provided a standard mechanism for identifying areas for improvement and a common language to standardize practice. However, due to the variability across fellowship programs and the limitations of educational resources and time, implementation of the new ACGME requirement was characterized in largely negative terms. Recommendations for improvement included modification of the milestones themselves, flexibility in their implementation, and evidentiary support for their use.

Impact of an Event Reporting System on Resident Complication Reporting in Plastic Surgery Training: Addressing an ACGME and Plastic Surgery Milestone Project Core Competency

Parikh RP, Snyder-Warwick A, Naidoo S, Skolnick GB, Patel KB. *Plast Reconstr Surg.* 2017 Nov; 140(5):736e-745e. doi: 10.1097/PRS.0000000000003771.

BACKGROUND:

The Accreditation Council for Graduate Medical Education and Plastic Surgery Milestone Project has identified practice-based learning and improvement, which involves systematically analyzing current practices and implementing changes, as a core competency in residency education. In surgical care, complication reporting is an essential component of practice-based learning and improvement as complications are analyzed in morbidity and mortality conference for quality improvement. Unfortunately, current methods for capturing a comprehensive profile of complications may significantly underestimate the true occurrence of complications. Therefore, the objectives of this study are to evaluate an intervention for complication reporting and compare this to current practice, in a plastic surgery training program.

METHODS:

This is a pre-intervention and post-intervention study evaluating resident reporting of complications on a plastic surgery service. The intervention was an online event reporting system developed by department leadership and patient safety experts. The cohorts consisted of all patients undergoing surgery during two separate 3-month blocks bridged by an implementation period. A trained reviewer recorded complications, and this served as the reference standard. Fisher's exact test was used for binary comparisons.

RESULTS:

There were 32 complications detected in 219 patients from June to August of 2015 and 35 complications in 202 patients from October to December of 2015. The proportion of complications reported in the pre-intervention group was nine of 32 (28.1 percent). After the intervention, this significantly increased to 32 of 35 (91.4 percent) ($p < 0.001$).

CONCLUSION:

An intervention using an event reporting system, supported by departmental leadership, led to significant improvements in complication reporting by plastic surgery residents.

Program Director Perceptions of the General Surgery Milestones Project

Drolet BC, Marwaha JS, Wasey A, Pallant A. J Surg Educ. 2017 Mar 23. pii: S1931-7204(16)30373-7. doi: 10.1016/j.jsurg.2017.02.012.

OBJECTIVE:

As a result of the Milestones Project, all Accreditation Council for Graduate Medical Education accredited training programs now use an evaluation framework based on outcomes in 6 core competencies. Despite their widespread use, the Milestones have not been broadly evaluated. This study sought to examine program director (PD) perceptions of the Milestones Project.

DESIGN, SETTING, AND PARTICIPANTS:

A national survey of general surgery PDs distributed between January and March of 2016.

RESULTS:

A total of 132 surgical PDs responded to the survey (60% response rate). Positive perceptions included value for education (55%) and evaluation of resident performance (58%), as well as ability of Milestones to provide unbiased feedback (55%) and to identify areas of resident deficiency (58%). Meanwhile, time input and the ability of Milestones to discriminate underperforming programs were less likely to be rated positively (25% and 21%, respectively). Half of PDs felt that the Milestones were an improvement over their previous evaluation system (55%).

CONCLUSIONS:

Using the Milestones as competency-based, developmental outcomes measures, surgical PDs reported perceived benefits for education and objectivity in the evaluation of resident performance. The overall response to the Milestones was generally favorable, and most PDs would not return to their previous evaluation systems. To improve future iterations of the Milestones, many PDs expressed a desire for customization of the Milestones' content and structure to allow for programmatic differences.

Building a Framework of Entrustable Professional Activities, Supported by Competencies and Milestones, to Bridge the Educational Continuum

Carraccio C, Englander R, Gilhooly J, Mink R, Hofkosh D, Barone MA, Holmboe ES. *Acad Med.* 2017 Mar;92(3):324-330. doi: 10.1097/ACM.0000000000001141.

ABSTRACT:

The transition to competency-based medical education (CBME) and adoption of the foundational domains of competence by the Accreditation Council for Graduate Medical Education, Association of American Medical Colleges (AAMC), and American Board of Medical Specialties' certification and maintenance of certification (MOC) programs provided an unprecedented opportunity for the pediatrics community to create a model of learning and assessment across the continuum. Two frameworks for assessment in CBME have been promoted: (1) entrustable professional activities (EPAs) and (2) milestones that define a developmental trajectory for individual competencies. EPAs are observable and measurable units of work that can be mapped to competencies and milestones critical to performing them safely and effectively. The pediatrics community integrated the two frameworks to create a potential pathway of learning and assessment across the continuum from undergraduate medical education (UME) to graduate medical education (GME) and from GME to practice. The authors briefly describe the evolution of the Pediatrics Milestone Project and the process for identifying EPAs for the specialty and subspecialties of pediatrics. The method of integrating EPAs with competencies and milestones through a mapping process is discussed, and an example is provided. The authors illustrate the alignment of the AAMC's Core EPAs for Entering Residency with the general pediatrics EPAs and, in turn, the alignment of the latter with the subspecialty EPAs, thus helping build the bridge between UME and GME. The authors propose how assessment in GME, based on EPAs and milestones, can guide MOC to complete the bridge across the education continuum.

Initial Comparison of Resident and Attending Milestones Evaluations in Plastic Surgery.

Yao A, Massenburg BB, Silver L, Taub PJ. J Surg Educ. 2017 Mar 2. pii: S1931-7204(17)30068-5. doi: 10.1016/j.jsurg.2017.02.001.

BACKGROUND:

Graduate medical education has recently undergone a major archetypal shift toward competency-based evaluations of residents' performance. The implementation of the Milestones program by the Accreditation Council for Graduate Medical Education (ACGME) is a core component of the shift, designed to ensure uniformity in measuring residency knowledge using a series of specialty-specific achievements. This study evaluates the correlation between residents' self-evaluations and program directors' assessments of their performance.

METHODS:

The study population comprised 12 plastic surgery residents, ranging from postgraduate year 1 to postgraduate year 6, enrolled in an integrated residency program at a single institution.

RESULTS:

Overall, average attending scores were lower than average resident scores at all levels except postgraduate year 6. Correlation between resident and attending evaluations ranged from 0.417 to 0.957, with the correlation of average scores of Patient Care (0.854) and Medical Knowledge (0.816) Milestones significantly higher than those of professional skillsets (0.581). "Patient care, facial esthetics" was the Milestone with the lowest average scores from both groups. Residents scored themselves notably higher than their attendings' evaluations in Practice-based Learning and Improvement categories (+0.958) and notably lower in Medical Knowledge categories such as "Cosmetic Surgery, Trunk and Lower Extremities" (-0.375) and "Non-trauma hand" (-0.208). The total possible number of participants in this study was 12. The actual number of participants was 12 (100%).

CONCLUSIONS:

The remarkable range of correlations suggests that expectations for performance standards may vary widely between residents and program directors. Understanding gaps between expectations and performance is vital to inform current and future residents as the restructuring of the accreditation process continues.

New Roadmap for the Journey from Internist to Rheumatologist

Criscione-Schreiber LG, Brown CR, O'Rourke KS, et al. *Arthritis Care & Research*. 2017; 69(6):769-775. doi:10.1002/acr.23151.

OBJECTIVE:

Measurement is necessary to gauge improvement. US training programs have not previously used shared standards to assess trainees' mastery of the knowledge, skills, and attitudes necessary to practice rheumatology competently. In 2014, the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System began requiring semiannual evaluation of all medicine subspecialty fellows on 23 internal medicine subspecialty reporting milestones. Since these reporting milestones are not subspecialty specific, rheumatology curricular milestones were needed to guide rheumatology fellowship training programs and fellows on the training journey from internist to rheumatologist.

METHODS:

Rheumatology curricular milestones were collaboratively composed by expanding the internal medicine reporting milestones to delineate the specific targets of rheumatology fellowship training within 6 ACGME core competencies. The 2006 American College of Rheumatology core curriculum for rheumatology training programs was updated.

RESULTS:

A total of 80 rheumatology curricular milestones were created, defining progressive learning through training; most focus on patient care and medical knowledge. The core curriculum update incorporates the new curricular milestones and rheumatology entrustable professional activities.

CONCLUSION:

Rheumatology curricular milestones are now available for implementation by rheumatology fellowship training programs, providing a clear roadmap for specific training goals and a guide to track each fellow's achievement over a 2-year training period. The comprehensive core curriculum delineates the essential breadth of knowledge, skills, and attitudes that define rheumatology, and provides a guide for educational activities during fellowship training. These guiding documents are now used to train and assess fellows as they prepare for independent rheumatology practice as the next generation of rheumatologists.

ASDS Cosmetic Dermatologic Surgery Fellowship Milestones

Waldman A, Arndt KA, Avram MM, Brown MR, Dover JS, Fabi SG, Friedmann DP, Geronemus RG, Goldberg DJ, Goldman MP, Green JB, Ibrahimi OA, Jones DH, Kilmer SL, McDaniel DH, Obagi S, Ortiz AE, Rohrer TE, Taylor MB, Torres A, Weinkle SH, Weiss MA, Weiss ET, Weiss RA, Poon E, Alam M. *Dermatol Surg*. 2016 Oct;42(10):1164-73. doi: 10.1097/DSS.0000000000000860.

BACKGROUND:

The American Council of Graduate Medical Education, which oversees much of postgraduate medical education in the United States, has championed the concept of "milestones," standard levels of achievement keyed to particular time points, to assess trainee performance during residency.

OBJECTIVE:

To develop a milestones document for the American Society for Dermatologic Surgery (ASDS) Cosmetic Dermatologic Surgery (CDS) fellowship program.

METHODS:

An ad hoc milestone drafting committee was convened that included members of the ASDS Accreditation Work Group and program directors of ASDS-approved Cosmetic Dermatologic Surgery (CDC) fellowship training programs. Draft milestones were circulated through email in multiple rounds until consensus was achieved.

RESULTS:

Thirteen milestones were developed in the 6 Accreditation Council for Graduate Medical Education (ACGME) competency areas, with 8 of these being patient-care milestones. Additional instructions for milestone administration more specific to the CDS fellowship than general ACGME instructions were also approved. Implementation of semiannual milestones was scheduled for the fellowship class entering in July 2018.

CONCLUSION:

Milestones are now available for CDS fellowship directors to implement in combination with other tools for fellow evaluation.

The Road Ahead in Education: Milestones for Geriatric Psychiatry Subspecialty Training

Swantek SS, Maixner SM, Llorente MD, Cheong JA, Edgar L, Thomas CR, Ahmed I. *Am J Geriatr Psychiatry*. 2016 Sep;24(9):675-89. doi: 10.1016/j.jagp.2016.03.011. Epub 2016 Apr 6.

OBJECTIVE:

The Accreditation Council of Graduate Medical Education (ACGME) Milestone Project is the next step in a series of changes revamping the system of graduate medical education. In 2013 the ACGME completed the general psychiatry milestones. The ACGME then pursued creation of milestones for accredited psychiatric subspecialty fellowships. This article documents the work of the geriatric psychiatry subspecialty milestones work group. It reports the history and rationale supporting the milestones, the milestone development process, and the implications for geriatric psychiatry fellowship training.

METHODS:

In consultation with the American Association for Geriatric Psychiatry, the American Board of Psychiatry and Neurology, and the ACGME Psychiatry Residency Review Committee, the ACGME appointed a working group to create the geriatric psychiatry milestones using the general psychiatry milestones as a guide.

CONCLUSION:

The geriatric psychiatry milestones are the result of an iterative process resulting in the definition of the characteristics vital to a fellowship-trained geriatric psychiatrist. It is premature to assess their effect on psychiatric training. The true impact of the milestones will be determined as each training director uses the milestones to re-evaluate their program curriculum and the educational and clinical learning environment. The ACGME is currently collecting the information about the milestone performance of residents and fellows to further refine and determine how the milestones can best be used to assist programs in improving training.

Defining, Achieving, and Maintaining Competence in Cardiovascular Training and Practice

Kuvin JT, Williams ES. J Am Coll Cardiol. 2016 Sep 20;68(12):1342-7. doi: 10.1016/j.jacc.2016.05.097.

ABSTRACT:

Patients, hospitals, insurers, and the public rely on competent physicians. The definition and documentation of competency in cardiovascular training and practice continues to evolve. New tools, such as the American College of Cardiology's in-training examination, restructured Core Cardiovascular Training Statement, curricular and lifelong learning competencies, and the Accreditation Council for Graduate Medical Education Milestones help define competent trainees and practitioners, and level the playing field. The American Board of Internal Medicine's Maintenance of Certification program is undergoing critical review, and a common vision of its future form and role are not yet clear. This paper explores present-day cardiovascular competency components, assessment tools, and strategies, and identifies challenges for the future.

What Is a Rheumatologist and How Do We Make One?

Brown CR Jr, Criscione-Schreiber L, O'Rourke KS, Fuchs HA, Putterman C, Tan IJ, Valeriano- Marcet J, Hsieh E, Zirkle S, Bolster MB. *Arthritis Care Res (Hoboken)*. 2016 Aug;68(8):1166-72. doi: 10.1002/acr.22817.

OBJECTIVE:

Graduate medical education is a critical time in the training of a rheumatologist, and purposeful evaluation of abilities during this time is essential for long-term success as an independent practitioner. The internal medicine subspecialties collectively developed a uniform set of reporting milestones by which trainees can be assessed and receive formative feedback, providing clarity of accomplishment as well as areas for improvement in training. Furthermore, the reporting milestones provide a schema for assessment and evaluation of fellows by supervisors. The internal medicine subspecialties were also tasked with considering entrustable professional activities (EPAs), which define the abilities of a subspecialty physician who has attained sufficient mastery of the field to be accountable to stakeholders and participate in independent practice. Although EPAs have been established for a few specialties, they had not yet been described for rheumatology. EPAs have value as descriptors of the comprehensive abilities, knowledge, and skills of a practicing rheumatologist. The rheumatology EPAs have a role in defining a specialist in rheumatology upon completion of training, and also represent the ways our specialty defines our abilities that are enduring throughout practice.

METHODS:

We describe the collaborative process of the development of both the subspecialty reporting milestones and the rheumatology EPAs. The reporting milestones evolved through discussions and collaborations among representatives from the Association of Specialty Professors, the Alliance for Academic Internal Medicine, the American Board of Internal Medicine, and the Accreditation Council for Graduate Medical Education. The EPAs were a product of deliberations by the Next Accreditation System (NAS) working group of the American College of Rheumatology (ACR) Committee on Rheumatology Training and Workforce Issues.

RESULTS:

Twenty-three subspecialty reporting milestones and 14 rheumatology EPAs were advanced and refined over the course of 3 subspecialty reporting milestone development summits and 3 ACR NAS working group meetings, respectively.

CONCLUSION:

The subspecialty reporting milestones and rheumatology EPAs presented here stipulate reasonable and measurable expectations for rheumatologists-in-training. Together, these tools aim to promote enrichment and greater accountability in the training of fellows. Additionally, the EPAs define, for all stakeholders, the expertise of a rheumatologist in practice.

"What Program Directors Think" III: Results of the 2014/2015 Annual Surveys of the Association of Program Directors in Radiology (APDR)

Rozenstein A, Heitkamp DE, Muhammed TL, Sclamborg JS, Paladin AM, Smith SE, Nguyen JB, Robbin M. Acad Radiol. 2016 Jul;23(7):861-9. doi: 10.1016/j.acra.2016.03.005. Epub 2016 Jun 8.

RATIONALE AND OBJECTIVES:

The Association of Program Directors in Radiology regularly surveys its members regarding issues of importance to support radiology residency programs and their directors.

MATERIALS AND METHODS:

This is an observational cross-sectional study using two Web-based surveys posed to the Association of Program Directors in Radiology membership in the fall of 2014 (49 items) and the spring of 2015 (46 items) on the subjects of importance to the members, including the Accreditation Council on Graduate Medical Education Milestones, the Non-Interpretative Skills Curriculum, the American Board of Radiology Core Examination, the effect of the new resident testing and program accreditation paradigms on training outcomes, the 2015 Residency Match, the Interventional Radiology/Diagnostic Radiology (IR/DR) Residency, and Program Director (PD)/Program Coordinator resources.

RESULTS:

Responses were collected electronically, results were tallied using Survey Monkey software, and qualitative responses were tabulated or summarized as comments. Findings were reported during the 63rd annual meeting of the Association of University Radiologists. The maximal response rate was 33% in the fall of 2014 and 36% in the spring of 2015.

CONCLUSIONS:

PDs believed that the radiology Milestones, now largely implemented, did not affect overall resident evaluation, was not reflective of resident experience, and actually made evaluation of residents more difficult. PDs also felt that although the American Board of Radiology oral examination had been a better test for clinical practice preparedness, their new residents knew at least as much as before. There was little evidence of recall reemergence. The radiology training community saw a drop in residency applicant quality as demonstrated by the United States Medical Licensing Examination scores and clinical rotation grades. Because the new IR/DR Residency positions were to be funded at the expense of the traditional DR positions, the majority of PDs expected a negative effect of the impending IR/DR match on their DR recruitment. PDs were in favor of a unified clinical radiology curriculum similar to the Radiological Society of North America online physics modules.

Teaching the Healthcare Economics Milestones to Radiology Residents: Our Pilot Curriculum Experience

Prober AS, Mehan WA Jr, Bedi HS. Acad Radiol. 2016 Jul;23(7):885-8. doi: 10.1016/j.acra.2016.02.014. Epub 2016 Apr 1.

RATIONALE AND OBJECTIVES:

Since July 2013, the Accreditation Council for Graduate Medical Education (ACGME) has required radiology residency programs to implement a set of educational milestones to track residents' educational advancement in six core competencies, including Systems-based Practice. The healthcare economics subcompetency of Systems-based Practice has traditionally been relatively neglected, and given the new increased ACGME oversight, will specifically require greater focused attention.

MATERIALS AND METHODS:

A multi-institutional health-care economics pilot curriculum combining didactic and practical components was implemented across five residency programs. The didactic portion included a package of online recorded presentations, reading, and testing materials developed by the American College of Radiology (ACR's) Radiology Leadership Institute. The practical component involved a series of local meetings led by program faculty with the production of a deliverable based on research of local reimbursement for a noncontrast head computed tomography. The capstone entailed the presentation of each program's deliverable during a live teleconference webcast with a Radiology Leadership Institute content expert acting as moderator and discussion leader.

RESULTS:

The pilot curriculum was well received by residents and faculty moderators, with 100% of survey respondents agreeing that the pilot met its objective of introducing how reimbursement works in American radiology in 2015 and how business terminology applies to their particular institutions.

CONCLUSION:

A health-care economics curriculum in the style of a Massive Open Online Course has strong potential to serve as many residency programs' method of choice in meeting the health-care economics milestones.

Pathology Informatics Essentials for Residents: A Flexible Informatics Curriculum Linked to Accreditation Council for Graduate Medical Education Milestones (a secondary publication).

Henricks WH, Karcher DS, Harrison JH Jr, Sinard JH, Riben MW, Boyer PJ, Plath S, Thompson A, Pantanowitz L. Acad Pathol. 2016 Jul 11;3:2374289516659051. doi: 10.1177/2374289516659051. eCollection 2016 Jan-Dec.

BACKGROUND:

Recognition of the importance of informatics to the practice of pathology has surged. Training residents in pathology informatics has been a daunting task for most residency programs in the United States because faculty often lacks experience and training resources. Nevertheless, developing resident competence in informatics is essential for the future of pathology as a specialty.

OBJECTIVE:

To develop and deliver a pathology informatics curriculum and instructional framework that guides pathology residency programs in training residents in critical pathology informatics knowledge and skills, and meets Accreditation Council for Graduate Medical Education Informatics Milestones.

DESIGN:

The College of American Pathologists, Association of Pathology Chairs, and Association for Pathology Informatics formed a partnership and expert work group to identify critical pathology informatics training outcomes and to create a highly adaptable curriculum and instructional approach, supported by a multiyear change management strategy.

RESULTS:

Pathology Informatics Essentials for Residents (PIER) is a rigorous approach for educating all pathology residents in important pathology informatics knowledge and skills. PIER includes an instructional resource guide and toolkit for incorporating informatics training into residency programs that vary in needs, size, settings, and resources. PIER is available at <http://www.apcprods.org/PIER> (accessed April 6, 2016).

CONCLUSIONS:

PIER is an important contribution to informatics training in pathology residency programs. PIER introduces pathology trainees to broadly useful informatics concepts and tools that are relevant to practice. PIER provides residency program directors with a means to implement a standardized informatics training curriculum, to adapt the approach to local program needs, and to evaluate resident performance and progress over time.

The Problem Resident Behavior Guide: Strategies for Remediation

Williamson K, Quattromani E, Aldeen A. Intern Emerg Med. 2016 Apr;11(3):437-49. doi: 10.1007/s11739-015-1367-5. Epub 2015 Dec 14.

ABSTRACT:

In 2012, the ACGME supplemented the core competencies with outcomes-based milestones for resident performance within the six competency domains. These milestones address the knowledge, skills, abilities, attitudes, and experiences that a resident is expected to progress through during the course of training. Even prior to the initiation of the milestones, there was a paucity of EM literature addressing the remediation of problem resident behaviors and there remain few readily accessible tools to aid in the implementation of a remediation plan. The goal of the "Problem Resident Behavior Guide" is to provide specific strategies for resident remediation based on deficiencies identified within the framework of the EM milestones. The "Problem Resident Behavior Guide" is a written instructional manual that provides concrete examples of remediation strategies to address specific milestone deficiencies. The more than 200 strategies stem from the experiences of the authors who have professional experience at three different academic hospitals and emergency medicine residency programs, supplemented by recommendations from educational leaders as well as utilization of valuable education adjuncts, such as focused simulation exercises, lecture preparation, and themed ED shifts. Most recommendations require active participation by the resident with guidance by faculty to achieve the remediation expectations. The ACGME outcomes-based milestones aid in the identification of deficiencies with regards to resident performance without providing recommendations on remediation. The Problem Resident Behavior Guide can therefore have a significant impact by filling in this gap.

Implementation of Competency-Based Medical Education: Are We Addressing the Concerns and Challenges?

Hawkins RE, Welcher CM, Holmboe ES, Kirk LM, Norcini JJ, Simons KB, Skochelak SE. *Med Educ.* 2015 Nov;49(11):1086-102. doi: 10.1111/medu.12831.

CONTEXT:

Competency-based medical education (CBME) has emerged as a core strategy to educate and assess the next generation of physicians. Advantages of CBME include: a focus on outcomes and learner achievement; requirements for multifaceted assessment that embraces formative and summative approaches; support of a flexible, time-independent trajectory through the curriculum; and increased accountability to stakeholders with a shared set of expectations and a common language for education, assessment and regulation.

OBJECTIVES:

Despite the advantages of CBME, numerous concerns and challenges to the implementation of CBME frameworks have been described, including: increased administrative requirements; the need for faculty development; the lack of models for flexible curricula, and inconsistencies in terms and definitions. Additionally, there are concerns about reductionist approaches to assessment in CBME, lack of good assessments for some competencies, and whether CBME frameworks include domains of current importance. This study will outline these issues and discuss the responses of the medical education community.

METHODS:

The concerns and challenges expressed are primarily categorised as: (i) those related to practical, administrative and logistical challenges in implementing CBME frameworks, and (ii) those with more conceptual or theoretical bases. The responses of the education community to these issues are then summarised.

CONCLUSIONS:

The education community has begun to address the challenges involved in implementing CBME. Models and guidance exist to inform implementation strategies across the continuum of education, and focus on the more efficient use of resources and technology, and the use of milestones and entrustable professional activities-based frameworks. Inconsistencies in CBME definitions and frameworks remain a significant obstacle. Evolution in assessment approaches from in vitro task-based methods to in vivo integrated approaches is responsive to many of the theoretical and conceptual concerns about CBME, but much work remains to be done to bring rigour and quality to work-based assessment.

Interprofessional Collaboration Milestones: Advocating for Common Assessment Criteria in Graduate Medical Education

Wingo MT, Havyer RD, Comfere NI, Nelson DR, Reed DA. BMC Med Educ. 2015 Sep 14;15:149. doi: 10.1186/s12909-015-0432-0.

BACKGROUND:

Milestone-based assessments of resident physicians inform critical decisions regarding resident competence and advancement. Thus, it is essential that milestone evaluations are based upon strong validity evidence and that consistent evaluation criteria are used across residency programs. A common approach to assessment of interprofessional collaboration milestones is particularly important since standardized measures of individual resident competence in interprofessional collaboration have not been established.

DISCUSSION:

We propose that assessments of interprofessional collaboration in graduate medical education meet common criteria, namely, these assessments should: 1) measure competency of an individual resident, 2) occur in the context of an interprofessional team, 3) be ascertained via direct observation of the resident, 4) be performed in a real-world clinical practice setting (such as a hospital ward, outpatient clinic, or operating room). We present the evidence-based rationale for these criteria and cite examples of published assessment instruments that fulfill one or more of the criteria, however further research is needed to ensure fidelity of assessments. The proposed criteria may assist residency educators as they endeavor to provide robust and consistent assessments of interprofessional collaboration milestones.

Achieving the Desired Transformation: Thoughts on Next Steps for Outcomes-Based Medical Education

Holmboe ES, Batalden P. *Acad Med.* 2015 Sep;90(9):1215-23. doi:10.1097/ACM.0000000000000779.

ABSTRACT:

Since the introduction of the outcomes-based medical education (OBME) movement, progress toward implementation has been active but challenging. Much of the angst and criticism has been directed at the approaches to assessment that are associated with outcomes-based or competency frameworks, particularly defining the outcomes. In addition, these changes to graduate medical education (GME) are concomitant with major change in health care systems—specifically, changes to increase quality and safety while reducing cost. Every sector, from medical education to health care delivery and financing, is in the midst of substantial change and disruption. The recent release of the Institute of Medicine's report on the financing and governance of GME highlights the urgent need to accelerate the transformation of medical education. One source of continued tension within the medical education community arises from the assumption that the much-needed increases in value and improvement in health care can be achieved by holding the current educational structures and architecture of learning in place while concomitantly withdrawing resources. The authors of this Perspective seek to reframe the important and necessary debate surrounding the current challenges to implementing OBME. Building on recent change and service theories (e.g., Theory U and coproduction), they propose several areas of redirection, including reexamination of curricular models and greater involvement of learners, teachers, and regulators in cocreating new training models, to help facilitate the desired transformation in medical education.

Reflections on the First 2 Years of Milestone Implementation

Holmboe ES, Yamazaki K, Edgar L, Conforti L, Yaghmour N, Miller RS, Hamstra SJ. J Grad Med Educ. 2015;7(3):506-11. doi: 10.4300/JGME-07-03-43.

-No Abstract Available.

Developing a Comprehensive Resident Education Evaluation System in the Era of Milestone Assessment

Gardner AK, Scott DJ, Choti MA, Mansour JC. J Surg Educ. 2015 Jul-Aug;72(4):618-24. doi: 10.1016/j.jsurg.2014.12.007. Epub 2015 Jan 23.

OBJECTIVES:

In an effort to move training programs toward competency-based education, the Accreditation Council for Graduate Medical Education (ACGME) introduced the Next Accreditation System (NAS), which organizes specific milestones regarding resident skills, knowledge, and abilities along a continuum. In order to foster innovation and creativity, the ACGME has provided programs with minimal guidelines regarding the optimal way to approach these milestones.

METHODS:

The education team at UT Southwestern embraced the milestones and developed a process in which performance assessment methods were critically evaluated, mapped onto an extrapolated performance list corresponding to the areas required by the ACGME milestones, and filled gaps in the previous system by modifying evaluation tools and creating new program components.

RESULTS:

Although the authors are early in the evolution of applying the new milestones system, this approach has thus far allowed them to comprehensively evaluate the residents and the program in an efficient and effective fashion, with notable improvements compared to the prior approach.

CONCLUSIONS:

The authors hope that these experiences can inform others embarking upon similar journeys with the milestones.

The New Accreditation Council for Graduate Medical Education Next Accreditation System Milestones Evaluation System: What Is Expected and How Are Plastic Surgery Residency Programs Preparing?

Sillah NM, Ibrahim AM, Lau FH, Shah J, Medin C, Lee BT, Lin SJ. *Plast Reconstr Surg.* 2015 Jul;136(1): 181-7. doi: 10.1097/PRS.0000000000001368.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Next Accreditation System milestones were implemented for plastic surgery programs in July of 2014. Forward progress through the milestones is an indicator of trainee-appropriate development, whereas regression or stalling may indicate the need for concentrated, targeted training.

METHODS:

Online software at www.surveymonkey.com was used to create a survey about the program's approaches to milestones and was distributed to program directors and administrators of 96 Accreditation Council for Graduate Medical Education-approved plastic surgery programs.

RESULTS:

The authors had a 63.5 percent response rate (61 of 96 plastic surgery programs). Most programs report some level of readiness, only 22 percent feel completely prepared for the Next Accreditation System milestones, and only 23 percent are completely satisfied with their planned approach for compliance. Seventy-five percent of programs claim to be using some form of electronic tracking system. Programs plan to use multiple tools to capture and report milestone data. Most programs (44.4 percent) plan to administer evaluations at the end of each rotation. Over 70 percent of respondents believe that the milestones approach would improve the quality of resident training. However, programs were less than confident that their current compliance systems would live up to their full potential.

CONCLUSIONS:

The Next Accreditation System has been implemented nationwide for plastic surgery training programs. Milestone-based resident training is a new paradigm for residency training evaluation; programs are in the process of making this transition to find ways to make milestone data meaningful for faculty and residents.

Implementation of Nephrology Subspecialty Curricular Milestones

Yuan CM, Prince LK, Oliver JD 3rd, Abbott KC, Nee R. Am J Kidney Dis. 2015 Jul;66(1):15-22. doi: 10.1053/j.ajkd.2015.01.020. Epub 2015 Mar 12.

ABSTRACT:

Beginning in the 2014-2015 training year, the US Accreditation Council for Graduate Medical Education (ACGME) required that nephrology Clinical Competency Committees assess fellows' progress toward 23 subcompetency "context nonspecific" internal medicine subspecialty milestones. Fellows' advancement toward the "ready for unsupervised practice" target milestone now is tracked in each of the 6 competencies: Patient Care, Medical Knowledge, Professionalism, Interpersonal Communication Skills, Practice-Based Learning and Improvement, and Systems-Based Practice. Nephrology program directors and subspecialty societies must define nephrology-specific "curricular milestones," mapped to the nonspecific ACGME milestones. Although the ACGME goal is to produce data that can discriminate between successful and underperforming training programs, the approach is at risk to produce biased, inaccurate, and unhelpful information. We map the ACGME internal medicine subspecialty milestones to our previously published nephrology-specific milestone schema and describe entrustable professional activities and other objective assessment tools that inform milestone decisions. Mapping our schema onto the ACGME subspecialty milestone reporting form allows comparison with the ACGME subspecialty milestones and the curricular milestones developed by the American Society of Nephrology Program Directors. Clinical Competency Committees may easily adapt and directly translate milestone decisions reached using our schema onto the ACGME internal medicine subspecialty competency milestone-reporting format.

Initial Validity Analysis of the Emergency Medicine Milestones

Beeson MS, Holmboe ES, Korte RC, Nasca TJ, Brigham T, Russ CM, Whitley CT, Reisdorff EJ. Acad Emerg Med. 2015 Jul;22(7):838-44. doi: 10.1111/acem.12697. Epub 2015 Jun 25.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) Milestones describe behavioral markers for the progressive acquisition of competencies during residency. As a key component of the Next Accreditation System, all residents are evaluated for the acquisition of specialty-specific Milestones. The objective was to determine the validity and reliability of the emergency medicine (EM) Milestones.

METHODS:

The ACGME and the American Board of Emergency Medicine performed this single-event observational study. The data included the initial EM Milestones performance ratings of all categorical EM residents submitted to the ACGME from October 31, 2013, to January 6, 2014. Mean performance ratings were determined for all 23 subcompetencies for every year of residency training. The internal consistency (reliability) of the Milestones was determined using a standardized Cronbach's alpha coefficient.

Exploratory factor analysis was conducted to determine how the subcompetencies were interrelated.

RESULTS:

EM Milestone performance ratings were obtained on 100% of EM residents (n = 5,805) from 162 residency programs. The mean performance ratings of the aggregate and individual subcompetency scores showed discrimination between residency years, and the factor structure further supported the validity of the EM Milestones. The reliability was $\alpha = 0.96$ within each year of training.

CONCLUSIONS:

The EM Milestones demonstrated validity and reliability as an assessment instrument for competency acquisition. EM residents can be assured that this evaluation process has demonstrated validity and reliability; faculty can be confident that the Milestones are psychometrically sound; and stakeholders can know that the Milestones are a nationally standardized, objective measure of specialty-specific competency acquisition.

Internal Medicine Residents' Perspectives on Receiving Feedback in Milestone Format

Angus S, Moriarty J, Nardino RJ, Chmielewski A, Rosenblum MJ. J Grad Med Educ. 2015 Jun;7(2):220-4. doi: 10.4300/JGME-D-14-00446.1.

BACKGROUND:

In contrast to historical feedback, which was vague or provided residents' numerical scores without clear meaning, milestone-based feedback is focused on specific knowledge, skills, and behaviors that define developmental trajectory. It was anticipated that residents would welcome the more specific and actionable feedback provided by the milestone framework, but this has not been studied.

OBJECTIVE:

We assessed internal medicine (IM) residents' perceptions of receiving feedback in the milestone framework, particularly assessing perception of the utility of milestone-based feedback compared to non-milestone-based feedback.

METHODS:

We surveyed a total of 510 IM residents from 7 institutions. Survey questions assessed resident perception of milestone feedback in identifying strengths, weaknesses, and trajectory of professional development. Postgraduate years 2 and 3 (PGY-2 and PGY-3) residents were asked to compare milestones with prior methods of feedback.

RESULTS:

Of 510 residents, 356 (69.8%) responded. Slightly less than half of the residents found milestone-based feedback "extremely useful" or "very useful" in identifying strengths (44%), weaknesses (43%), specific areas for improvement (45%), and appropriate education progress (48%). Few residents found such feedback "not very useful" or "not at all useful" in these domains. A total of 51% of PGY-2 and PGY-3 residents agreed that receiving milestone-based feedback was more helpful than previous forms of feedback.

CONCLUSIONS:

IM residents are aware of the concepts of milestones, and half of the residents surveyed found milestone feedback more helpful than previous forms of feedback. More work needs to be done to understand how milestone-based feedback could be delivered more effectively to enhance resident development.

Realizing the Promise of Competency-Based Medical Education

Holmboe ES. Acad Med. 2015 Apr;90(4):411-3. doi: 10.1097/ACM.0000000000000515.

ABSTRACT

Competency-based medical education (CBME) places a premium on both educational and clinical outcomes. The Milestones component of the Next Accreditation System represents a fundamental change in medical education in the United States and is part of the drive to realize the full promise of CBME. The Milestones framework provides a descriptive blueprint in each specialty to guide curriculum development and assessment practices. From the beginning of the Outcomes project in 1999, the Accreditation Council for Graduate Medical Education and the larger medical education community recognized the importance of improving their approach to assessment. Work-based assessments, which rely heavily on the observations and judgments of clinical faculty, are central to a competency-based approach. The direct observation of learners and the provision of robust feedback have always been recognized as critical components of medical education, but CBME systems further elevate their importance. Without effective and frequent direct observation, coaching, and feedback, the full potential of CBME and the Milestones cannot be achieved.

Furthermore, simply using the Milestones as end-of-rotation evaluations to "check the box" to meet requirements undermines the intent of an outcomes-based accreditation system. In this Commentary, the author explores these challenges, addressing the concerns raised by Williams and colleagues in their Commentary. Meeting the assessment challenges of the Milestones will require a renewed commitment from institutions to meet the profession's "special obligations" to patients and learners. All stakeholders in graduate medical education must commit to a professional system of self-regulation to prepare highly competent physicians to fulfill this social contract.

The New Milestones: Do We Need to Take a Step Back to Go a Mile Forward?

Dewan M, Manring J, Satish U. Acad Psychiatry. 2015 Apr;39(2):147-50. doi: 10.1007/s40596-014-0213-9. Epub 2014 Aug 9.

ABSTRACT:

The Milestones Project, like all previous systems and changes in graduate psychiatric education, for example, moving from 3 to 4 years of training or adopting six competency domains, has been devised without any supporting data and does not assess meaningful outcomes, such as improved patient outcomes. No evidence is presented that Milestones-based training will produce better psychiatrists. There is a path forward. First, replace unproven expert consensus with scientific and evidence-based approaches. Second, exchange endpoints that are easy to assess but uncorrelated with real world functioning (e.g., multiple-choice examinations) for outcomes that are meaningful and external to the training program (e.g., patient outcomes). Finally, to prevent possible waste, excess burden, or harm, no changes should be mandated until proven in prospective studies.

The Milestones for Psychosomatic Medicine Subspecialty Training

Boland RJ, Becker M, Levenson JL, Servis M, Crone CC, Edgar L, Thomas CR. Psychosomatics. 2015 Mar-Apr;56(2):153-67. doi: 10.1016/j.psym.2014.11.003. Epub 2014 Nov 13.

BACKGROUND:

The Accreditation Council of Graduate Medical Education Milestones project is a key element in the Next Accreditation System for graduate medical education. On completing the general psychiatry milestones in 2013, the Accreditation Council of Graduate Medical Education began the process of creating milestones for the accredited psychiatric subspecialties.

METHODS:

With consultation from the Academy of Psychosomatic Medicine, the Accreditation Council of Graduate Medical Education appointed a working group to create the psychosomatic medicine milestones, using the general psychiatry milestones as a starting point.

RESULTS:

This article represents a record of the work of this committee. It describes the history and rationale behind the milestones, the development process used by the working group, and the implications of these milestones on psychosomatic medicine fellowship training.

CONCLUSIONS:

The milestones, as presented in this article, will have an important influence on psychosomatic medicine training programs. The implications of these include changes in how fellowship programs will be reviewed and accredited by the Accreditation Council of Graduate Medical Education and changes in the process of assessment and feedback for fellows.

Two Cheers for Milestones

Pangaro LN. J Grad Med Educ. 2015 Mar;7(1):4-6. doi: 10.4300/JGME-D-14-00738.1.

This editorial will explore the implementation of milestones across graduate medical education (GME) from 2 perspectives. The first is my perspective as a clinician, who often asks, “How do I make decisions with a patient when there isn't evidence to use as a guideline?” The second is my perspective as a department chair who asks a different question: “What resources are needed for milestone implementation?”

2015 APDS SPRING MEETING: Milestones: The Road to Faculty Development

Shah D, Goettler CE, Torrent DJ, et al. *Journal of Surgical Education*. 2015;72:e226-e235. doi:10.1016/j.jsurg.2015.06.017.

PURPOSE:

Milestones for the assessment of residents in graduate medical education mark a change in our evaluation paradigms. The Accreditation Council for Graduate Medical Education has created milestones and defined them as significant points in development of a resident based on the 6 competencies. We propose that a similar approach be taken for resident assessment of teaching faculty. We believe this will establish parity and objectivity for faculty evaluation, provide improved data about attending surgeons' teaching, and standardize faculty evaluations by residents.

METHODS:

A small group of advanced surgery educators determined appropriate educational characteristics, resulting in creation of 11 milestones (Fig. 2) that were reviewed by faculty and residents. The residents have historically answered 16 questions, developed by our surgical education committee (Fig. 3), on a 5-point Likert score (never to very often). Three weeks after completing this Likert-type evaluation, the residents were asked to again evaluate attending faculty using the Faculty Milestones evaluation. The residents then completed a survey of 7 questions (scale of 1-9—disagree to strongly agree, neutral = 5), assessing the new milestones and compared with the previous Likert evaluation system.

RESULTS:

Of 32 surgery residents, 13 completed the Likert evaluations (3760 data points) and 13 completed the milestones evaluations (1800 data points). The number completing both or neither is not known, as the responses are anonymous when used for faculty feedback. The Faculty Milestones attending physicians' scores have far fewer top of range scores (21% vs 42%) and have a wider spread of data giving better indication of areas for improvement in teaching skills. The residents completed 17 surveys (116 responses) to evaluate the new milestones system. Surveys indicated that milestones were easier to use (average rating 6.13 ± 0.42 Standard Error (SE)), effective (6.82 ± 0.39) and efficient (6.11 ± 0.53), and more objective ($6.69 \pm 0.39/6.75 \pm 0.38$) than the Likert evaluations are. Average response was 6.47 ± 0.46 for overall satisfaction with the Faculty Milestones evaluation. More surveys were completed than evaluations, as all residents had an opportunity to review both evaluation systems.

CONCLUSIONS:

Faculty Milestones are more objective in evaluating surgical faculty and mirror the new paradigm in resident evaluations. Residents found this was an easier, more effective, efficient, and objective evaluation of our faculty. Although our Faculty Milestones are designed for surgical educators, they are likely to be applicable with appropriate modifications to other medical educators as well.

Cytopathology Fellowship Milestones

Naritoku WY, Black-Schaffer WS. Cancer Cytopathol. 2014 Dec;122(12):859-65. doi: 10.1002/cncy.21483. Epub 2014 Sep 18.

ABSTRACT:

The American Society of Cytopathology has provided guidelines for goals and objectives for cytopathology fellows. There are 90 Accreditation Council for Graduate Medical Education- accredited cytopathology fellowship training programs in the United States, each with its own unique curriculum designed to achieve these goals and objectives. The Accreditation Council for Graduate Medical Education cytopathology fellowship milestones were developed to ensure some uniformity in the outcomes of the various skill sets and competencies expected of a graduating cytopathology fellow. The rationale, development, and details of the cytopathology fellowship milestones are described herein.

Medical Specialty Boards Can Help Measure Graduate Medical Education Outcomes

Peterson LE, Carek P, Holmboe ES, Puffer JC, Warm EJ, Phillips RL. Acad Med. 2014 Jun;89(6):840-2. doi: 10.1097/ACM.0000000000000250.

ABSTRACT:

U.S. graduate medical education (GME) training institutions are under increasing scrutiny to measure program outcomes as a demonstration of accountability for the sizeable funding they receive from the federal government. The Accreditation Council for Graduate Medical Education (ACGME) is a potential agent of measuring GME accountability but has no interaction with physicians after residency training is completed. American Board of Medical Specialty (ABMS) member boards interact with physicians throughout their careers through maintenance of certification (MOC) and are a potential source of valuable data on physician competency and quality of care, both of which could be used to measure GME accountability. The authors propose that ABMS boards and the ACGME deepen their existing relationship to better assess residency training outcomes. ABMS boards have a wealth of data on physicians collected as a by-product of MOC and business operations. Further, many ABMS boards collect practice demographics and scope-of-practice information through MOC enrollment surveys or recertification examination questionnaires. These data are potentially valuable in helping residencies know what their graduates are doing in practice. Part 4 of MOC generally involves assessment of the quality of care delivered in practice, and ABMS boards could share these deidentified data with the ACGME and residency programs to provide direct feedback on the practice outcomes of graduates. ABMS member boards and the ACGME should broaden their long-standing relationship to further develop shared roles and data-sharing mechanisms to better inform residencies and the public about GME training outcomes.

Putting the Pediatrics Milestones into Practice: A Consensus Roadmap and Resource Analysis

Schumacher DJ, Spector ND, Calaman S, West DC, Cruz M, Frohna JG, Gonzalez Del Rey J, Gustafson KK, Poynter SE, Rosenbluth G, Southgate WM, Vinci RJ, Sectish TC. *Pediatrics*. 2014 May;133(5):898-906. doi: 10.1542/peds.2013-2917. Epub 2014 Apr 14.

ABSTRACT:

The Accreditation Council for Graduate Medical Education has partnered with member boards of the American Board of Medical Specialties to initiate the next steps in advancing competency-based assessment in residency programs. This initiative, known as the Milestone Project, is a paradigm shift from traditional assessment efforts and requires all pediatrics residency programs to report individual resident progression along a series of 4 to 5 developmental levels of performance, or milestones, for individual competencies every 6 months beginning in June 2014. The effort required to successfully make this shift is tremendous given the number of training programs, training institutions, and trainees. However, it holds great promise for achieving training outcomes that align with patient needs; developing a valid, reliable, and meaningful way to track residents' development; and providing trainees with a roadmap for learning. Recognizing the resources needed to implement this new system, the authors, all residency program leaders, provide their consensus view of the components necessary for implementing and sustaining this effort, including resource estimates for completing this work. The authors have identified 4 domains: (1) Program Review and Development of Stakeholders and Participants, (2) Assessment Methods and Validation, (3) Data and Assessment System Development, and (4) Summative Assessment and Feedback. This work can serve as a starting point and framework for collaboration with program, department, and institutional leaders to identify and garner necessary resources and plan for local and national efforts that will ensure successful transition to milestones-based assessment.

Progress toward Improved Leadership and Management Training in Pathology

Weiss RL, Hassell LA, Parks ER. Arch Pathol Lab Med. 2014 Apr;138(4):492-7. doi: 10.5858/ arpa.2013-0288-RA.

CONTEXT:

Competency gaps in leadership and laboratory management skills continue to exist between what training programs deliver and what recent graduates and future employers expect. A number of recent surveys substantiate this. Interest in delivering content in these areas is challenged by time constraints, the presence of knowledgeable faculty role models, and the necessary importance placed on diagnostic skills development, which overshadows any priority trainees have toward developing these skills.

OBJECTIVE:

To describe the problem, the near-future horizon, the current solutions, and the recommendations for improving resident training in laboratory management.

DATA SOURCES:

The demands of new health care delivery models and the value being placed on these skills by the Pathology Milestones and Next Accreditation System initiative of the Accreditation Council for Graduate Medical Education for training programs emphasizes their importance. This initiative includes 6 milestone competencies in laboratory management. Organizations like the American Society for Clinical Pathology, the American Pathology Foundation, the College of American Pathologists, and the Association of Pathology Chairs Program Directors Section recognize these competencies and are working to create new tools for training programs to deploy.

CONCLUSIONS:

It is our recommendation that (1) every training program develop a formal educational strategy for management training, (2) greater opportunity and visibility be afforded for peer-reviewed publications on management topics in mainstream pathology literature, and (3) pathology milestones-oriented tools be developed to assist program directors and their trainees in developing this necessary knowledge and skills.

The Pathology Milestones and the Next Accreditation System

Naritoku WY, Alexander CB, Bennett BD, Black-Schaffer WS, Brissette MD, Grimes MM, Hoffman RD, Hunt JL, Iezzoni JC, Johnson R, Kozel J, Mendoza RM, Post MD, Powell SZ, Procop GW, Steinberg JJ, Thorsen LM, Nestler SP. Arch Pathol Lab Med. 2014 Mar;138(3):307-15. doi: 10.5858/arpa.2013-0260-SA.

BACKGROUND:

In the late 1990s, the Accreditation Council for Graduate Medical Education developed the Outcomes Project and the 6 general competencies with the intent to improve the outcome of graduate medical education in the United States. The competencies were used as the basis for developing learning goals and objectives and tools to evaluate residents' performance. By the mid-2000s the stakeholders in resident education and the general public felt that the Outcomes Project had fallen short of expectations.

OBJECTIVE:

To develop a new evaluation method to track trainee progress throughout residency using benchmarks called milestones. A change in leadership at the Accreditation Council for Graduate Medical Education brought a new vision for the accreditation of training programs and a radically different approach to the evaluation of residents.

DATA SOURCES:

The Pathology Milestones Working Group reviewed examples of developing milestones in other specialties, the literature, and the Accreditation Council for Graduate Medical Education program requirements for pathology to develop pathology milestones. The pathology milestones are a set of objective descriptors for measuring progress in the development of competency in patient care, procedural skill sets, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

CONCLUSIONS:

The milestones provide a national standard for evaluation that will be used for the assessment of all residents in Accreditation Council for Graduate Medical Education-accredited pathology training programs.

Time to Trust: Longitudinal Integrated Clerkships and Entrustable Professional Activities

Hirsh DA, Holmboe ES, ten Cate O. Acad Med. 2014 Feb;89(2):201-4. doi: 10.1097/ACM.0000000000000111.

ABSTRACT:

Medical education shaped by the learning sciences can better serve medical students, residents, faculty, health care institutions, and patients. With increasing innovation in undergraduate and graduate medical education and more focused attention on educational principles and how people learn, this era of educational transformation offers promise. Principles manifest in "educational continuity" are informing changes in educational structures and venues and are enriching new discourse in educational pedagogy, assessment, and scholarship. The articles by Myhre and colleagues and Woloschuk and colleagues in this issue, along with mounting evidence preceding these works, should reassure that principle-driven innovation in medical education is not only possible but can be achieved safely. In this commentary, the authors draw from these works and the wider literature on longitudinal integrated educational design. They suggest that the confluences of movements for longitudinal integrated clerkships and entrustable professional activities open new possibilities for other educational and practice advancements in quality and safety. With the advent of competency-based education, explicit milestones, and improved assessment regimens, overseers will increasingly evaluate students, trainees, and other learners on their ability rather than relying solely on time spent in an activity. The authors suggest that, for such oversight to have the most value, assessors and learners need adequate oversight time, and redesign of educational models will serve this operational imperative. As education leaders are reassessing old medical school and training models, rotational blocks, and other barriers to progress, the authors explore the dynamic interplay between longitudinal integrated learning models and entrustment.

Early Feedback on the Use of the Internal Medicine Reporting Milestones in Assessment of Resident Performance

Aagaard E, Kane GC, Conforti L, Hood S, Caverzagie KJ, Smith C, Chick DA, Holmboe ES, Iobst WF. J Grad Med Educ. 2013 Sep;5(3):433-8

BACKGROUND:

The educational milestones were designed as a criterion-based framework for assessing resident progression on the 6 Accreditation Council for Graduate Medical Education competencies.

OBJECTIVE:

We obtained feedback on, and assessed the construct validity and perceived feasibility and utility of, draft Internal Medicine Milestones for Patient Care and Systems-Based Practice.

METHODS:

All participants in our mixed-methods study were members of competency committees in internal medicine residency programs. An initial survey assessed participant and program demographics; focus groups obtained feedback on the draft milestones and explored their perceived utility in resident assessment, and an exit survey elicited input on the value of the draft milestones in resident assessment. Surveys were tabulated using descriptive statistics. Conventional content analysis method was used to assess the focus group data.

RESULTS:

Thirty-four participants from 17 programs completed surveys and participated in 1 of 6 focus groups. Overall, the milestones were perceived as useful in formative and summative assessment of residents. Participants raised concerns about the length and complexity of some draft milestones and suggested specific changes. The focus groups also identified a need for faculty development. In the exit survey, most participants agreed that the Patient Care and Systems-Based Practice Milestones would help competency committees assess trainee progress toward independent practice.

CONCLUSIONS:

Draft reporting milestones for 2 competencies demonstrated significant construct validity in both the content and response process and the perceived utility for the assessment of resident performance. To ensure success, additional feedback from the internal medicine community and faculty development will be necessary.

The ACGME Milestone Project in Ophthalmology

Lee AG, Arnold AC. *Surv Ophthalmol*. 2013 Jul-Aug;58(4):359-69. doi: 10.1016/j.survophthal. 2013.01.002.

ABSTRACT:

The ACGME is moving towards the next generation of accreditation in the USA called the Next Accreditation System (NAS). The NAS is anticipated to reduce the burden on programs to comply with accreditation requirements; to produce meaningful, innovative, and continuous benchmark outcomes data; to use ongoing individual and programmatic milestones to judge performance; and ultimately to produce better trained residents, to improve the quality of care, to reduce health care costs and health care disparities, and to provide objective evidence to the public and other external stakeholders of the quality of graduate medical education across the specialties of medicine. We describe the ACGME milestone development process for ophthalmology. If successful, the NAS will benefit all programs by reducing the programmatic burden and paperwork; increasing accreditation cycle length; and improving all programs through formative and summative feedback.

The Development of the Emergency Medicine Milestones

Beeson MS, Carter WA, Christopher TA, Heidt JW, Jones JH, Meyer LE, Promes SB, Rodgers KG, Shayne PH, Swing SR, Wagner MJ. Acad Emerg Med. 2013 Jul;20(7):724-9. doi: 10.1111/acem.12157. Epub 2013 Jun 19.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) has outlined its "Next Accreditation System" (NAS) that will focus on resident and residency outcome measurements. Emergency medicine (EM) is one of seven specialties that will implement the NAS beginning July 2013. All other specialties will follow in July 2014. A key component of the NAS is the development of assessable milestones, which are explicit accomplishments or behaviors that occur during the process of residency education. Milestones describe competencies more specifically and identify specialty-specific knowledge, skills, attitudes, and behaviors (KSABs) that can be used as outcome measures within the general competencies. The ACGME and the American Board of Emergency Medicine (ABEM) convened an EM milestone working group to develop the EM milestones. This article describes the development, use within the NAS, and challenges of the EM milestones.

Educational Milestone Development in the First 7 Specialties to Enter the Next Accreditation System

Swing SR, Beeson MS, Carraccio C, Coburn M, Iobst W, Selden NR, Stern PJ, Vydareny K. *J Grad Med Educ.* 2013 Mar;5(1):98-106. doi: 10.4300/JGME-05-01-33.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) Outcome Project introduced six general competencies relevant to medical practice but fell short of its goal to create a robust assessment system that would allow program accreditation based on outcomes. In response, the ACGME, the specialty boards, and other stakeholders collaborated to develop educational milestones, observable steps in residents' professional development that describe progress from entry to graduation and beyond.

OBJECTIVES:

We summarize the development of the milestones, focusing on 7 specialties, moving to the next accreditation system in July 2013, and offer evidence of their validity.

METHODS:

Specialty work groups with broad representation used a 5-level developmental framework and incorporated information from literature reviews, specialty curricula, dialogue with constituents, and pilot testing.

RESULTS:

The work groups produced richly diverse sets of milestones that reflect the community's consideration of attributes of competence relevant to practice in the given specialty. Both their development process and the milestones themselves establish a validity argument, when contemporary views of validity for complex performance assessment are used.

CONCLUSIONS:

Initial evidence for validity emerges from the development processes and the resulting milestones. Further advancing a validity argument will require research on the use of milestone data in resident assessment and program accreditation.

Operationalizing the Internal Medicine Milestones – An Early Status Report

Nabors C, Peterson SJ, Forman L, Stallings GW, Mumtaz A, Sule S, Shah T, Aronow W, Delorenzo L, Chandy D, Lehrman SG, Frishman WH, Holmboe E. J Grad Med Educ. 2013 Mar;5(1):130-7. doi: 10.4300/JGME-D-12-00130.1.

BACKGROUND:

The internal medicine milestones were developed to advance outcomes-based residency training and will play an important role in the next accreditation system.

INNOVATION:

As an element of our program's participation in the internal medicine educational innovations project, we implemented a milestones-based evaluation process in our general medicine and pulmonary-critical care rotations on July 1, 2010.

MEASURES:

Outcomes assessed included survey-rated acceptability to participating faculty, residents, and clinical competency committee members.

RESULTS:

Faculty and residents agreed that the milestones promoted a common understanding of what knowledge, skills, and attitudes should be displayed at particular points in residents' professional development and enhanced evaluators' ability to provide specific performance feedback. Most residents and faculty members agreed that the milestones promoted fairness and uniformity in the evaluation process. Clinical competency committee members agreed the milestones improved the quality of information available for deliberations and resulted in more uniform promotion standards. Faculty rated the use of too many milestones per form/tool at a mean of 7.3 (where 1 was minimally problematic, and 10 was maximally problematic) and the potential for evaluator fatigue (mean, 8.2) as the most significant challenges to the use of milestones. Eight of 12 faculty members would recommend milestones in other programs; 4 were uncertain.

CONCLUSIONS:

Despite logistical challenges, educators and trainees found that milestones promoted a common understanding of what knowledge, skills and attitudes should be displayed at particular stages of training; permitted greater specificity in performance feedback; and enhanced uniformity and fairness in promotion decisions.

From Theory to Actual Practice: Creation and Application of Milestones in an Internal Medicine Residency Program, 2004-2010

Meade LB, Borden SH, McArdle P, Rosenblum MJ, Picchioni MS, Hinchey KT. Med Teach. 2012;34(9):717-23. doi: 10.3109/0142159X.2012.689441. Epub 2012 May 30.

BACKGROUND:

In the USA, the Accreditation Council of Graduate Medical Education, Educational Innovations Project is a partner in reshaping residency training to meet increasingly complex systems of health care delivery.

AIM:

We describe the creation and implementation of milestones as a vehicle for translating educational theory into practice in preparing residents to provide safe, autonomous patient care.

METHOD:

Six program faculty leaders, all with advanced medical education training, met in an iterative process of developing, implementing, and modifying milestones until a final set were vetted.

RESULTS:

We first formed the profile of a Master Internist. We then translated it into milestone language and implemented its integration across the program. Thirty-seven milestones were applied in all settings and rotations to reach explicit educational outcomes. We created three types of milestones: Progressive, build one on top of the other to mastery; additive, adding multiple behaviors together to culminate in mastery; and descriptive, using a proscribed set of complex, predetermined steps toward mastery.

CONCLUSIONS:

Using milestones, our program has enhanced an educational model into explicit, end of training goals. Milestone implementation has yielded positive results toward competency-based training and others may adapt our strategies in a similar effort.

Milestones for Apheresis Education

Marshall CS, Andrzejewski C, Carey PM, Crookston KP, Li Y, Lopez-Plaza I, Sachais BS, Schwartz J, Winters JL, Wong EC, Wu Y. J Clin Apher. 2012 Nov;27(5):242-6. doi: 10.1002/jca.21235. Epub 2012 Jul 6.

ABSTRACT:

Milestones represent the essential knowledge, skills, and attitudes required for the practice of a medical discipline. Defining these milestones for each medical specialty has become a focus for the American Council of Graduate Medical Education (ACGME). Practitioners of Apheresis Medicine come from a variety of medical specialties making it challenging to establish the essential educational milestones for all. The American Society for Apheresis (ASFA) has an interest in promoting standards of excellence for Apheresis Medicine. ASFA's Physician's Curriculum Content Committee is a group of physician educators in the field of Apheresis Medicine, both donor and therapeutic, from across the United States, who have met regularly for several years to discuss the appropriate educational milestones in Apheresis training. The committee members teach residents and fellows from Pathology, Transfusion Medicine, Hematology/Oncology, Nephrology and other specialties. In this document, we have outlined the basic set of Apheresis milestones required in the ACGME defined competency areas of Patient Care and Medical Knowledge. We have also recommended methods of evaluation and estimated the time necessary for the acquisition of these cognitive and behavioral elements.



Trends in Milestones Data

Longitudinal Reliability of Milestones-Based Learning Trajectories in Family Medicine Residents

Park YS, Hamstra SJ, Yamazaki K, Holmboe E. JAMA Netw Open. 2021 Dec 1;4(12):e2137179. doi: 10.1001/jamanetworkopen.2021.37179. PMID: 34874406; PMCID: PMC8652607.

IMPORTANCE:

Longitudinal Milestones data reported to the Accreditation Council for Graduate Medical Education (ACGME) can be used to measure the developmental and educational progression of learners. Learning trajectories illustrate the pattern and rate at which learners acquire competencies toward unsupervised practice.

OBJECTIVE:

To investigate the reliability of learning trajectories and patterns of learning progression that can support meaningful intervention and remediation for residents.

DESIGN:

This national retrospective cohort study included Milestones data from residents in family medicine, representing 6 semi-annual reporting periods from July 2016 to June 2019.

INTERVENTIONS:

Longitudinal formative assessment using the Milestones assessment system reported to the ACGME.

MAIN OUTCOMES TO MEASURE:

To estimate longitudinal consistency, growth rate reliability (GRR) and growth curve reliability (GCR) for 22 subcompetencies in the ACGME family medicine Milestones were used, incorporating clustering effects at the program level. Latent class growth curve models were used to examine longitudinal learning trajectories.

RESULTS:

This study included Milestones ratings from 3872 residents in 514 programs. The Milestones reporting system reliably differentiated individual longitudinal patterns for formative purposes (mean [SD] GRR, 0.63 [0.03]); there was also evidence of precision for model-based rates of change (mean [SD] GCR, 0.91 [0.02]). Milestones ratings increased significantly across training years and reporting periods (mean [SD] of 0.55 [0.04] Milestones units per reporting period; $P < .001$); patterns of developmental progress varied by subcompetency. There were 3 or 4 distinct patterns of learning trajectories for each of the 22 subcompetencies. For example, for the professionalism subcompetency, residents were classified to 4 groups of learning trajectories; during the 3-year family medicine training period, trajectories diverged further after postgraduate year (PGY) 1, indicating a potential remediation point between the end of PGY 1 and the beginning of PGY 2 for struggling learners, who represented 16% of learners (620 residents). Similar inferences for learning trajectories were found for practice-based learning and improvement, systems-based practice, and interpersonal and communication skills. Subcompetencies in medical knowledge and patient care demonstrated more consistent patterns of upward growth.

CONCLUSIONS:

These findings suggest that the Milestones reporting system provides reliable longitudinal data for individualized tracking of progress in all subcompetencies. Learning trajectories with supporting reliability evidence could be used to understand residents' developmental progress and tailored for individualized learning plans and remediation.

Longitudinal Milestone Assessment Extending Through Subspecialty Training: The Relationship Between ACGME Internal Medicine Residency Milestones and Subsequent Pulmonary and Critical Care Fellowship Milestones

Heath JK, Wang T, Santhosh L, Denson JL, Holmboe E, Yamazaki K, Clay AS, Carlos WG. *Acad Med.* 2021 Nov 1;96(11):1603-1608. doi: 10.1097/ACM.0000000000004165. PMID: 34010863.

PURPOSE:

Accreditation Council for Graduate Medical Education (ACGME) milestones were implemented across medical subspecialties in 2015. Although milestones were proposed as a longitudinal assessment tool potentially providing opportunities for early implementation of individualized fellowship learning plans, the association of subspecialty fellowship ratings with prior residency ratings remains unclear. This study aimed to assess the relationship between internal medicine (IM) residency milestones and pulmonary and critical care medicine (PCCM) fellowship milestones.

METHOD:

A multicenter retrospective cohort analysis was conducted for all PCCM trainees in ACGME-accredited PCCM fellowship programs, 2017-2018, who had complete prior IM milestone ratings from 2014 to 2017. Only professionalism and interpersonal and communication skills (ICS) were included based on shared anchors between IM and PCCM milestones. Using a generalized estimating equations model, the association of PCCM milestones ≤ 2.5 during the first fellowship year with corresponding IM subcompetencies was assessed at each time point, nested by program. Statistical significance was determined using logistic regression.

RESULTS:

The study included 354 unique PCCM fellows. For ICS and professionalism subcompetencies, fellows with higher IM ratings were less likely to obtain PCCM ratings ≤ 2.5 during the first fellowship year. Each ICS subcompetency was significantly associated with future lapses in fellowship (ICS01: $\beta = -0.67$, $P = .003$; ICS02: $\beta = -0.70$, $P = .001$; ICS03: $\beta = -0.60$, $P = .004$) at various residency time points. Similar associations were noted for PROF03 ($\beta = -0.57$, $P = .007$).

CONCLUSIONS:

Findings demonstrated an association between IM milestone ratings and low milestone ratings during PCCM fellowship. IM trainees with low ratings in several professionalism and ICS subcompetencies were more likely to be rated ≤ 2.5 during the first PCCM fellowship year. This highlights a potential use of longitudinal milestones to target educational gaps at the beginning of PCCM fellowship.

Trainee Sex and Accreditation Council for Graduate Medical Education Milestone Assessments During General Surgery Residency

Landau SI, Syvyk S, Wirtalla C, Aarons CB, Butts S, Holmboe E, Kelz RR. *JAMA Surg.* 2021 Oct 1;156(10):925-931. doi: 10.1001/jamasurg.2021.3005. PMID: 34232269; PMCID: PMC8264749.

IMPORTANCE:

In evaluating the effectiveness of general surgery (GS) training, an unbiased assessment of the progression of residents with attention to individual learner factors is imperative.

OBJECTIVE:

To evaluate the role of trainee sex in milestone achievement over the course of GS residency using national data from the Accreditation Council for Graduate Medical Education (ACGME).

DESIGN:

This cross-sectional study evaluated female and male GS residents enrolled in ACGME-accredited programs in the US from 2014 to 2018 with reported variation in milestones performance across years in training and representation. Data were analyzed from November 2019 to June 2021.

MAIN OUTCOMES AND MEASURES:

Mean reported milestone score at initial and final assessment, and predicted time-to-attainment of equivalent performance by sex.

RESULTS:

Among 4476 GS residents from 250 programs who had milestone assessments at any point in their clinical training, 1735 were female (38.8%). Initially, female and male residents received similar mean (SD) milestone scores (1.95 [0.50] vs 1.94 [0.50]; $P = .69$). At the final assessment, female trainees received overall lower mean milestone scores than male trainees (4.25 vs 4.31; $P < .001$). Significantly lower mean milestone scores were reported for female residents at the final assessment for several subcompetencies in both univariate and multivariate analyses, with only medical knowledge 1 (pathophysiology, diagnosis, and initial management) common to both. Multilevel mixed-effects linear modeling demonstrated that female trainees had significantly lower rates of monthly milestone attainment in the subcompetency of medical knowledge 1, which was associated with a significant difference in training time of approximately 1.8 months.

CONCLUSIONS:

Both female and male GS trainees achieved the competency scores necessary to transition to independence after residency as measured by the milestones assessment system. Initially, there were no sex differences in milestone score. By graduation, there were differences in the measured assessment of female and male trainees across several subcompetencies. Careful monitoring for sex bias in the evaluation of trainees and scrutiny of the training process is needed to ensure that surgical residency programs support the educational needs of both female and male trainees.

Using Learning Analytics to Examine Achievement of Graduation Targets for Systems-Based Practice and Practice-Based Learning and Improvement: A National Cohort of Vascular Surgery Fellows

Smith BK, Luman A, Yamazaki K, Tekian A, Hamstra SJ, Holmboe E, Mitchell EL, Park YS. *Ann Vasc Surg.* 2021 Oct;76:463-471. doi: 10.1016/j.avsg.2021.03.046. Epub 2021 Apr 24. PMID: 33905852.

BACKGROUND:

Surgeons provide patient care in complex health care systems and must be able to participate in improving both personal performance and the performance of the system. The Accreditation Council for Graduate Medical Education (ACGME) Vascular Surgery Milestones are utilized to assess vascular surgery fellows' (VSF) achievement of graduation targets in the competencies of Systems Based Practice (SBP) and Practice Based Learning and Improvement (PBLI). We investigate the predictive value of semiannual milestones ratings for final achievement within these competencies at the time of graduation.

METHODS:

National ACGME milestones data were utilized for analysis. All trainees entering the 2-year vascular surgery fellowship programs in July 2016 were included in the analysis (n = 122). Predictive probability values (PPVs) were obtained for each SBP and PBLI sub-competencies by biannual review periods, to estimate the probability of VSFs not reaching the recommended graduation target based on their previous milestones ratings.

RESULTS:

The rate of nonachievement of the graduation target level 4.0 on the SBP and PBLI sub-competencies at the time of graduation for VSFs was 13.1-25.4%. At the first time point of assessment, 6 months into the fellowship program, the PPV of the SBP and PBLI milestones for nonachievement of level 4.0 upon graduation ranged from 16.3-60.2%. Six months prior to graduation, the PPVs across the 6 sub-competencies ranged from 14.6-82.9%.

CONCLUSIONS:

A significant percentage of VSFs do not achieve the ACGME Vascular Surgery Milestone targets for graduation in the competencies of SBP and PBLI, suggesting a need to improve curricula and assessment strategies in these domains across vascular surgery fellowship programs. Reported milestones levels across all time point are predictive of ultimate achievement upon graduation and should be utilized to provide targeted feedback and individualized learning plans to ensure graduates are prepared to engage in personal and health care system improvement once in unsupervised practice.

Exploring the Association Between USMLE Scores and ACGME Milestone Ratings: A Validity Study Using National Data From Emergency Medicine

Hamstra SJ, Cuddy MM, Jurich D, Yamazaki K, Burkhardt J, Holmboe ES, Barone MA, Santen SA. *Acad Med.* 2021 Sep 1;96(9):1324-1331. doi: 10.1097/ACM.0000000000004207. PMID: 34133345; PMCID: PMC8378430.

PURPOSE:

The United States Medical Licensing Examination (USMLE) sequence and the Accreditation Council for Graduate Medical Education (ACGME) milestones represent 2 major components along the continuum of assessment from undergraduate through graduate medical education. This study examines associations between USMLE Step 1 and Step 2 Clinical Knowledge (CK) scores and ACGME emergency medicine (EM) milestone ratings.

METHOD:

In February 2019, subject matter experts (SMEs) provided judgments of expected associations for each combination of Step examination and EM subcompetency. The resulting sets of subcompetencies with expected strong and weak associations were selected for convergent and discriminant validity analysis, respectively. National-level data for 2013-2018 were provided; the final sample included 6,618 EM residents from 158 training programs. Empirical bivariate correlations between milestone ratings and Step scores were calculated, then those correlations were compared with the SMEs' judgments. Multilevel regression analyses were conducted on the selected subcompetencies, in which milestone ratings were the dependent variable, and Step 1 score, Step 2 CK score, and cohort year were independent variables.

RESULTS:

Regression results showed small but statistically significant positive relationships between Step 2 CK score and the subcompetencies (regression coefficients ranged from 0.02 [95% confidence interval (CI), 0.01-0.03] to 0.12 [95% CI, 0.11-0.13]; all $P < .05$), with the degree of association matching the SMEs' judgments for 7 of the 9 selected subcompetencies. For example, a 1 standard deviation increase in Step 2 CK score predicted a 0.12 increase in MK-01 milestone rating, when controlling for Step 1. Step 1 score showed a small statistically significant effect with only the MK-01 subcompetency (regression coefficient = 0.06 [95% CI, 0.05-0.07], $P < .05$).

CONCLUSIONS:

These results provide incremental validity evidence in support of Step 1 and Step 2 CK score and EM milestone rating uses.

Milestone Learning Trajectories of Residents at Five Anesthesiology Residency Programs

Tanaka P, Park YS, Roby J, Ahn K, Kakazu C, Udani A, Macario A. Teach Learn Med. 2021 Jun-Jul;33(3):304-313. doi: 10.1080/10401334.2020.1842210. Epub 2020 Dec 17. PMID: 33327788.

CONSTRUCT:

Every six months, residency programs report their trainees' Milestones Level achievement to the Accreditation Council for Graduate Medical Education (ACGME). Milestones should enable the learner and training program to know an individual's competency development trajectory. Background: Milestone Level ratings for residents grouped by specialty (e.g., Internal Medicine and Emergency Medicine) show that, in aggregate, senior residents receive higher ratings than junior residents. Anesthesiology Milestones, as assessed by both residents and faculty, also have a positive linear relationship with postgraduate year. However, these studies have been cross-sectional rather than longitudinal cohort studies, and studies of how individual residents progress during the course of training are needed. Longitudinal data analysis of performance assessment trajectories addresses a relevant validity question for the Next Accreditation System. We explored the application of learning analytics to longitudinal Milestones data to: 1) measure the frequency of "straight-lining"; 2) assess the proportion of residents that reach "Level 4" (ready for unsupervised practice) by graduation for each subcompetency; 3) identify variability among programs and individual residents in their baseline Milestone Level and rates of improvement; and 4) determine how hypothetically constructed growth curve models fit to the Milestones data reported to ACGME.

APPROACH:

De-identified Milestone Level ratings in each of the 25 subcompetencies submitted semiannually to the ACGME from July 1, 2014 to June 30, 2017 were retrospectively analyzed for graduating residents (n = 67) from a convenience sample of five anesthesia residency programs. The data reflected longitudinal resident Milestone progression from the beginning of the first year to the end of the third and final year of clinical anesthesiology training. The frequency of straight-lining, defined as the resident receiving the same exact Milestone Level rating for all 25 subcompetencies on a given 6-month report, was calculated for each program. Every resident was evaluated six times during training with the possibility of six straight-lined ratings.

FINDINGS:

The number of residents in each program ranged from 5-21 (Median 13, range 16). Mean Milestone Level ratings for subcompetencies were significantly different at each six-month assessment ($p < 0.001$). Frequency of straight-lining varied significantly by program from 9% - 57% (Median 22%). Depending on the program, 53%-100% (median 86%) of residents reached the graduation target Level 4 or higher in all 25 anesthesiology subcompetencies. Nine to 18% of residents did not achieve a Level 4 rating for at least one subcompetency at any time during their residency. Across programs, significant variability was found in first-year clinical anesthesia training Milestone Levels, as well in the rate of improvement for five of the six core competencies.

CONCLUSIONS:

Anesthesia residents' Milestone Level growth trajectories as reported to the ACGME vary significantly across individual residents as well as by program. The present study offers a case

example that raises concerns regarding the validity of the Next Accreditation System as it is currently used by some residency programs.

Milestone Level Changes from Residency to Fellowship: A Multicenter Cohort Study

Sawyer T, Gray M, Chabra S, Johnston LC, Carbajal MM, Gillam-Krakauer M, Brady JM, French H. J Grad Med Educ. 2021 Jun;13(3):377-384. doi: 10.4300/JGME-D-20-00954.1. Epub 2021 Jun 14. PMID: 34178263; PMCID: PMC8207935.

BACKGROUND:

A vital element of the Next Accreditation System is measuring and reporting educational Milestones. Little is known about changes in Milestones levels during the transition from residency to fellowship training.

OBJECTIVE:

Evaluate the Accreditation Council for Graduate Medical Education (ACGME) Milestones' ability to provide a linear trajectory of professional development from general pediatrics residency to neonatal-perinatal medicine (NPM) fellowship training.

METHODS:

We identified 11 subcompetencies that were the same for general pediatrics residency and NPM fellowship. We then extracted the last residency Milestone level and the first fellowship Milestone level for each subcompetency from the ACGME's Accreditation Data System on 89 subjects who started fellowship training between 2014 and 2018 at 6 NPM fellowship programs. Mixed-effects models were used to examine the intra-individual changes in Milestone scores between residency and fellowship after adjusting for the effects of the individual programs.

RESULTS:

A total of 1905 subcompetency Milestone levels were analyzed. The average first fellowship Milestone levels were significantly lower than the last residency Milestone levels (residency, mean 3.99 [SD = 0.48] vs fellowship 2.51 [SD = 0.56]; $P < .001$). Milestone levels decreased by an average of -1.49 (SD = 0.65) from the last residency to the first fellowship evaluation. Significant differences in Milestone levels were seen in both context-dependent subcompetencies (patient care and medical knowledge) and context-independent subcompetencies (professionalism).

CONCLUSIONS:

Contrary to providing a linear trajectory of professional development, we found that Milestone levels were reset when trainees transitioned from general pediatrics residency to NPM fellowship.

Gender Differences in Milestone Ratings and Medical Knowledge Examination Scores Among Internal Medicine Residents

Hauer KE, Jurich D, Vandergrift J, Lipner RS, McDonald FS, Yamazaki K, Chick D, McAllister K, Holmboe ES. *Acad Med.* 2021 Jun 1;96(6):876-884. doi: 10.1097/ACM.0000000000004040. PMID: 33711841.

PURPOSE:

To examine whether there are group differences in milestone ratings submitted by program directors working with clinical competency committees (CCCs) based on gender for internal medicine (IM) residents and whether women and men rated similarly on milestones perform comparably on subsequent in-training and certification examinations.

METHOD:

This national retrospective study examined end-of-year medical knowledge (MK) and patient care (PC) milestone ratings and IM In-Training Examination (IM-ITE) and IM Certification Examination (IM-CE) scores for 2 cohorts (2014-2017, 2015-2018) of U.S. IM residents at ACGME-accredited programs. It included 20,098/21,440 (94%) residents, with 9,424 women (47%) and 10,674 men (53%). Descriptive statistics and differential prediction techniques using hierarchical linear models were performed.

RESULTS:

For MK milestone ratings in PGY-1, men and women showed no statistical difference at a significance level of .01 ($P = .02$). In PGY-2 and PGY-3, men received statistically higher average MK ratings than women ($P = .002$ and $P < .001$, respectively). In contrast, men and women received equivalent average PC ratings in each PGY ($P = .47$, $P = .72$, and $P = .80$, for PGY-1, PGY-2, and PGY-3, respectively). Men slightly outperformed women with similar MK or PC ratings in PGY-1 and PGY-2 on the IM-ITE by about 1.7 and 1.5 percentage points, respectively, after adjusting for covariates. For PGY-3 ratings, women and men with similar milestone ratings performed equivalently on the IM-CE.

CONCLUSIONS:

Milestone ratings were largely similar for women and men. Generally, women and men with similar MK or PC milestone ratings performed similarly on future examinations. Although there were small differences favoring men on earlier examinations, these differences disappeared by the final training year. It is questionable whether these small differences are educationally or clinically meaningful. The findings suggest fair, unbiased milestone ratings generated by program directors and CCCs assessing residents.

Association Between Internal Medicine Residency Applicant Characteristics and Performance on ACGME Milestones During Intern Year

Golden BP, Henschen BL, Liss DT, Kiely SL, Didwania AK. J Grad Med Educ. 2021 Apr;13(2):213-222. doi: 10.4300/JGME-D-20-00603.1. Epub 2021 Apr 16. PMID: 33897955; PMCID: PMC8054584.

BACKGROUND:

Residency programs apply varying criteria to the resident selection process. However, it is unclear which applicant characteristics reflect preparedness for residency.

OBJECTIVE:

We determined the applicant characteristics associated with first-year performance in internal medicine residency as assessed by performance on Accreditation Council for Graduate Medical Education (ACGME) Milestones.

METHODS:

We examined the association between applicant characteristics and performance on ACGME Milestones during intern year for individuals entering Northwestern University's internal medicine residency between 2013 and 2018. We used bivariate analysis and a multivariable linear regression model to determine the association between individual factors and Milestone performance.

RESULTS:

Of 203 eligible residents, 198 (98%) were included in the final sample. One hundred fourteen residents (58%) were female, and 116 residents (59%) were White. Mean Step 1 and Step 2 CK scores were 245.5 (SD 12.0) and 258 (SD 10.8) respectively. Step 1 scores, Alpha Omega Alpha membership, medicine clerkship grades, and interview scores were not associated with Milestone performance in the bivariate analysis and were not included in the multivariable model. In the multivariable model, overall clerkship grades, ranking of the medical school, and year entering residency were significantly associated with Milestone performance ($P \leq .04$).

CONCLUSIONS:

Most traditional metrics used in residency selection were not associated with early performance on ACGME Milestones during internal medicine residency.

Simulation-Based Assessments and Graduating Neurology Residents' Milestones: Status Epilepticus Milestones

Mikhaeil-Demo Y, Holmboe E, Gerard EE, Wayne DB, Cohen ER, Yamazaki K, Templer JW, Bega D, Culler GW, Bhatt AB, Shafi N, Barsuk JH. *J Grad Med Educ.* 2021 Apr;13(2):223-230. doi: 10.4300/JGME-D-20-00832.1. Epub 2021 Apr 16. PMID: 33897956; PMCID: PMC8054597.

BACKGROUND:

The American Board of Psychiatry and Neurology and the Accreditation Council for Graduate Medical Education (ACGME) developed Milestones that provide a framework for residents' assessment. However, Milestones do not provide a description for how programs should perform assessments.

OBJECTIVES:

We evaluated graduating residents' status epilepticus (SE) identification and management skills and how they correlate with ACGME Milestones reported for epilepsy and management/treatment by their program's clinical competency committee (CCC).

METHODS:

We performed a cohort study of graduating neurology residents from 3 academic medical centers in Chicago in 2018. We evaluated residents' skills identifying and managing SE using a simulation-based assessment (26-item checklist). Simulation-based assessment scores were compared to experience (number of SE cases each resident reported identifying and managing during residency), self-confidence in identifying and managing these cases, and their end of residency Milestones assigned by a CCC based on end-of-rotation evaluations.

RESULTS:

Sixteen of 21 (76%) eligible residents participated in the study. Average SE checklist score was 15.6 of 26 checklist items correct (60%, SD 12.2%). There were no significant correlations between resident checklist performance and experience or self-confidence. The average participant's level of Milestone for epilepsy and management/treatment was high at 4.3 of 5 (SD 0.4) and 4.4 of 5 (SD 0.4), respectively. There were no significant associations between checklist skills performance and level of Milestone assigned.

CONCLUSIONS:

Simulated SE skills performance of graduating neurology residents was poor. Our study suggests that end-of-rotation evaluations alone are inadequate for assigning Milestones for high-stakes clinical skills such as identification and management of SE.

Is there a Gender Bias in Milestones Evaluations in General Surgery Residency Training?

Kwasny L, Shebrain S, Munene G, Sawyer R. Am J Surg. 2021 Mar;221(3):505-508. doi: 10.1016/j.amjsurg.2020.12.020. Epub 2020 Dec 13. PMID: 33358140.

BACKGROUND:

Studies of gender disparity in surgical training have yielded conflicting results. We hypothesize that there is no influence of gender on resident self-evaluation Milestone (SEM) scores and those assigned by the Clinical Competency Committee (CCC).

METHODS:

42 residents (25 male & 17 female) and faculty completed 300 Accreditation Council for Graduate Medical Education (ACGME) Milestone evaluations over a 4-year period. Two-way ANOVA, intraclass correlations coefficients, and general linear mixed models were used for analysis.

RESULTS:

CCC Milestone scores from 150 evaluations, 51 (34%) for female residents and 99 (66%) for male residents, were compared to corresponding SEM scores. There is a high interrater reliability (self vs. CCC). There was a significant increase in scores with advancing PGY levels ($p < 0.001$). No effect of gender on Milestones scores ($p > 0.05$) was noted.

CONCLUSIONS:

We found no significant differences in Milestones scores between male and female residents as determined by the CCC. Both scores improved significantly as residents progressed in training.

Do Milestone Ratings Predict Physical Medicine and Rehabilitation Board Certification Examination Scores?

Francisco GE, Yamazaki K, Raddatz M, Sabharwal S, Robinson L, Kinney C, Holmboe E. *Am J Phys Med Rehabil.* 2021 Feb 1;100(2S Suppl 1):S34-S39. doi: 10.1097/PHM.0000000000001613. PMID: 33048889.

ABSTRACT:

The Accreditation Council of Graduate Medical Education developed the Milestones to assist training programs in assessing resident physicians in the context of their participation in Accreditation Council of Graduate Medical Education-accredited training programs. Biannual assessments are done over a resident's entire training period to define the trajectory in achieving specialty-specific competencies. As part of its process of initial certification, the American Board of Physical Medicine and Rehabilitation requires successful completion of two examinations administered approximately 9 mos apart. The Part I Examination measures a single dimensional construct, physical medicine and rehabilitation medical knowledge, whereas Part II assesses the application of medical and psychiatric knowledge to multiple domains, including data acquisition, problem solving, patient management, systems-based practice, and interpersonal and communication skills through specific patient case scenarios. This study aimed to investigate the validity of the Milestones by demonstrating its association with performance in the American Board of Physical Medicine and Rehabilitation certifying examinations. A cohort of 233 physical medicine and rehabilitation trainees in 3-yr residency programs (postgraduate year 2 entry) in the United States from academic years 2014-2016, who also took the American Board of Physical Medicine and Rehabilitation Parts I and II certifying examinations between 2016 and 2018, were included in the study. Milestones ratings in four distinct observation periods were correlated with scores in the American Board of Physical Medicine and Rehabilitation Parts I and II Examinations. Milestones ratings of medical knowledge (but not patient care, professionalism, problem-based learning, interpersonal and communication skills, and systems-based practice) predicted performance in subsequent Part I American Board of Physical Medicine and Rehabilitation Examination, but none of the Milestone ratings correlated with Part II Examination scaled scores.

Female Residents Give Themselves Lower Scores Than Male Colleagues and Faculty Evaluators on ACGME Milestones

Brady JM, Bray A, Kim P, Schneider B, Lippe J, Mercer D, Sutton K. *J Surg Educ.* 2020 Dec 18:S1931- 7204(20)30471-2. doi: 10.1016/j.jsurg.2020.12.003. Epub ahead of print. PMID: 33349566.

OBJECTIVE:

Orthopedic surgery is one of the specialties with the lowest number of women residents and practicing surgeons. The gender discrepancy in orthopedic residency training may drive a competency bias. We asked whether female orthopedic surgery residents score themselves lower on the Accreditation Council for Graduate Medical Education (ACGME) Milestones than their male counterparts, and lower than their faculty evaluators.

DESIGN:

We conducted a retrospective review of ACGME Milestone data from faculty and residents over a 4-year period. The data were analyzed using a snapshot of PGY2 (n = 20 residents) and PGY4 (n = 19 residents) scores, and using a Generalized Estimation Equation (GEE) to account for additional data points from the same residents over the 4-year data collection period.

SETTING:

Assessment scores were compiled from a single orthopedic surgery residency at Oregon Health & Science University from 2014 to 2017.

PARTICIPANTS:

The residency program has 5 residents in each program year (PGY1 through PGY5); a total of 25 residents during each year of the study were included.

RESULTS:

On average, female residents scored themselves lower than both their male counterparts and their faculty mentors. Female PGY2 self-evaluation scores were lower than males in both patient care (p = 0.005) and medical knowledge (p < 0.001). When the GEE model was applied to 99 responses from 41 residents over a 4-year period, there were no gender-related differences in resident self-evaluation scores and in faculty scores of male and female residents, with the exception of meniscal tear. For this milestone, faculty rated female residents lower than males. Furthermore, the differences between faculty evaluation scores and resident self-evaluation scores were significantly lower for males than for females for 4 of the clinical domains, as well as the systems-based practice domains of cost and communication.

CONCLUSIONS:

Our results indicate female residents are at risk for a competency bias during training, as reflected by evaluations using the ACGME Milestones.

Milestone Learning Trajectories of Residents at Five Anesthesiology Residency Programs

Tanaka P, Park YS, Roby J, Ahn K, Kakazu C, Udani A, Macario A. Teach Learn Med. 2020 Dec 17:1-10. doi: 10.1080/10401334.2020.1842210. Epub ahead of print. PMID: 33327788.

CONSTRUCT:

Every six months, residency programs report their trainees' Milestones Level achievement to the Accreditation Council for Graduate Medical Education (ACGME). Milestones should enable the learner and training program to know an individual's competency development trajectory.

BACKGROUND:

Milestone Level ratings for residents grouped by specialty (e.g., Internal Medicine and Emergency Medicine) show that, in aggregate, senior residents receive higher ratings than junior residents. Anesthesiology Milestones, as assessed by both residents and faculty, also have a positive linear relationship with postgraduate year. However, these studies have been cross-sectional rather than longitudinal cohort studies, and studies of how individual residents progress during the course of training are needed. Longitudinal data analysis of performance assessment trajectories addresses a relevant validity question for the Next Accreditation System. We explored the application of learning analytics to longitudinal Milestones data to: 1) measure the frequency of "straight-lining"; 2) assess the proportion of residents that reach "Level 4" (ready for unsupervised practice) by graduation for each subcompetency; 3) identify variability among programs and individual residents in their baseline Milestone Level and rates of improvement; and 4) determine how hypothetically constructed growth curve models fit to the Milestones data reported to ACGME.

APPROACH:

De-identified Milestone Level ratings in each of the 25 subcompetencies submitted semiannually to the ACGME from July 1, 2014 to June 30, 2017 were retrospectively analyzed for graduating residents (n = 67) from a convenience sample of five anesthesia residency programs. The data reflected longitudinal resident Milestone progression from the beginning of the first year to the end of the third and final year of clinical anesthesiology training. The frequency of straight-lining, defined as the resident receiving the same exact Milestone Level rating for all 25 subcompetencies on a given 6-month report, was calculated for each program. Every resident was evaluated six times during training with the possibility of six straight-lined ratings.

FINDINGS:

The number of residents in each program ranged from 5-21 (Median 13, range 16). Mean Milestone Level ratings for subcompetencies were significantly different at each six-month assessment ($p < 0.001$). Frequency of straight-lining varied significantly by program from 9% - 57% (Median 22%). Depending on the program, 53%-100% (median 86%) of residents reached the graduation target Level 4 or higher in all 25 anesthesiology subcompetencies. Nine to 18% of residents did not achieve a Level 4 rating for at least one subcompetency at any time during their residency. Across programs, significant variability was found in first-year clinical anesthesia training Milestone Levels, as well in the rate of improvement for five of the six core competencies.

CONCLUSIONS:

Anesthesia residents' Milestone Level growth trajectories as reported to the ACGME vary significantly across individual residents as well as by program. The present study offers a case example that raises concerns regarding the validity of the Next Accreditation System as it is currently used by some residency programs.

Is there a gender bias in milestones evaluations in general surgery residency training?

Kwasny L, Shebrain S, Munene G, Sawyer R. Am J Surg. 2020 Dec 13:S0002-9610(20)30798-4. doi: 10.1016/j.amjsurg.2020.12.020. Epub ahead of print. PMID: 33358140.

BACKGROUND:

Studies of gender disparity in surgical training have yielded conflicting results. We hypothesize that there is no influence of gender on resident self-evaluation Milestone (SEM) scores and those assigned by the Clinical Competency Committee (CCC).

METHODS:

42 residents (25 male & 17 female) and faculty completed 300 Accreditation Council for Graduate Medical Education (ACGME) Milestone evaluations over a 4-year period. Two-way ANOVA, intraclass correlations coefficients, and general linear mixed models were used for analysis.

RESULTS:

CCC Milestone scores from 150 evaluations, 51 (34%) for female residents and 99 (66%) for male residents, were compared to corresponding SEM scores. There is a high interrater reliability (self vs. CCC). There was a significant increase in scores with advancing PGY levels ($p < 0.001$). No effect of gender on Milestones scores ($p > 0.05$) was noted.

CONCLUSIONS:

We found no significant differences in Milestones scores between male and female residents as determined by the CCC. Both scores improved significantly as residents progressed in training.

Association Between Entrustable Professional Activities and Milestones Evaluations: Real-time Assessments Correlate With Semiannual Reviews

Albright JB, Meier AH, Ruangvoravat L, VanderMeer TJ. *J Surg Educ.* 2020 Nov-Dec;77(6):e220-e228. doi: 10.1016/j.jsurg.2020.07.027. Epub 2020 Jul 31. PMID: 32747323.

OBJECTIVE:

Entrustable professional activities (EPAs) have been developed to refine competency-based education. The American Board of Surgery has initiated a 2-year pilot study to evaluate the impact of EPAs on the evaluation and feedback of surgical residents. The ACGME Milestones in Surgery is a semiannual competency-based evaluation program to measure resident progression through 16 professional attributes across 8 practice domains. The correlation between these 2 evaluation tools remains unclear. The purpose of this study is to evaluate this correlation through comparison of an EPA with the corresponding elements of the ACGME Milestones.

DESIGN:

From July, 2018 to October, 2019, all residents submitting EPA evaluations for gall bladder disease were evaluated for preoperative, intraoperative, and/or postoperative entrustability. The ratings were converted to a numerical rank from 0 to 4. Milestones scores from May 2019 and November 2019 were obtained for each resident, with scores ranging from 0 to 4. The gall bladder EPA incorporates the operative PC3 and MK2 and nonoperative PC1, PC2, and ICS3 components. Spearman rank correlation was conducted to evaluate the association between each resident's median EPA ranking and his/her milestones scores.

SETTING:

SUNY Upstate Medical University, Syracuse, NY, a university-based hospital.

PARTICIPANTS:

General surgery residents.

RESULTS:

Among 24 residents, 106 intraoperative EPA evaluations were. For both the May and November milestones, significant positive correlations were noted for PC3 (correlation coefficient $\rho = 0.690$, $p < 0.001$; $\rho = 0.876$, $p < 0.001$). Similarly, for MK2, a significant positive correlation was noted ($\rho = 0.882$, $p < 0.001$; $\rho = 0.759$, $p < 0.001$). Interestingly, significant positive correlations were also identified between the 3 nonoperative milestones and the intraoperative entrustability ranking.

CONCLUSIONS:

We observed significant correlations between EPAs for cholecystectomy and associated milestones evaluation scores. These findings indicate that EPAs may provide more timely and specific feedback than existing tools and, on aggregate, may improve upon existing formative feedback practices provided through the biannual evaluation of surgical residents.

A Not So Perfect Score: Factors Associated with the Rate of Straight Line Scoring in Oncology Training Programs

Hinchcliff E, Gunther J, Ponnio AE, Bednarski B, Onstad M, Shafer A, Frumovitz M, Jazaeri A, Urbauer D, Bodurka DC. *J Cancer Educ.* 2020 Aug 25. doi: 10.1007/s13187-020-01855-6. Epub ahead of print. PMID: 32839894.

ABSTRACT:

Straight line scoring (SLS), defined as trainee assessments with the same score for all evaluation items, is statistically improbable and potentially indicates inaccurate assessment. Factors contributing to higher SLS rates are unknown, and knowledge of SLS prevalence within oncologic training is lacking. SLS frequency was measured for evaluations from all Accreditation Council for Graduate Medical Education (ACGME)-accredited programs at a single cancer care institution between 2014 and 2018. SLS prevalence was estimated using hierarchical linear models (HLM) that considered characteristics of evaluator, trainee, and evaluation potentially related to SLS. Results were compared with national SLS rates. Six thousand one hundred sixty evaluations were included from 476 evaluators. Overall prevalence of SLS was 12.1% (95% CI 4.5–28.8). Residents (vs fellows) were less likely to have SLS evaluations (OR 0.5, 95% CI 0.4–0.8), though for all trainees increasing training year corresponded with increasing SLS frequency (OR 1.5, 95% CI 1.3–1.7). SLS was more common in procedural specialties compared with medical specialties (OR 2.1, 95% CI 1.1–3.8). Formative evaluations had lower SLS rates (OR 0.6, 95% CI 0.5–0.9) than summative evaluations, while milestone-based evaluations had higher rates than those that were not milestone-based (OR 1.5, 95% CI 1.03–2.2). Features of evaluators, such as subspecialty within oncology, and of trainees, such as seniority or trainee type, were related to SLS. Summative intent and milestone-based evaluations were more likely to be straight line scored. Specific evaluation scenarios at higher risk of SLS should be further examined.

Do Pediatric Emergency Medicine Fellows Meet the Milestone Targets for Graduation?

Roskind, C. G., Leonard, K., Baghdassarian, A., Kou, M., Lvasseur, K., Rose, J., Shabanova, V., Vu, T., Zuckerbraun, N. S., & Langhan, M. L. *Academic Pediatrics*. 2020;20(7):e35-e36.

ABSTRACT:

The ACGME Milestone Project is a competency-based assessment tool. Subcompetencies (SC) are scored on a 5-point scale, and level 4 is recommended for graduation. The 2018 Milestones Report found that across subspecialties, not all graduates are attaining a level 4 for every SC. To describe the number of pediatric emergency medicine (PEM) fellows who achieve level 4 in all 23 SC at graduation and to identify SC and predictive factors where a level 4 is not achieved. This is a multicenter, retrospective cohort study of PEM fellows. Program directors provided de-identified milestone reports from 2015- 2018. Descriptive analysis of milestone scores at graduation was performed. Demographics were compared between fellows who did and did not meet level 4 at graduation for each SC. Sub-analyses assessed differences in residency and first year milestone scores and the rate of milestone attainment between fellows who did and did not attain level 4 at graduation. Data from 48 PEM fellowship programs yielded graduation scores for 392 fellows (62% of total). 87% completed pediatric residency and 60% were female. Residency scores were available for 45 fellows. There were no SC in which all fellows attained at least level 4 at graduation; the range of fellows scoring < level 4 per SC was 7-39%. (Table 1) 67% of fellows did not attain level 4 on one or more of the 23 SC at graduation. While some fellows failed to attain a level 4 on up to all 23 SC, 26% failed to meet level 4 on only 1 or 2 SC. In 19/23 SC, residency and/or first year milestones scores were significantly lower for those who did not attain level 4 at graduation compared to those who did (mean difference 0.74 points). Those who did not attain level 4 at graduation had a significantly faster rate of improvement in milestone scores for 10/23 SC compared to those who did attain level 4. In our sample, 67% of PEM fellows did not attain level 4 for at least 1 of the 23 SC at graduation. Low scores during residency or early in fellowship may predict difficulty in meeting level 4 by fellowship completion.

Milestones Achievement from Residency to Fellowship: A Continuum?

Rose JA. 74. *Academic Pediatrics*. 2020;(7). doi:10.1016/j.acap.2020.06.095

ABSTRACT:

Background In 2013, the ACGME implemented the Milestones as a competency-based evaluation framework, spanning the continuum from novice to expert. Some subcompetencies from residency programs were adopted into subspecialty subcompetencies with the same 5-point scores. ACGME Milestones reports indicate lower achievement in identical subcompetencies for first year Pediatric Emergency Medicine (PEM) fellows compared with graduating pediatric residents. While differences between residency and fellowship programs exist, it is unclear why demonstrated skills would be 'lost' by residents transitioning to PEM fellowship as suggested by lower milestones scores. **Aim** To investigate the trajectory of milestone scores from residency to PEM fellowship. **Methods** We completed a multicenter retrospective cohort study of a national sample of PEM fellows. Participating programs submitted de-identified Milestones data for PEM fellows (2015-2018). Of 23 PEM subcompetencies, 10 were adopted from pediatric and 7 from EM residency subcompetencies. We compared first year PEM fellow performance for these 17 subcompetencies to end-of-residency performance, using Wilcoxon signed rank tests to evaluate the difference in fellows paired scores. A 1-point decline in milestone score was deemed a priori to be clinically significant. **Results** We collected data for 639 PEM fellows from 48 fellowships. End-of-residency scores were available for 218 fellows from 42 programs. Most (210/218, 96%) completed pediatric residencies; 8 (4%) completed EM training. Declines in median milestones scores between end-of-residency and first year of PEM fellowship were observed for all fellows. These declines were statistically significant for pediatric-trained fellows; clinically significant declines were seen in two subcompetencies (Table 1). **Conclusions** Our study found significant declines across adopted pediatric subcompetencies for pediatric residency graduates assessed early in their PEM fellowships. It is unclear whether this observed decline in achievement represents a true loss of skills, or a reset of faculty expectations and variance of Milestones interpretation by fellowships. Future studies are warranted to examine whether Milestones accurately assess trainee development across the continuum, or if they are applied differently as physicians transition from residency to subspecialty training.

Developing a Novel Scoring System to Objectively Track Orthopaedic Resident Educational Performance and Progression

Krueger CA, Rivera JC, Bhullar PS, Osborn PM. J Surg Educ. 2020 Mar - Apr;77(2):454-460. doi: 10.1016/j.jsurg.2019.09.009. Epub 2019 Dec 27.

OBJECTIVE:

Objectively determining orthopedic resident competence remains difficult and lacks standardization across residency programs. We sought to develop a scoring system to measure resident educational activity to stratify participation and performance in particular aspects of training and the effect of these measures on board certification.

DESIGN:

A weighted scoring system (Average Resident Score, ARS) was developed using the number of logged cases, clinic notes dictated, OITE PGY percentile, case minimums met, and scholarly activity completed each academic year (AY), with clinical activity being more heavily weighted. The Resident Effectiveness Score (RES), a z-score showing the number of standard deviations from the mean, was determined using the ARS. The RES effect on the Accreditation Council for Graduate Medical Education (ACGME) Milestones and American Board of Orthopedic Surgery (ABOS) Part 1 percentile score was determined using a Spearman correlation.

SETTING:

Large academic orthopedic residency.

PARTICIPANTS:

Thirty one orthopedic residents graduating between 2011 and 2016 were included.

RESULTS:

The RES did not differ between classes in the same AY, nor change significantly for individual residents during their training. Milestone z-scores increased as residents progressed in their education. The RES correlated with each Milestone competency subscore. The PGY5 OITE score and achieving ACGME minimums correlated with passing ABOS Part 1 (28/31 1st time pass), but the RES did not predict passing the board examination.

CONCLUSIONS:

This study demonstrates a scoring system encompassing multiple facets of resident education to track resident activity and progress. The RES can be tailored to an individual program's goals and aims and help program directors identify residents not maximizing educational opportunities compared to their peers. Monitoring this score may allow tailoring of educational efforts to individual resident needs. This RES may also allow residents to measure their performance and educational accomplishments and adjust their focus to obtain competence and board certification.

Mid-Year Medical Knowledge Milestones and ABSITE Scores in First-Year Surgery Residents

Cassaro S, Jarman BT, Joshi ART, Goldman-Mellor S, Hope WW, Johna S, Kaufman T, Grannan KJ; Association of Program Directors in Surgery Independent Surgery Programs Collaborative. *J Surg Educ.* 2020 Mar - Apr; 77(2):273-280. doi: 10.1016/j.jsurg.2019.09.012. Epub 2019 Sep 28.

OBJECTIVE:

Accreditation Council for Graduate Medical Education (ACGME) Surgery milestone ratings in the "Knowledge of Diseases and Conditions" (MK1) sub competency have been shown to correlate with American Board of Surgery In Training Examination (ABSITE) scores, and hypothesized to predict them. To better assess the predictive value of the MK1 milestone and avoid the potential bias caused by previous years' ABSITE scores, we designed a study including only first-year (PGY-1) residents and analyzed the correlation between their mid-year MK1 ratings and their scores in the ABSITE they took approximately a month later.

METHODS:

De-identified United States Medical Licensing Examination (USMLE) Step 1 and Step 2 scores, mid-year MK1 milestone ratings and the subsequent ABSITE standard scores for the five academic years from 2014-2015 to 2018-2019 were collected and tabulated for 247 PGY-1 preliminary- and categorical-track residents from ten ACGME-accredited surgery residency programs.

RESULTS:

The mid-year rating of PGY-1 residents' MK1 was predictive of their subsequent first ABSITE score for the entire cohort and for the categorical residents' subset. Notably, controlling for all other independent predictors, each half-point increase in MK1 rating was associated with a 25-point increase in ABSITE score. Preliminary residents performed significantly worse on the ABSITE, and their scores did not correlate significantly with their MK1 ratings.

CONCLUSIONS:

The mid-year rating of PGY-1 residents' MK1 was predictive of their subsequent first ABSITE score for the entire cohort and for the categorical but not the preliminary residents. This finding suggests that evaluators correctly rated MK1 higher in the categorical residents who did perform better on the subsequent ABSITE.

Cytopathology Milestones: Can You Get to Level 5?

Dyhdalo KS, Oshilaja O, Chute DJ, Booth CN, Suchy P, Smith K, Procop GW, Reynolds JP. *J Am Soc Cytopathol.* 2020 Mar 30. pii: S2213-2945(20)30046-6. doi: 10.1016/j.jasc.2020.03.002. [Epub ahead of print]

INTRODUCTION:

ACGME Milestones describe 6 areas of proficiency, indicating readiness for practice. Each is divided into 5 levels of mastery; Level 1 (new trainees) through Levels 4 (graduation) and 5 (aspirational). Milestones reporting began Spring 2016. We used Milestones to assess graduated fellows.

MATERIALS AND METHODS:

We conducted phone interviews with previous fellows and collected demographic information including practice setting. We asked graduates if they fulfilled each example of mastery and recorded their answers.

RESULTS:

A total of 22 fellows graduated from 2010 to 2017; 15 responded (10 academic, 5 private). Milestones in which nearly all respondents performed well (Level 4+) were: PC1, MK1, SBP2, SBP4, PROF1-4, ICS1-3. Some were more challenging (PC2, MK2, SBP1/3/5, PBL1). For PC2, 2 respondents achieved Level 1 (did not perform fine-needle aspirations). For MK2, 2 respondents achieved Level 1 (did not evaluate Papanicolaou). For SBP1, 80% in private practice achieved Level 5; 50% in academics achieved Level 3. For SBP3, 80% in private practice achieved Level 4+; 100% in academics achieved maximum Level 2. For SBP5, 60% of all respondents achieved maximum Level 3; only 1 achieved Level 5.

CONCLUSIONS:

Many Milestones are attainable. Eleven of 18 yielded Level 4+ from most respondents. Three (PC2, MK1, MK2) yielded rare Level 1 due to scope of practice. Others (SBP1, SBP3) reflect more of an all-or-nothing phenomenon. For SBP5, most respondents achieved Level 3; only 1 achieved Level 5. Some Milestones are highly dependent on practice setting, and others remain aspirational.

Association of intraoperative entrustment with clinical competency amongst general surgery residents

Ji S1, Hwang C, Karmakar M, Matusko N, Thompson-Burdine J, Williams AM, Leininger L, Minter RM3, Sandhu G4. *Am J Surg.* 2020 Feb;219(2):245-252. doi: 10.1016/j.amjsurg.2019.12.012. Epub 2019 Dec 13.

BACKGROUND:

Lack of transparency and meaningful assessment in surgical residency has led to inconsistent intraoperative entrustment and highly variable trainee competence at graduation. The relationship between faculty entrustment and resident entrustability on clinical competency remains unclear. We sought to evaluate the dynamic between entrustment/entrustability and clinical competency in general surgery residency.

METHODS:

Intraoperative observations were conducted across a 22-month period at an academic tertiary center. Entrustment/entrustability were measured using OpTrust. Clinical competencies were appraised via ACGME Milestones and Objective Structured Assessment of Technical Skill (OSATS) scores. Mixed effects linear regression was used to investigate the relationship among overall ACGME Milestone scores, OSATS domain scores, and overall OpTrust scores.

RESULTS:

Overall OpTrust scores significantly correlated with overall Milestone scores and multiple OSATS score domains.

CONCLUSIONS:

OpTrust demonstrated a positive association between ACGME general surgery Milestones and OSATS scores. Overall, OpTrust may help optimize intraoperative faculty entrustment and resident entrustability, facilitating surgical trainee success during residency.

Comparison of Male and Female Resident Milestone Assessments During Emergency Medicine Residency Training: A National Study

Santen SA, Yamazaki K, Holmboe ES, Yarris LM, Hamstra SJ. Acad Med. 2020 Feb;95(2):263-268. doi: 10.1097/ACM.0000000000002988.

PURPOSE:

A previous study found that milestone ratings at the end of training were higher for male than female residents in emergency medicine (EM). However, that study was restricted to a sample of 8 EM residency programs, and used individual faculty ratings from milestone reporting forms that were designed for use by the program's Clinical Competency Committee (CCC). The objective of this study was to investigate whether similar results would be found when examining the entire national cohort of EM milestone ratings reported by programs after CCC consensus review.

METHOD:

This study examined longitudinal milestone ratings for all EM residents (n = 1,363; 125 programs) reported to the Accreditation Council for Graduate Medical Education every 6 months from 2014-2017. A multilevel linear regression model was used to estimate differences in slope for all subcompetencies, and predicted marginal means between genders were compared at time of graduation.

RESULTS:

There were small but statistically significant differences between males' and females' increase in ratings from initial rating to graduation on 6 of the 22 subcompetencies. Marginal mean comparisons at time of graduation demonstrated gender effects for 4 patient care subcompetencies. For these subcompetencies, males were rated as performing better than females; differences ranged from 0.048 to 0.074 milestone ratings.

CONCLUSIONS:

In this national dataset of EM resident milestone assessments by CCCs, males and females were rated similarly at the end of their training for the majority of subcompetencies. Statistically significant but small absolute differences were noted in 4 patient care subcompetencies.

Using Longitudinal Milestones Data and Learning Analytics to Facilitate the Professional Development of Residents: Early Lessons from Three Specialties

Holmboe ES, Yamazaki K, Nasca TJ, Hamstra SJ. Acad Med. 2020 Jan;95(1):97-103. doi: 10.1097/ACM.0000000000002899.

PURPOSE:

To investigate the effectiveness of using national, longitudinal milestones data to provide formative assessments to identify residents at risk of not achieving recommended competency milestone goals by residency completion. The investigators hypothesized that specific, lower milestone ratings at earlier time points in residency would be predictive of not achieving recommended Level (L) 4 milestones by graduation.

METHOD:

In 2018, the investigators conducted a longitudinal cohort study of emergency medicine (EM), family medicine (FM), and internal medicine (IM) residents who completed their residency programs from 2015 to 2018. They calculated predictive values (PVs) and odds ratios (ORs), adjusting for nesting within programs, for specific milestone rating thresholds at 6-month intervals for all subcompetencies within each specialty. They used final milestone ratings (May/June 2018) as the outcome variables, setting L4 as the ideal educational outcome.

RESULTS:

The investigators included 1,386 (98.9%) EM residents, 3,276 (98.0%) FM residents, and 7,399 (98.0%) IM residents in their analysis. The percentage of residents not reaching Level 4 by graduation ranged from 11-31% in EM, 16-53% in FM, and 5-15% in IM. Using a milestone rating of Level 2.5 or lower at the end of PGY2, the predictive probability of not attaining the L4 milestone graduation goal ranged from 32-56% in EM, 32-67% in FM, and 15-36% in IM.

CONCLUSIONS:

Longitudinal milestones ratings may provide educationally useful, predictive information to help individual residents address potential competency gaps, but the predictive power of the milestones ratings varies by specialty and subcompetency within these three adult care specialties.

Completion of an Individualized Learning Plan for Otolaryngology-Related Milestone Subcompetencies Leads to Improved Otolaryngology Training Exam Scores

Penneck M, Svrakic M, Bent JP 3rd. *Otol Neurotol*. 2019 Dec;40(10):1392-1398. doi: 10.1097/MAO.0000000000002392.

OBJECTIVE:

To examine the relationships among self-assessment of knowledge in otology via an individualized learning plan (ILP), otology milestone achievement rate, and otolaryngology training exam (OTE) otology scores.

STUDY DESIGN:

Prospective study.

SETTING:

One otolaryngology residency covering a tertiary care facility, trauma and hospital center, outpatient ambulatory surgery center, and outpatient clinics.

PARTICIPANTS:

Twenty otolaryngology residents, four from each class.

METHODS:

Residents identified four milestones from otology-related sub-competencies to achieve in a 3-month rotation via an ILP. During the same rotation, the residents sat for the OTE, and their overall and otology scores were analyzed.

MAIN OUTCOME MEASURES:

Completion of an ILP before and at the end of the rotation, self-reported achievement of otology milestones, and OTE score components including total percent correct, scaled score, group stanine, national stanine, and residency group weighted scores.

RESULTS:

Group stanine OTE otology scores were higher for those residents who completed pre- and post-rotation ILPs compared with those who did not, 4.0 (± 0.348) versus 2.75 (± 0.453), respectively ($p=0.04$). Residents who self-reported achieving all four otology milestones had significantly higher otology group stanine scores than the residents who achieved less, 4.1 (± 0.348) versus 2.9 ± 0.433 , respectively ($p=0.045$). Residents who performed well in their PGY program cohort on the otology OTE 1 year were less inclined to complete an ILP for otology in the subsequent year (Pearson correlation -0.528 , $p=0.035$).

CONCLUSION:

In the otology subspecialty, residents who completed ILPs scored better on OTE examinations independent of resident class. Consequently, programs may find ILPs useful in other otolaryngology subspecialties and across residencies.

Exploring Gender Bias in Nursing Evaluations of Emergency Medicine Residents

Brucker K, Whitaker N, Morgan ZS, Pettit K, Thinnes E, Banta AM, Palmer MM. Acad Emerg Med. 2019 Nov;26(11):1266-1272. doi: 10.1111/acem.13843. Epub 2019 Sep 23.

OBJECTIVES:

Nursing evaluations are an important component of residents' professional development as nurses are present for interactions with patients and nonphysician providers. Despite this, there has been few prior studies on the benefits, harms, or effectiveness of using nursing evaluations to help guide emergency medicine residents' development. We hypothesized that gender bias exists in nursing evaluations and that female residents, compared to their male counterparts, would receive more negative feedback on the perception of their interpersonal communication skills.

METHODS:

Data were drawn from nursing evaluations of residents between March 2013 and April 2016. All comments were coded if they contained words falling into four main categories: standout, ability, grindstone, and interpersonal. This methodology and the list of words that guided coding were based on the work of prior scholars. Names and gendered pronouns were obscured and each comment was manually reviewed and coded for valence (positive, neutral, negative) and strength (certain or tentative) by at least two members of the research team. Following the qualitative coding, quantitative analysis was performed to test for differences. To evaluate whether any measurable differences in ability between male and female residents existed, we compiled and compared American Board of Emergency Medicine in-training examination scores and relevant milestone evaluations between female and male residents from the same period in which the residents were evaluated by nursing staff.

RESULTS:

Of 1,112 nursing evaluations, 30% contained comments. Chi-square tests on the distribution of valence (positive, neutral, or negative) indicated statistically significant differences in ability and milestone categories based on the gender of the resident. A total of 51% of ability comments about female residents were negative compared to 20% of those about male residents ($\chi^2 = 11.83$, $p < 0.01$). A total of 57% of milestone comments about female residents were negative as opposed 24% of those about male residents ($\chi^2 = 6.03$, $p < 0.01$).

CONCLUSIONS:

Our findings demonstrate that, despite the lack of difference in ability or competence as measured by in-service examination scores and milestone evaluations, nurses evaluate female residents lower in their abilities and work ethic compared to male residents.

Evaluation of Gender Differences in Ultrasound Milestone Evaluations During Emergency Medicine Residency Training: A Multicenter Study

Acuña J, Stolz U, Stolz LA, Situ-LaCasse EH, Bell G, Berkeley RP, Boyd JS, Castle D, Carmody K, Fong T, Grewal E, Jones R, Hilberts S, Kanter C, Kelley K, Leetch SJ, Pazderka P, Shaver E, Stowell JR, Josephson EB, Theodoro D, Adhikari S. *AEM Educ Train*. 2019 Oct 24;4(2):94-102. doi: 10.1002/aet2.10397. eCollection 2020 Apr.

OBJECTIVES:

Prior literature has demonstrated incongruities among faculty evaluation of male and female residents' procedural competency during residency training. There are no known studies investigating gender differences in the assessment of procedural skills among emergency medicine (EM) residents, such as those required by ultrasound. The objective of this study was to determine if there are significant gender differences in ultrasound milestone evaluations during EM residency training.

METHODS:

We used a stratified, random cluster sample of Accreditation Council for Graduate Medical Education (ACGME) EM residency programs to conduct a longitudinal, retrospective cohort analysis of resident ultrasound milestone evaluation data. Milestone evaluation data were collected from a total of 16 ACGME-accredited EM residency programs representing a 4-year period. We stratified milestone data by resident gender, date of evaluation, resident postgraduate year, and cohort (residents with the same starting date).

RESULTS:

A total of 2,554 ultrasound milestone evaluations were collected from 1,187 EM residents (750 men [62.8%] and 444 women [37.1%]) by 104 faculty members during the study period. There was no significant overall difference in mean milestone score between female and male residents [mean difference = 0.01 (95% confidence interval {CI} = -0.04 to 0.05)]. There were no significant differences between female and male residents' mean milestone scores at the first (baseline) PGY1 evaluation (mean difference = -0.04 [95% CI = -0.09 to 0.003]) or at the final evaluation during PGY3 (mean difference = 0.02 [95% CI = -0.03 to 0.06]).

CONCLUSIONS:

Despite prior studies suggesting gender bias in the evaluation of procedural competency during residency training, our study indicates that there were no significant gender-related differences in the ultrasound milestone evaluations among EM residents within training programs throughout the United States.

Family Medicine Residency Graduates' Preparation for Quality Improvement Leadership

Lichkus J, Fang B, Peterson LE. J Grad Med Educ. 2019 Oct;11(5):558-564. doi: 10.4300/JGME-D-18-01060.1.

BACKGROUND:

Training in quality improvement (QI) is a standard component of family medicine residency education. Graduating family medicine residents' ability to lead QI initiatives is unknown.

OBJECTIVE:

We assessed the preparedness of graduating family medicine residents to lead QI projects and to identify factors that may increase such readiness.

METHODS:

Milestone data for all graduating family medicine residents were linked to a practice demographic questionnaire completed by the same residents who registered for the American Board of Family Medicine certification examination between 2014 and 2017. The change in self-assessed QI preparedness over time and its association with faculty-assigned milestone ratings were examined using descriptive and regression analyses.

RESULTS:

The questionnaire had a 100% response rate (12 208 responded). Between 2014 and 2017, the percentage of residents who self-reported being "extremely" or "moderately" prepared to lead QI projects increased from 72.7% (2208 of 3038) to 75.8% (2434 of 3210, $P = .009$). Self-reported QI team leadership was associated with 93% higher odds of feeling extremely prepared compared to moderately prepared (odds ratio 1.93, 95% CI 1.58-2.35). The average midyear faculty-assigned milestone rating for QI among residents who felt "extremely" prepared was 3.28 compared to 3.14 among those who felt "not at all" prepared.

CONCLUSIONS:

Over the past 4 years, family medicine residents' self-assessed preparedness to lead QI projects has barely increased. There was no correlation between self-assessed preparation and faculty-assigned milestone rating. However, we found a small association between self-reported QI leadership and self-assessed QI preparedness.

A National Study of Longitudinal Consistency in ACGME Milestone Ratings by Clinical Competency Committees: Exploring an Aspect of Validity in the Assessment of Residents' Competence

Hamstra SJ, Yamazaki K, Barton MA, Santen SA, Beeson MS, Holmboe ES. *Acad Med.* 2019 Oct;94(10):1522-1531. doi: 10.1097/ACM.0000000000002820.

PURPOSE:

To investigate whether clinical competency committees (CCCs) were consistent in applying milestone ratings for first-year residents over time or whether ratings increased or decreased.

METHOD:

Beginning in December 2013, the ACGME initiated a phased-in requirement for reporting milestones; emergency medicine (EM), diagnostic radiology (DR), and urology (UR) were among the earliest reporting specialties. The authors analyzed CCC milestone ratings of first-year residents from 2013-2016 from all ACGME-accredited EM, DR, and UR programs for which they had data. The number of first-year residents in these programs ranged from 2,838 to 2,928 over this time period. The program-level average milestone rating for each subcompetency was regressed onto the time of observation using a random coefficient multilevel regression model.

RESULTS:

National average program-level milestone ratings of first-year residents decreased significantly over the observed time period for 32 of the 56 subcompetencies examined. None of the other subcompetencies showed a significant change. National average in-training examination scores for each of the specialties remained essentially unchanged over the time period, suggesting differences between the cohorts was not likely an explanatory factor.

CONCLUSIONS:

The findings indicate that CCCs tend to become more stringent or maintain consistency in their ratings of beginning residents over time. One explanation for these results is that CCCs may become increasingly comfortable in assigning lower ratings when appropriate. This finding is consistent with an increase in confidence with the milestones rating process and the quality of feedback it provides. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

The Value of Numerical USMLE Step 1 Scores in Radiology Resident Selection

Maxfield CM, Grimm LJ. Acad Radiol. 2019 Aug 21. pii: S1076-6332(19)30386-1. doi: 10.1016/j.acra.2019.08.007.

RATIONALE AND OBJECTIVES:

In response to a recent proposal to change scoring on the United States Medical Licensing (USMLE) Step 1 exam to pass/fail, we sought to determine the value of numerical Step 1 scores in predicting success in our radiology residency program.

MATERIALS AND METHODS:

Residency applications for 157 residents entering the program between 2005 and 2017 were retrospectively reviewed. Biographical (gender, sports participation, advanced degree), undergraduate (school, major), and medical school (grades, USMLE Step 1 score, Alpha Omega Alpha membership, letters of recommendation, publications) data were recorded. Multivariate regression analysis was used to examine the relationship between these application factors and subsequent performance as a radiology resident, as determined by completion of the program without requiring corrective action, select Accreditation Council for Graduate Medical Education milestones, and selection as chief resident.

RESULTS:

Corrective action was required for 7% (n = 12) of residents. Of the predictor variables, only Step 1 score was associated with the need for corrective action ($p < 0.001$). The interpretation of exams milestone was associated with higher Step 1 scores ($p = 0.001$) and number of medical school clerkship honors ($p = 0.008$). Selection as chief resident was associated with sports participation ($p = 0.04$), and clerkship honors ($p = 0.02$).

CONCLUSION:

Numerical USMLE Step 1 scores are predictive of successful completion of radiology residency training without the need for corrective action, and of accelerated competence in the interpretation of exams milestone. Continued reporting of numerical Step 1 scores would be valuable in selection of radiology residents.

Are Otolaryngology Milestones Predictive of Otolaryngology Training Examination Scores?

Lozada KN, Ferrandino RM, Teng MS, Colley PM, Bernstein JM. Ear Nose Throat J. 2019 Mar;98 (3):139-142. doi: 10.1177/0145561319832253. Epub 2019 Feb 21.

IMPORTANCE:

Otolaryngology residents take the otolaryngology training examination (OTE) yearly to assess their fund of knowledge. The Accreditation Council for Graduate Medical Education (ACGME) milestone evaluations are also conducted semiannually. Accurate prediction of training examination performance allows identification of residents who are performing well and those who need targeted remediation.

Prior studies in other specialties have attempted to use milestone evaluations to help predict in-training examination scores.

OBJECTIVE:

In this study, we aim to identify whether ACGME milestone evaluation scores predict OTE performance.

DESIGN:

Milestone ratings and OTE scores for residents at 2 US otolaryngology residency programs were collected. Multivariate analysis was achieved using linear mixed modeling. We considered a 2-tailed P value of $\leq .05$ as statistically significant.

SETTING:

Two US otolaryngology residency programs.

PARTICIPANTS:

Forty-eight otolaryngology residents postgraduate years 2 to 5.

RESULTS:

Otolaryngology training examination scores and ACGME milestone evaluations were collected from 48 residents from postgraduate year 2 to 5 between the years 2014 and 2017. One hundred eight OTE scores were available. Linear mixed-effect models were constructed, and after adjusting for level of training and OTE year, the total milestone rating made a negligible impact in estimating OTE percentage correct ($\beta = -.01$, $P = .9$). Similarly, total milestone rating demonstrated a minimal contribution in approximating OTE national stanine score after adjusting for the level of training ($\beta = -.003$, $P = .9$).

CONCLUSIONS AND RELEVANCE:

In our study, ACGME milestone evaluations are not predictive of residents' OTE performance. What these milestone evaluation data mean and how they should be used continues to be an unanswered question. We should aim to identify the most effective applications of the milestone data collected yearly by otolaryngology programs.

Identification of Gender Differences in Ultrasound Milestone Assessments during Emergency Medicine Residency Training: A Pilot Study

Acuña J, Situ-LaCasse EH, Patanwala AE, Stolz LA, Amini R, Friedman L, Adhikari S. *Adv Med Educ Pract.* 2019 Mar 27;10:141-145. doi: 10.2147/AMEP.S196140. eCollection 2019.

OBJECTIVES:

Prior literature suggests that incongruities between male and female resident's procedural competency may be explained by gender bias during the evaluation process. There are no known studies investigating gender differences in the assessment of ultrasound-based procedural skills among emergency medicine (EM) residents. The purpose of this study was to evaluate for gender differences in ultrasound milestone assessments among EM residents.

METHODS:

This is a retrospective study including EM residents. Milestone assessment data were collected from a total of 3 Accreditation Council for Graduate Medical Education (ACGME) EM residency programs representing a 3-year period. The outcome measures included mean milestone levels, milestone levels at baseline and graduation and differences in milestone achievement between female and male EM residents. An unpaired Student's t-test was used to compare milestone scores between female and male residents.

RESULTS:

A total of 456 ultrasound milestone evaluations were collected from 91 EM residents (34 females [37%] and 57 males [63%]). No significant differences were noted in the overall mean milestone level between females (2.3 ± 0.6) and males (2.2 ± 0.6) ($P=0.387$). There were no significant differences noted in the ultrasound milestone level between females (0.8 ± 0.6) and males (0.7 ± 0.7) at baseline ($P=0.754$). Although it did not reach statistical significance ($P=0.197$), the increase in the mean ultrasound milestone level from baseline to graduation was greater in males (3.4 ± 0.7) compared to females (3.1 ± 0.7).

CONCLUSION:

Overall, there were no statistically significant differences in the mean ultrasound milestone levels between females and males. The rate of ultrasound milestone level achievement during EM residency training at our institution had a slight tendency to be higher for males than females in the observed residency programs; however, this also did not reach statistical significance. Possible gender bias while evaluating ultrasound milestone levels needs to be further studied on a larger scale.

Predicting Performance of First-Year Residents: Correlations between Structured Interview, Licensure Exam, and Competency Scores in a Multi-Institutional Study

Marcus-Blank B, Dahlke JA, Braman JP, Borman-Shoap E, Tiryaki E, Chipman J, Andrews JS, Sackett PR, Cullen MJ. *Acad Med.* 2019 Mar;94(3):378-387. doi: 10.1097/ACM.0000000000002429.

PURPOSE:

To determine whether scores on structured interview (SI) questions designed to measure non-cognitive competencies in physicians (1) predict subsequent first-year resident performance on Accreditation Council for Graduate Medical Education (ACGME) milestones and (2) add incremental validity over United States Medical Licensing Examination (USMLE) Step 1 and Step 2 Clinical Knowledge (CK) scores in predicting performance.

METHOD:

The authors developed 18 behavioral description questions to measure key non-cognitive competencies (e.g., teamwork). In 2013-2015, 14 programs (13 residency, 1 fellowship) from 6 institutions used subsets of these questions in their selection processes. The authors conducted analyses to determine the validity of SIs and USMLE scores in predicting first-year resident milestone performance in the ACGME's core competency domains and overall.

RESULTS:

SI scores predicted mid-year and year-end overall performance ($r = .18$ and $.19$, respectively, $P < .05$) and year-end performance on patient care, interpersonal and communication skills, and professionalism competencies ($r = .23$, $r = .22$, and $r = .20$, respectively, $p < .05$). SI scores contributed incremental validity over USMLE scores in predicting year-end performance on patient care ($\Delta R = .05$), interpersonal and communication skills ($\Delta R = .09$), and professionalism ($\Delta R = .09$; all $P < .05$). USMLE scores contributed incremental validity over SI scores in predicting year-end performance overall and on patient care and medical knowledge.

CONCLUSIONS:

SI scores predict first-year resident year-end performance in the interpersonal and communication skills, patient care, and professionalism competency domains. Future research should investigate whether SIs predict a range of clinically relevant outcomes.

ACGME Milestones within Subspecialty Training Programs: One Institution's Experience

Heath JK, Dine CJ. J Grad Med Educ. 2019 Feb;11(1):53-59. doi: 10.4300/JGME-D-18-00308.1.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Milestones were created as a criterion-based framework to promote competency-based education during graduate medical education. Despite widespread implementation across subspecialty programs, extensive validity evidence supporting the use of milestones within fellowship training is lacking.

OBJECTIVE:

We assessed the construct and response process validity of milestones in subspecialty fellowship programs in an academic medical center.

METHODS:

From 2014-2016, we performed a single center retrospective cohort analysis of milestone data from fellows across 5 programs. We analyzed summary statistics and performed multivariable linear regression to assess change in milestone ratings by training year and variability in ratings across fellowship programs. Finally, we examined a subset of Professionalism and Interpersonal and Communication Skills subcompetencies from the first 6 months of training to identify the proportion of fellows deemed "ready for independent practice" in these domains.

RESULTS:

Milestone data were available for 68 fellows, with 75933 unique subcompetency ratings. Multivariable linear regression, adjusted for subcompetency and subspecialty, revealed an increase of 0.17 (0.16-0.19) in ratings with each postgraduate year level increase ($P < .005$), as well as significant variation in milestone ratings across subspecialties. For the Professionalism and Interpersonal and Communication Skills domains, mean ratings within the first 6 months of training were 3.78 and 3.95, respectively.

CONCLUSIONS:

We noted a minimal upward trend of milestone ratings in subspecialty training programs, and significant variability in implementing milestones across differing subspecialties. This may suggest possible difficulties with the construct validity and response process of the milestone system in certain medical subspecialties.

Surgical Simulation: Markers of Proficiency

Binkley J, Bukoski AD, Doty J, Crane M, Barnes SL, Quick JA. J Surg Educ. 2019 Jan - Feb;76 (1): 234-241. doi: 10.1016/j.jsurg.2018.05.018. Epub 2018 Jul 6.

OBJECTIVE:

Surgical simulation has become an integral component of surgical training. Simulation proficiency determination has been traditionally based upon time to completion of various simulated tasks. We aimed to determine objective markers of proficiency in surgical simulation by comparing novel assessments with conventional evaluations of technical skill.

DESIGN:

Categorical general surgery residents completed 10 laparoscopic cholecystectomy modules using a high-fidelity simulator. We recorded and analyzed simulation task times, as well as number of hand movements, instrument path length, instrument acceleration, and participant affective engagement during each simulation. Comparisons were made to Objective Structured Assessment of Technical Skill (OSATS) and Accreditation Council for Graduate Medical Education Milestones, as well as previous laparoscopic experience, duration of laparoscopic cholecystectomies performed by participants, and postgraduate year. Comparisons were also made to Fundamentals of Laparoscopic Surgery task times. Spearman's rho was utilized for comparisons, significance set at >0.50 .

SETTING:

University of Missouri, Columbia, Missouri, an academic tertiary care facility.

PARTICIPANTS:

Fourteen categorical general surgery residents (postgraduate year 1-5) were prospectively enrolled.

RESULTS:

One hundred forty simulations were included. The number of hand movements and instrument path lengths strongly correlated with simulation task times (ρ 0.62-0.87, $p < 0.0001$), FLS task completion times (ρ 0.50-0.53, $p < 0.0001$), and prior real-world laparoscopic cholecystectomy experience (ρ -0.51 to -0.53, $p < 0.0001$). No significant correlations were identified between any of the studied markers with Accreditation Council for Graduate Medical Education Milestones, Objective Structured Assessment of Technical Skill evaluations, total previous laparoscopic experience, or postgraduate year level. Neither instrument acceleration nor participant engagement showed significant correlation with any of the conventional markers of real-world or simulation skill proficiency.

CONCLUSIONS:

Simulation proficiency, measured by instrument and hand motion, is more representative of simulation skill than simulation task time, instrument acceleration, or participant engagement.

Application Factors Associated with Clinical Performance during Pediatric Internship: A 5-Year Single Center Retrospective Cohort Study

Gross C J, O'Halloran C, Deshpande S, Lux S, Sectish T, Michelson C, Winn A, Sox C. 64. *Academic Pediatrics*. 2019;(6). doi:10.1016/j.acap.2019.05.078.

BACKGROUND:

The specific components of an application to residency that predict clinical performance during training in pediatrics remain unknown.

METHODS:

Retrospective cohort study of all pediatric interns who matched into the Boston Combined Residency Program from 2013-2017. Demographics, subspecialty track, medical school ranking, USMLE scores, advanced degrees, clerkship grades, Alpha-Omega-Alpha (AOA) and Gold Humanism Honor Society membership, interview day performance, letters of recommendation (LOR) strength, and number of publications were extracted from application materials. The primary outcome was clinical performance at the end of internship, measured as a weighted average of existing ACGME pediatric milestones scores. Linear mixed effects modeling with random effects for grading committee and match year was used to identify factors independently associated with clinical performance. Variables with p-values <0.2 in bivariate analysis were included in the final model.

RESULTS:

223 interns were included in the study. In the model (Table 1), higher average LOR score (B=.07, p=.01), having a master's degree (B =.19, p=.03), and not having a PhD (B =.13, p=.03) were associated with more advanced clinical performance at the end of pediatric internship. AOA membership, medical school ranking, public medical school attendance, time off prior to medical school, number of clerkship honors, and interview score were included in the model, but not significant predictors of clinical performance. The fixed effects explained 15% of the variance in milestones score, while the random effects (match year and grading committee) explained 8% of the variance (marginal R²=.15, conditional R²=.23).

CONCLUSIONS:

Strong letters of recommendation, having a master's degree and not having a PhD are associated with more advanced clinical performance during pediatric internship. However, much of the variance in clinical performance remains unexplained by quantifiable application variables.

Timing of Milestone Competency Acquisition in Neurology Residency: What by When?

Jones LK Jr, Eggers SDZ, Capobianco DJ, Boes CJ. *Neurology*. 2018 Oct 16;91(16):748-754. doi: 10.1212/WNL.0000000000006361. Epub 2018 Sep 14.

OBJECTIVE:

To determine the stage of training at which neurology residents should achieve individual elements of the Accreditation Council for Graduate Medical Education neurology Milestones and to examine the relationship between perceived importance of Milestones and the stage by which they should be achieved.

METHODS:

A modified Delphi technique was used to establish consensus postgraduate year (PGY) expectations for neurology Milestone competencies across 3 geographically and administratively distinct Mayo Clinic neurology residency programs. Timing expectations were examined for relationships to perceived importance of the individual Milestones and effects of participant characteristics.

RESULTS:

PGY expectations for neurology Milestone elements ranged from PGY 1.3 to PGY 4.1. Extent of rater educational seniority had no effect on PGY competency expectations. There was a moderate inverse relationship between perceived importance of the Milestone element and the PGY by which it should be achieved ($r_s = -0.74$, $p < 0.0001$).

CONCLUSIONS AND RELEVANCE:

Expectations for neurology Milestone competency acquisition can be measured and may help inform individual program design, educational expectations, and future Milestone design.

Visuospatial Aptitude Testing Differentially Predicts Simulated Surgical Skill

Hinchcliff E, Green I, Destephano C, Cox M, Smink D, Kumar A, Hokenstad E, Bengtson J, Cohen SL. *J Minim Invasive Gynecol.* 2018 Sep - Oct;25(6):1044-1050. doi: 10.1016/j.jmig.2018.01.031. Epub 2018 Feb 5.

OBJECTIVE:

To determine whether visuospatial perception (VSP) testing is correlated to simulated or intraoperative surgical performance as rated by the American College of Graduate Medical Education (ACGME) milestones.

DESIGN: (Canadian Task Force classification II-2).

SETTING: Two academic training institutions.

PARTICIPANTS:

Forty-one residents, including 19 from Brigham and Women's Hospital and 22 from the Mayo Clinic, from 3 different specialties: obstetrics and gynecology, general surgery, and urology.

INTERVENTION:

Participants underwent 3 different tests: visuospatial perception testing (VSP), Fundamentals of Laparoscopic Surgery (FLS) peg transfer, and da Vinci robotic simulation peg transfer. Surgical grading from the ACGME milestones tool was obtained for each participant. Demographic and background information was also collected, including specialty, year of training, previous experience with simulated skills, and surgical interest. Standard statistical analyses were performed using Student's t test, and correlations were determined using adjusted linear regression models.

MEASUREMENTS AND MAIN RESULTS:

In univariate analysis, Brigham and Women's Hospital and Mayo Clinic training programs differed in times and overall scores for both the FLS peg transfer and da Vinci robotic simulation peg transfer tests ($p < .05$ for all). In addition, type of residency training affected time and overall score on the robotic peg transfer test. Familiarity with tasks correlated with higher score and faster task completion ($p = .05$ for all except VSP score). There were no differences in VSP scores by program, specialty, or year of training. In adjusted linear regression modeling, VSP testing was correlated only to robotic peg transfer skills (average time, $p = .006$; overall score, $p = .001$). Milestones did not correlate to either VSP or surgical simulation testing.

CONCLUSION:

VSP score was correlated with robotic simulation skills, but not with FLS skills or ACGME milestones. This suggests that the ability of VSP score to predict competence differs between tasks. Therefore, further investigation of aptitude testing is needed, especially before its integration as an entry examination into a surgical subspecialty.

Pediatric Program Director Minimum Milestone Expectations before Allowing Supervision of Others and Unsupervised Practice

Li ST, Tancredi DJ, Schwartz A, Guillot A, Burke AE, Trimm RF, Guralnick S, Mahan JD, Gifford K. *Acad Pediatr*. 2018 Sep - Oct;18(7):828-836. doi: 10.1016/j.acap.2018.04.010. Epub 2018 Apr 25.

BACKGROUND:

The Accreditation Council for Graduate Medical Education requires semiannual Milestone reporting on all residents. Milestone expectations of performance are unknown.

OBJECTIVE:

Determine pediatric program director (PD) minimum Milestone expectations for residents prior to being ready to supervise and prior to being ready to graduate.

METHODS:

Mixed methods survey of pediatric PDs on their programs' Milestone expectations before residents are ready to supervise and before they are ready to graduate, and in what ways PDs use Milestones to make supervision and graduation decisions. If programs had no established Milestone expectations, PDs indicated expectations they considered for use in their program. Mean minimum Milestone level expectations adjusted for program size, region, and clustering of Milestone expectations by program were calculated for prior to supervise and prior to graduate. Free-text questions were analyzed using thematic analysis.

RESULTS:

The response rate was 56.8% (113/199). Most programs had no required minimum Milestone level before residents are ready to supervise (80%; 76/95) or ready to graduate (84%; 80/95). For readiness to supervise, minimum Milestone expectations PDs considered establishing for their program were highest for humanism (2.46, 95% CI: 2.21-2.71) and professionalization (2.37, 2.15-2.60). Minimum Milestone expectations for graduates were highest for help-seeking (3.14, 2.83-3.46). Main themes included the use of Milestones in combination with other information to assess learner performance and Milestones are not equally weighted when making advancement decisions.

CONCLUSIONS:

Most PDs have not established program minimum Milestones, but would vary such expectations by competency.

Challenges in Measuring ACGME Competencies: Considerations for Milestones

Natesan P, Batley NJ, Bakhti R, El-Doueihi PZ. *Int J Emerg Med*. 2018 Sep 28;11(1):39. doi: 10.1186/s12245-018-0198-3.

BACKGROUND:

Measuring milestones, competencies, and sub-competencies as residents progress through a training program is an essential strategy in Accreditation Council for Graduate Medical Education (ACGME)'s attempts to ensure graduates meet expected professional standards.

Previous studies have found, however, that physicians make global ratings often by using a single criterion.

METHODS:

We use advanced statistical analysis to extend these studies by examining the validity of ACGME International competency measures for an international setting, across emergency medicine (EM) and neurology, and across evaluators. Confirmatory factor analysis (CFA) models were fitted to both EM and neurology data. A single-factor CFA was hypothesized to fit each dataset. This model was modified based on model fit indices. Differences in how different EM physicians perceived the core competencies were tested using a series of measurement invariance tests.

RESULTS:

Extremely high alpha reliability coefficients, factor coefficients ($> .93$), and item correlations indicated multicollinearity, that is, most items being evaluated could essentially replace the underlying construct itself. This was true for both EM and neurology data, as well as all six EM faculty.

CONCLUSIONS:

Evaluation forms measuring the six core ACGME competencies did not possess adequate validity. Severe multicollinearity exists for the six competencies in this study. ACGME is introducing milestones with 24 sub-competencies. Attempting to measure these as discrete elements, without recognizing the inherent weaknesses in the tools used will likely serve to exacerbate an already flawed strategy. Physicians likely use their "gut feelings" to judge a resident's overall performance. A better process could be conceived in which this subjectivity is acknowledged, contributing to more meaningful evaluation and feedback.

National Internal Medicine Milestone Ratings: Validity Evidence from Longitudinal Three-Year Follow-Up

Hauer KE, Vandergrift J, Lipner RS, Holmboe ES, Hood S, McDonald FS. Acad Med. 2018 Aug;93(8):1189-1204. doi: 10.1097/ACM.0000000000002234.

PURPOSE:

To evaluate validity evidence for internal medicine milestone ratings across programs for three resident cohorts by quantifying "not assessable" ratings; reporting mean longitudinal milestone ratings for individual residents; and correlating medical knowledge ratings across training years with certification examination scores to determine predictive validity of milestone ratings for certification outcomes.

METHOD:

This retrospective study examined milestone ratings for postgraduate year (PGY)-1-3 residents in United States internal medicine residency programs. Data sources included milestone ratings, program characteristics, and certification examination scores.

RESULTS:

Among 35,217 participants, there was a decreased percentage with "not assessable" ratings across years: 1,566 (22.5%) PGY-1s in 2013-2014 versus 1,219 (16.6%) in 2015-2016 ($P = .01$), and 342 (5.1%) of PGY-3s in 2013-2014 versus 177 (2.6%) in 2015-2016 ($P = .04$). For individual residents with three years of ratings, mean milestone ratings increased from around 3 (behaviors of an early learner or advancing resident) in PGY-1 (ranging from a mean of 2.73 to 3.19 across subcompetencies) to around 4 (ready for unsupervised practice) in PGY-3 (mean of 4.00 to 4.22 across subcompetencies, $P < .001$ for all subcompetencies). For each increase of 0.5 units in two medical knowledge (MK1, MK2) subcompetency ratings, the difference in examination scores for PGY-3s was 19.5 points for MK1 ($P < .001$) and 19.0 for MK2 ($P < .001$).

CONCLUSIONS:

These findings provide evidence of validity of the milestones by showing how training programs have applied them over time and how milestones predict other training outcomes.

A Survey on Recent Medical School Graduate Comfort with the Level 1 Milestones

Petravick ME, Marsh JL, Karam MD, Dirschl DR. J Surg Educ. 2018 Jul - Aug;75(4):911-917. doi: 10.1016/j.jsurg.2017.10.004. Epub 2017 Nov 7.

OBJECTIVE:

The Next Accreditation System implemented 5 levels of milestones for orthopedic surgery residents in 2013. The Level 1 milestones were noted as those "expected of an incoming resident." While the milestones were intended for assessing resident progression and readiness for independent practice, this designation can also be used to assess how well prepared graduating medical students are for beginning an orthopedic surgery residency. The primary objective of this paper is to measure recent medical school graduate comfort with the Level 1 milestones.

DESIGN, SETTING, AND PARTICIPANTS:

In June 2015, the program directors for the Midwest Orthopaedic Surgical Skills (MOSS) Consortium affiliated residency programs were sent an online survey for distribution to the recent medical school graduates who matched at their respective programs. The survey was about recent graduate comfort with the Level 1 milestone handles associated with 16 orthopedic milestones spanning multiple subspecialties. Responses were grouped based on comfort with individual milestone handles with orthopedic conditions (e.g., carpal tunnel) or with broader categories spanning orthopedic milestones (e.g., imaging).

RESULTS:

In all, 66 of 112 graduates (58.9%) responded. Of 60 milestone handles surveyed, respondents were "Comfortable" with an average of 31.6 ± 14.2 handles with some conditions performing much better than others. The median "Comfortable" response rate was 31 handles. The 8 broader categories had "Comfortable" response rates between 35% and 70%. All 8 orthopedic conditions had significantly higher "Comfortable" response rates for "Evaluation & Knowledge" handles than for "Decision Making & Treatment" handles.

CONCLUSIONS:

Most recent medical student graduates who matched into an orthopedic surgery residencies are only comfortable with about half of the Level 1 milestone handles even though they are expected to meet the Level 1 milestones upon beginning residency. This finding suggests the development of an assessment based on the Level 1 milestones would be appropriate to better inform both graduate and undergraduate medical education in orthopedic surgery.

Surgical Simulation: Markers of Proficiency

Binkley J, Bukoski AD, Doty J, Crane M, Barnes SL, Quick JA. J Surg Educ. 2018 Jul 5. pii: S1931-7204(18)30055-2. doi: 10.1016/j.jsurg.2018.05.018.

OBJECTIVE:

Surgical simulation has become an integral component of surgical training. Simulation proficiency determination has been traditionally based upon time to completion of various simulated tasks. We aimed to determine objective markers of proficiency in surgical simulation by comparing novel assessments with conventional evaluations of technical skill.

DESIGN:

Categorical general surgery residents completed 10 laparoscopic cholecystectomy modules using a high-fidelity simulator. We recorded and analyzed simulation task times, as well as number of hand movements, instrument path length, instrument acceleration, and participant affective engagement during each simulation. Comparisons were made to Objective Structured Assessment of Technical Skill (OSATS) and Accreditation Council for Graduate Medical Education Milestones, as well as previous laparoscopic experience, duration of laparoscopic cholecystectomies performed by participants, and postgraduate year. Comparisons were also made to Fundamentals of Laparoscopic Surgery task times. Spearman's rho was utilized for comparisons, significance set at >0.50 .

SETTING:

University of Missouri, Columbia, Missouri, an academic tertiary care facility.

PARTICIPANTS:

Fourteen categorical general surgery residents (postgraduate year 1-5) were prospectively enrolled.

RESULTS:

One hundred forty simulations were included. The number of hand movements and instrument path lengths strongly correlated with simulation task times (ρ 0.62-0.87, $p < 0.0001$), FLS task completion times (ρ 0.50-0.53, $p < 0.0001$), and prior real-world laparoscopic cholecystectomy experience (ρ -0.51 to -0.53, $p < 0.0001$). No significant correlations were identified between any of the studied markers with Accreditation Council for Graduate Medical Education Milestones, Objective Structured Assessment of Technical Skill evaluations, total previous laparoscopic experience, or postgraduate year level. Neither instrument acceleration nor participant engagement showed significant correlation with any of the conventional markers of real-world or simulation skill proficiency.

CONCLUSIONS:

Simulation proficiency, measured by instrument and hand motion, is more representative of simulation skill than simulation task time, instrument acceleration, or participant engagement.

An Analysis of Residents' Self Evaluation and Faculty Evaluation in Internal Medicine Standardized Residency Training Program using Milestones Evaluation System

Zhang Y, Chu XT, Zeng XJ, Li H, Zhang FC, Zhang SY, Shen T. Zhonghua Nei Ke Za Zhi. 2018 Jun 1;57(6):440-445. doi: 10.3760/cma.j.issn.0578-1426.2018.06.009.

OBJECTIVE:

To assess the value of internal medicine residency training program at Peking Union Medical College Hospital (PUMCH), and the feasibility of applying revised Milestones evaluation system.

METHODS:

Postgraduate-year-one to four (PGY-1 to PGY-4) residents in PUMCH finished the revised Milestones evaluation scales in September 2017. Residents' self-evaluation and faculty- evaluation scores were calculated. Statistical analysis was conducted on the data.

RESULTS:

A total of 207 residents were enrolled in this cross-sectional study. Both self and faculty scores showed an increasing trend in senior residents. PGY-1 residents were assessed during their first month of residency with scores of 4 points or higher, suggesting that residents have a high starting level. More strikingly, the mean score in PGY-4 was 7 points or higher, proving the career development of residency training program. There was no statistically significant difference between total self- and faculty-evaluation scores. Evaluation scores of learning ability and communication ability were lower in faculty group ($t=-2.627, -4.279$, all $P<0.05$). The scores in graduate students were lower than those in standardized training residents.

CONCLUSIONS:

The goal of national standardized residency training is to improve the quality of healthcare and residents' career development. The evaluation results would guide curriculum design and emphasize the importance and necessity of multi-level teaching. Self-evaluation contributes to the understanding of training objectives and personal cognition.

Case Reporting, Competence, and Confidence: A Discrepancy in the Numbers

Shah D, Haisch CE, Noland SL. *J Surg Educ.* 2018 Mar - Apr;75(2):304-312. doi: 10.1016/j.jsurg.2018.01.007. Epub 2018 Feb 1.

PURPOSE:

The Accreditation Council for Graduate Medical Education (ACGME) continues to play an integral role in accreditation of surgical programs. The institution of case logs to demonstrate competency of graduating residents is a key component of evaluation. This study compared the number of vascular cases a surgical resident has completed according to the ACGME operative log to their operative proficiency, quality of anastomosis, operative experience, and confidence in both a simulation and operative setting.

MATERIALS AND METHODS:

General surgery residents ranging from PGY 1 to 5 participated in a simulation laboratory in which they completed an end-to-side vascular anastomosis. Each participant was given a weighted score based on technical proficiency and anastomosis quality using a previously validated Global Rating Scale (Duran et al, 2014). These scores were correlated to the General Surgery Milestones. Participants completed preoperative and postoperative surveys assessing resident operative experience using the 4-level Zwisch scale (DaRosa et al., 2013), confidence with vascular procedures and confidence performing simulated anastomoses. Confidence was assessed on a scale from 1 to 9 (not confident to extremely confident). Case logs were recorded for each participant. An IRB approved questionnaire was distributed to assess preoperative and postoperative roles of both the resident physician and faculty, with a defined goal. Univariate and multivariate analysis was performed.

RESULTS:

Twenty-one general surgery residents were evaluated in the simulation laboratory and 8 residents were assessed intraoperatively. The residents were evenly distributed throughout clinical years. Groups of residents were divided into quartiles based upon the number of vascular cases recorded in the ACGME database. No correlation was found between number of cases, Milestones score and the weighted score ($p = 0.94$). No statistical significance was found between confidence and quality of anastomosis ($p = 0.1$). Resident operative experience per the Zwisch scale was categorized most commonly as "Smart Help" by both the trainee and attending surgeon, despite mean resident confidence ratings of 6.67 (± 1.61) with vascular procedures.

CONCLUSIONS:

ACGME case logs, which are utilized to assess readiness for completion of general surgery residency, may not be indicative of a resident's operative competency and technical proficiency. Confidence is not correlated with technical ability. Faculty and resident insight as to their role in a procedure differ, as faculty feel that they are providing less help than the resident perceives. Careful examination of resident operative technique is the best measure of competency.

Simulation for Assessment of Milestones in Emergency Medicine Residents

Hart D, Bond W, Siegelman JN, Miller D, Cassara M, Barker L, Anders S, Ahn J, Huang H, Strother C, Hui J. Acad Emerg Med. 2018 Feb;25(2):205-220. doi: 10.1111/acem.13296. Epub 2017 Nov 9.

OBJECTIVES:

All residency programs in the United States are required to report their residents' progress on the milestones to the Accreditation Council for Graduate Medical Education (ACGME) biannually. Since the development and institution of this competency-based assessment framework, residency programs have been attempting to ascertain the best ways to assess resident performance on these metrics. Simulation was recommended by the ACGME as one method of assessment for many of the milestone subcompetencies. We developed three simulation scenarios with scenario-specific milestone-based assessment tools. We aimed to gather validity evidence for this tool.

METHODS:

We conducted a prospective observational study to investigate the validity evidence for three mannequin-based simulation scenarios for assessing individual residents on emergency medicine (EM) milestones. The subcompetencies (i.e., patient care [PC]1, PC2, PC3) included were identified via a modified Delphi technique using a group of experienced EM simulationists. The scenario-specific checklist (CL) items were designed based on the individual milestone items within each EM subcompetency chosen for assessment and reviewed by experienced EM simulationists. Two independent live raters who were EM faculty at the respective study sites scored each scenario following brief rater training. The inter-rater reliability (IRR) of the assessment tool was determined by measuring intraclass correlation coefficient (ICC) for the sum of the CL items as well as the global rating scales (GRSs) for each scenario. Comparing GRS and CL scores between various postgraduate year (PGY) levels was performed with analysis of variance.

RESULTS:

Eight subcompetencies were chosen to assess with three simulation cases, using 118 subjects. Evidence of test content, internal structure, response process, and relations with other variables were found. The ICCs for the sum of the CL items and the GRSs were >0.8 for all cases, with one exception (clinical management GRS = 0.74 in sepsis case). The sum of CL items and GRSs ($p < 0.05$) discriminated between PGY levels on all cases. However, when the specific CL items were mapped back to milestones in various proficiency levels, the milestones in the higher proficiency levels (level 3 [L3] and 4 [L4]) did not often discriminate between various PGY levels. L3 milestone items discriminated between PGY levels on five of 12 occasions they were assessed, and L4 items discriminated only two of 12 times they were assessed.

CONCLUSION:

Three simulation cases with scenario-specific assessment tools allowed evaluation of EM residents on proficiency L1 to L4 within eight of the EM milestone subcompetencies. Evidence of test content, internal structure, response process, and relations with other variables were found. Good to excellent IRR and the ability to discriminate between various PGY levels was found for both the sum of CL items and the GRSs. However, there was a lack of a positive relationship between advancing PGY level and the completion of higher-level milestone items (L3 and L4).

Competency Assessment in Family Medicine Residency: Observations, Knowledge-Based Examinations, and Advancement

Mainous AG 3rd, Fang B, Peterson LE. J Grad Med Educ. 2017 Dec;9(6):730-734. doi: 10.4300/JGME-D-17-00212.1.

BACKGROUND:

The Family Medicine (FM) Milestones are competency-based assessments of residents in key dimensions relevant to practice in the specialty. Residency programs use the milestones in semiannual reviews of resident performance from the time of entry into the program to graduation.

OBJECTIVE:

Using a national sample, we investigated the relationship of FM competency-based assessments to resident progress and the complementarity of milestones with knowledge-based assessments in FM residencies.

METHODS:

We used midyear and end-of-year milestone ratings for all FM residents in Accreditation Council for Graduate Medical Education-accredited programs during academic years 2014-2015 and 2015-2016. The milestones contain 22 items across 6 competencies. We created a summative index across the milestones. The American Board of Family Medicine database provided resident demographics and in-training examination (ITE) scores. We linked information to the milestone data.

RESULTS:

The sample encompassed 6630 FM residents. The summative milestone index increased, on average, for each cohort (postgraduate year 1 [PGY-1] to PGY-2 and PGY-2 to PGY-3) at each assessment. The correlation between the milestone index that excluded the medical knowledge milestone and ITE scores was $r = .195$ ($P < .001$) for PGY-1 to PGY-2 cohort and $r = .254$ ($P < .001$) for PGY-2 to PGY-3 cohort. For both cohorts, ITE scores and composite milestone assessments were higher for residents who advanced than for those who did not.

CONCLUSIONS:

Competency-based assessment using the milestones for FM residents seems to be a viable multidimensional tool to assess the successful progression of residents.

A Multicenter Prospective Comparison of the Accreditation Council for Graduate Medical Education Milestones: Clinical Competency Committee vs. Resident Self-Assessment

Watson RS, Borgert AJ, O Heron CT, Kallies KJ, Sidwell RA, Mellinger JD, Joshi AR, Galante JM, Chambers LW, Morris JB, Josloff RK, Melcher ML, Fuhrman GM, Terhune KP, Chang L, Ferguson EM, Auyang ED, Patel KR, Jarman BT. *J Surg Educ.* 2017 Nov - Dec;74(6):e8-e14. doi: 10.1016/j.jsurg.2017.06.009. Epub 2017 Jun 27.

OBJECTIVE:

The Accreditation Council for Graduate Medical Education requires accredited residency programs to implement competency-based assessments of medical trainees based upon nationally established Milestones. Clinical competency committees (CCC) are required to prepare biannual reports using the Milestones and ensure reporting to the Accreditation Council for Graduate Medical Education. Previous research demonstrated a strong correlation between CCC and resident scores on the Milestones at 1 institution. We sought to evaluate a national sampling of general surgery residency programs and hypothesized that CCC and resident assessments are similar.

DESIGN:

Details regarding the makeup and process of each CCC were obtained. Major disparities were defined as an absolute mean difference of ≥ 0.5 on the 4-point scale. A negative assessment disparity indicated that the residents evaluated themselves at a lower level than did the CCC. Statistical analysis included Wilcoxon rank sum and Sign tests.

SETTING:

CCCs and categorical general surgery residents from 15 residency programs completed the Milestones document independently during the spring of 2016.

RESULTS:

Overall, 334 residents were included; 44 (13%) and 43 (13%) residents scored themselves ≥ 0.5 points higher and lower than the CCC, respectively. Female residents scored themselves a mean of 0.08 points lower, and male residents scored themselves a mean of 0.03 points higher than the CCC. Median assessment differences for postgraduate year (PGY)-1-5 were 0.03 (range: -0.94 to 1.28), -0.11 (range: -1.22 to 1.22), -0.08 (range: -1.28 to 0.81), 0.02 (range: -1.00 to 1.00), and -0.19 (range: -1.16 to 0.50), respectively. Residents in university vs. independent programs had higher rates of negative assessment differences in medical knowledge (15% vs. 6%; $P = 0.015$), patient care (17% vs. 5%; $P = 0.002$), professionalism (23% vs. 14%; $P = 0.013$), and system-based practice (18% vs. 9%; $P = 0.031$) competencies. Major assessment disparities by sex or PGY were similar among individual competencies.

CONCLUSIONS:

Surgery residents in this national cohort demonstrated self-awareness when compared to assessments by their respective CCCs. This was independent of program type, sex, or level of training. PGY 5 residents, female residents, and those from university programs consistently rated themselves lower than the CCC, but these were not major disparities and the significance of this is unclear.

Validity Evidence from Ratings of Pediatric Interns and Subinterns on a Subset of Pediatric Milestones

Turner TL, Bhavaraju VL, Luciw-Dubas UA, Hicks PJ, Multerer S, Osta A, McDonnell J, Poynter S, Schumacher DJ, Tenney-Soeiro R, Waggoner-Fountain L, Schwartz A; and the Association of Pediatric Program Directors Longitudinal Educational Assessment Research Network–National Board of Medical Examiners Pediatrics Milestones Assessment Group. *Acad Med.* 2017 Jun;92(6):809-819. doi: 10.1097/ACM.0000000000001622.

PURPOSE:

To investigate evidence for validity of faculty members' pediatric milestone (PM) ratings of interns (first-year residents) and subinterns (fourth-year medical students) on nine subcompetencies related to readiness to serve as a pediatric intern in the inpatient setting.

METHOD:

The Association of Pediatric Program Directors Longitudinal Educational Assessment Research Network (APPD LEARN) and the National Board of Medical Examiners collaborated to investigate the utility of assessments of the PMs for trainees' performance. Data from 32 subinterns and 179 interns at 17 programs were collected from July 2012 through April 2013. Observers used several tools to assess learners. At each site, a faculty member used these data to make judgments about the learner's current developmental milestone in each subcompetency. Linear mixed models were fitted to milestone judgments to examine their relationship with learner's rank and subcompetency.

RESULTS:

On a 5-point developmental scale, mean milestone levels for interns ranged from 3.20 (for the subcompetency Work effectively as a member of a team) to 3.72 (Humanism) and for subinterns from 2.89 (Organize and prioritize care) to 3.61 (Professionalization). Mean milestone ratings were significantly higher for the Professionalism competency (3.59-3.72) for all trainees compared with Patient Care (2.89-3.24) and Personal and Professional Development (3.33-3.51). Mean intern ratings were significantly higher than mean subintern ratings for all nine subcompetencies except Professionalization, Humanism, and Trustworthiness.

CONCLUSIONS:

The PMs had a coherent internal structure and could distinguish between differing levels of trainees, which supports their validation for documenting developmental progression of pediatric trainees.

Examining the Functioning and Reliability of the Family Medicine Milestones

Peabody MR, O'Neill TR, Peterson LE. J Grad Med Educ. 2017 Feb;9(1):46-53. doi: 10.4300/JGME-D-16-00172.1.

BACKGROUND:

The Family Medicine (FM) Milestones are a framework designed to assess development of residents in key dimensions of physician competency. Residency programs use the milestones in semiannual reviews of resident performance from entry toward graduation.

OBJECTIVE:

To examine the functioning and reliability of the FM Milestones and to determine whether they measure the amount of a latent trait (eg, knowledge or ability) possessed by a resident or simply indicate where a resident falls along the training sequence.

METHODS:

This study utilized the Rasch Partial Credit model to examine academic year 2014-2015 ratings for 10563 residents from 476 residency programs (postgraduate year [PGY] 1 = 3639; PGY-2 = 3562; PGY-3 = 3351; PGY-4 = 11).

RESULTS:

Reliability was exceptionally high at 0.99. Mean scores were 3.2 (SD = 1.3) for PGY-1; 5.0 (SD = 1.3) for PGY-2; 6.7 (SD = 1.2) for PGY-3; and 7.4 (SD = 1.0) for PGY-4. Keyform analysis showed a rating on 1 item was likely to be similar for all other items.

CONCLUSIONS:

Our findings suggest that FM Milestones seem to largely function as intended. Lack of spread in item difficulty and lack of variation in category probabilities show that FM Milestones do not measure the amount of a latent trait possessed by a resident, but rather describe where a resident falls along the training sequence. High reliability indicates residents are being rated in a stable manner as they progress through residency, and individual residents deviating from this rating structure warrant consideration by program leaders.

Correlations between Ratings on the Resident Annual Evaluation Summary and the Internal Medicine Milestones and Association with ABIM Certification Examination Scores among US Internal Medicine Residents, 2013-2014

Hauer KE, Vandergrift J, Hess B, Lipner RS, Holmboe ES, Hood S, Iobst W, Hamstra SJ, McDonald FS. JAMA. 2016 Dec 6;316(21):2253-2262. doi: 10.1001/jama.2016.17357.

IMPORTANCE:

US internal medicine residency programs are now required to rate residents using milestones. Evidence of validity of milestone ratings is needed.

OBJECTIVE:

To compare ratings of internal medicine residents using the pre-2015 resident annual evaluation summary (RAES), a non-developmental rating scale, with developmental milestone ratings.

DESIGN, SETTING, AND PARTICIPANTS:

Cross-sectional study of US internal medicine residency programs in the 2013-2014 academic year, including 21 284 internal medicine residents (7048 postgraduate-year 1 [PGY-1], 7233 PGY-2, and 7003 PGY-3).

EXPOSURES:

Program director ratings on the RAES and milestone ratings.

MAIN OUTCOMES AND MEASURES:

Correlations of RAES and milestone ratings by training year; correlations of medical knowledge ratings with American Board of Internal Medicine (ABIM) certification examination scores; rating of unprofessional behavior using the 2 systems.

RESULTS:

Corresponding RAES ratings and milestone ratings showed progressively higher correlations across training years, ranging among competencies from 0.31 (95% CI, 0.29 to 0.33) to 0.35 (95% CI, 0.33 to 0.37) for PGY-1 residents to 0.43 (95% CI, 0.41 to 0.45) to 0.52 (95% CI, 0.50 to 0.54) for PGY-3 residents (all P values <.05). Linear regression showed ratings differed more between PGY-1 and PGY-3 years using milestone ratings than the RAES (all P values <.001). Of the 6260 residents who attempted the certification examination, the 618 who failed had lower ratings using both systems for medical knowledge than did those who passed (RAES difference, -0.9; 95% CI, -1.0 to -0.8; P < .001; milestone medical knowledge 1 difference, -0.3; 95% CI, -0.3 to -0.3; P < .001; and medical knowledge 2 difference, -0.2; 95% CI, -0.3 to -0.2; P < .001). Of the 26 PGY-3 residents with milestone ratings indicating deficiencies on either of the 2 medical knowledge subcompetencies, 12 failed the certification examination. Correlation of RAES ratings for professionalism with residents' lowest professionalism milestone ratings was 0.44 (95% CI, 0.43 to 0.45; P <.001).

CONCLUSIONS AND RELEVANCE:

Among US internal medicine residents in the 2013-2014 academic year, milestone-based ratings correlated with RAES ratings but with a greater difference across training years. Both rating systems for medical knowledge correlated with ABIM certification examination scores. Milestone ratings may better detect problems with professionalism. These preliminary findings may inform establishment of the validity of milestone-based assessment.

Using the ACGME Milestones for Resident Self-Evaluation and Faculty Engagement

Meier AH, Gruessner A, Cooney RN. J Surg Educ. 2016 Nov-Dec;73(6):e150-e157. doi: 10.1016/j.jsurg.2016.09.001.

BACKGROUND:

Since July 2014 General Surgery residency programs have been required to use the Accreditation Council for Graduate Medical Education milestones twice annually to assess the progress of their trainees. We felt this change was a great opportunity to use this new evaluation tool for resident self-assessment and to furthermore engage the faculty in the educational efforts of the program.

METHODS:

We piloted the milestones with postgraduate year (PGY) II and IV residents during the 2013/2014 academic year to get faculty and residents acquainted with the instrument. In July 2014, we implemented the same protocol for all residents. Residents meet with their advisers quarterly. Two of these meetings are used for milestones assessment. The residents perform an independent self-evaluation and the adviser grades them independently. They discuss the evaluations focusing mainly on areas of greatest disagreement. The faculty member then presents the resident to the clinical competency committee (CCC) and the committee decides on the final scores and submits them to the Accreditation Council for Graduate Medical Education website. We stored all records anonymously in a MySQL database. We used Anova with Tukey post hoc analysis to evaluate differences between groups. We used intraclass correlation coefficients and Krippendorff's α to assess interrater reliability.

RESULTS:

We analyzed evaluations for 44 residents. We created scale scores across all Likert items for each evaluation. We compared score differences by PGY level and raters (self, adviser, and CCC). We found highly significant increases of scores between most PGY levels ($p < 0.05$). There were no significant score differences per PGY level between the raters. The interrater reliability for the total score and 6 competency domains was very high (ICC: 0.87-0.98 and α : 0.84-0.97). Even though this milestone evaluation process added additional work for residents and faculty we had very good participation (93.9% by residents and 92.9% by faculty) and feedback was generally positive.

CONCLUSION:

Even though implementation of the milestones has added additional work for general surgery residency programs, it has also opened opportunities to furthermore engage the residents in reflection and self-evaluation and to create additional venues for faculty to get involved with the educational process within the residency program. Using the adviser as the initial rater seems to correlate closely with the final CCC assessment. Self-evaluation by the resident is a requirement by the RRC and the milestones seem to be a good instrument to use for this purpose. Our early assessment suggests the milestones provide a useful instrument to track trainee progression through their residency.

The Internal Medicine Reporting Milestones: Cross-Sectional Description of Initial Implementation in US Residency Programs

Hauer KE, Clauser J, Lipner RS, Holmboe ES, Caverzagie K, Hamstra SJ, Hood S, Iobst W, Warm E, McDonald FS. *Ann Intern Med.* 2016 Sep 6;165(5):356-62. doi: 10.7326/M15-2411. Epub 2016 May 10.

BACKGROUND:

High-quality assessment of resident performance is needed to guide individual residents' development and ensure their preparedness to provide patient care. To facilitate this aim, reporting milestones are now required across all internal medicine (IM) residency programs.

OBJECTIVE:

To describe initial milestone ratings for the population of IM residents by IM residency programs.

DESIGN:

Cross-sectional study.

SETTING:

IM residency programs.

PARTICIPANTS:

All IM residents whose residency program directors submitted milestone data at the end of the 2013-2014 academic year.

MEASUREMENTS:

Ratings addressed 6 competencies and 22 subcompetencies. A rating of "not assessable" indicated insufficient information to evaluate the given subcompetency. Descriptive statistics were calculated to describe ratings across competencies and training years.

RESULTS:

Data were available for all 21 774 U.S. IM residents from all 383 programs. Overall, 2889 residents (1621 in postgraduate year 1 [PGY-1], 902 in PGY-2, and 366 in PGY-3) had at least 1 subcompetency rated as not assessable. Summaries of average ratings by competency and training year showed higher ratings for PGY-3 residents in all competencies. Overall ratings for each of the 6 individual competencies showed that fewer than 1% of third-year residents were rated as "unsatisfactory" or "conditional on improvement." However, when subcompetency milestone ratings were used, 861 residents (12.8%) who successfully completed training had at least 1 competency with all corresponding subcompetencies graded below the threshold of "readiness for unsupervised practice."

LIMITATION:

Data were derived from a point in time in the first reporting period in which milestones were used.

CONCLUSION:

The initial milestone-based evaluations of IM residents nationally suggest that documenting developmental progression of competency is possible over training years. Subcompetencies may identify areas in which residents might benefit from additional feedback and experience. Future work is needed to explore how milestones are used to support residents' development and enhance residency curricula.

A First Look at the Accreditation Council for Graduate Medical Education Anesthesiology Milestones: Implementation of Self-Evaluation in a Large Residency Program

Ross FJ, Metro DG, Beaman ST, Cain JG, Dowdy MM, Apfel A, Jeong JH, Ibinson JW. J Clin Anesth. 2016 Aug;32:17-24. doi: 10.1016/j.jclinane.2015.12.026. Epub 2016 Mar 22.

STUDY OBJECTIVE:

The objective was to determine if there is a correlation between resident postgraduate year (PGY) of training and self-evaluation of performance using the Accreditation Council for Graduate Medical Education milestones.

DESIGN:

Survey.

SETTING:

Residency program at a large academic center.

PATIENTS:

Residents and Faculty Clinical Competency Committee (CCC).

INTERVENTIONS:

None.

MEASUREMENTS:

Resident and CCC milestone scores.

MAIN RESULTS:

Correlation coefficients for average score for each milestone vs PGY level ranged from 0.80 for receiving and giving feedback to 0.95 for anesthetic choice and conduct. All milestones showed a relatively linear relationship with PGY of training, and none were found to be consistently reached very late or very early in training. When examining variation across the scores for the individual residents, the distributions for PGY-2 and -3 appeared to be wider than those for PGY-1 and -4. The intraclass correlation coefficients ranged from 0.718 to 0.928.

CONCLUSIONS:

There was a remarkable degree of consistency in the relationship between level of training and resident self-assessment score for every milestone, as well as strong agreement between the resident and CCC faculty scores. Examination of the variance in the scores, when interpreted in light of our particular training program's characteristics, suggests that the milestones accurately reflect the progression in skill across the residency. In addition, given the concordance between the self-evaluation scores and the CCC faculty scores, self-evaluation may be a reasonable starting point as programs begin the daunting task of determining scores for each of the 25 milestones as part of the biannual evaluation process.

Pathology Milestones: Assessing Clinical Competency by Committee

Klutts JS, Guerin LA, Bruch LA, Firchau DJ, Knudson CM, Rosenthal NS, Samuelson MI, Jensen CS, Delwiche JL, Krasowski MD. Acad Pathol. 2015 Oct 29;2(4):2374289515614003. doi: 10.1177/2374289515614003. eCollection 2015 Oct-Dec.

ABSTRACT:

All Accreditation Council for Graduate Medical Education accredited pathology residency training programs are now required to evaluate residents using the new Pathology Milestones assessment tool. Similar to implementation of the 6 Accreditation Council for Graduate Medical Education competencies a decade ago, there have been challenges in implementation of the new milestones for many residency programs. The pathology department at the University of Iowa has implemented a process that divides the labor of the task in rating residents while also maintaining consistency in the process. The process is described in detail, and some initial trends in milestone evaluation are described and discussed. Our experience indicates that thoughtful implementation of the Pathology Milestones can provide programs with valuable information that can inform curricular changes.

Practicing Emergency Physicians Report Performing Well on Most Emergency Medicine Milestones

Peck TC, Dubosh N, Rosen C, Tibbles C, Pope J, Fisher J. J Emerg Med. 2014 Oct;47(4):432-40. doi: 10.1016/j.jemermed.2014.04.032. Epub 2014 Jul 8.

BACKGROUND:

The Accreditation Council for Graduate Medical Education's Next Accreditation System endorsed specialty-specific milestones as the foundation of an outcomes-based resident evaluation process. These milestones represent five competency levels (entry level to expert), and graduating residents will be expected to meet Level 4 on all 23 milestones. Limited validation data on these milestones exist. It is unclear if higher levels represent true competencies of practicing emergency medicine (EM) attendings.

OBJECTIVE:

Our aim was to examine how practicing EM attendings in academic and community settings self-evaluate on the new EM milestones.

METHODS:

An electronic self-evaluation survey outlining 9 of the 23 EM milestones was sent to a sample of practicing EM attendings in academic and community settings. Attendings were asked to identify which level was appropriate for them.

RESULTS:

Seventy-nine attendings were surveyed, with an 89% response rate. Sixty-one percent were academic. Twenty-three percent (95% confidence interval [CI] 20%-27%) of all responses were Levels 1, 2, or 3; 38% (95% CI 34%-42%) were Level 4; and 39% (95% CI 35%-43%) were Level 5. Seventy-seven percent of attendings found themselves to be Level 4 or 5 in eight of nine milestones. Only 47% found themselves to be Level 4 or 5 in ultrasound skills ($p = 0.0001$).

CONCLUSIONS:

Although a majority of EM attendings reported meeting Level 4 milestones, many felt they did not meet Level 4 criteria. Attendings report less perceived competence in ultrasound skills than other milestones. It is unclear if self-assessments reflect the true competency of practicing attendings. The study design can be useful to define the accuracy, precision, and validity of milestones for any medical field.

The Pathology Milestones and the Next Accreditation System

Naritoku WY, Alexander CB, Bennett BD, Black-Schaffer WS, Brissette MD, Grimes MM, Hoffman RD, Hunt JL, Iezzoni JC, Johnson R, Kozel J, Mendoza RM, Post MD, Powell SZ, Procop GW, Steinberg JJ, Thorsen LM, Nestler SP. Arch Pathol Lab Med. 2014 Mar;138(3):307-15. doi: 10.5858/arpa.2013-0260-SA.

BACKGROUND:

In the late 1990s, the Accreditation Council for Graduate Medical Education developed the Outcomes Project and the 6 general competencies with the intent to improve the outcome of graduate medical education in the United States. The competencies were used as the basis for developing learning goals and objectives and tools to evaluate residents' performance. By the mid-2000s the stakeholders in resident education and the general public felt that the Outcomes Project had fallen short of expectations.

OBJECTIVE:

To develop a new evaluation method to track trainee progress throughout residency using benchmarks called milestones. A change in leadership at the Accreditation Council for Graduate Medical Education brought a new vision for the accreditation of training programs and a radically different approach to the evaluation of residents.

DATA SOURCES:

The Pathology Milestones Working Group reviewed examples of developing milestones in other specialties, the literature, and the Accreditation Council for Graduate Medical Education program requirements for pathology to develop pathology milestones. The pathology milestones are a set of objective descriptors for measuring progress in the development of competency in patient care, procedural skill sets, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

CONCLUSIONS:

The milestones provide a national standard for evaluation that will be used for the assessment of all residents in Accreditation Council for Graduate Medical Education-accredited pathology training programs.



**Content - Do the Milestones
Represent my
Specialty/Program?**

Updates in Forensic Pathology Education: ACGME Milestones 2.0

Forensic Pathology Working Group. Am J Forensic Med Pathol. 2021 Dec 1;42(4):313-317. doi: 10.1097/PAF.0000000000000689. PMID: 34091494.

ABSTRACT:

The Accreditation Council for Graduate Medical Education Milestones offer a framework for competency-based assessment of forensic pathology fellows. The initial forensic pathology-specific milestones (Milestones 1.0) were developed in 2014. Although a great foundation, this first iteration of the milestones was somewhat convoluted and exhibited areas of discrepancy. A Forensic Pathology Milestone 2.0 Working Group of 12 volunteers, with various levels of forensic pathology expertise representing a broad array of institutions across the United States, sought to reduce milestone complexity and modify the cross-specialty "harmonized" milestones to ensure they fit within the context of forensic pathology training. The group also created a supplemental guide to provide additional clarification for each milestone. Overall, 5 specialty-specific subcompetencies were drafted, and the language in the 14 harmonized subcompetencies was adjusted to reflect the unique population of patients and multidisciplinary medicolegal systems inherent to forensic pathology. Once the initial development was complete, the Milestones 2.0 draft was made available for review by the greater forensic pathology community, with the aim of creating a shared mental model for forensic pathology education and the trajectory of the field. Additional changes were made based on the survey results and Milestones 2.0 will be implemented during the 2021-2022 academic year.

ACGME Milestones 2.0: Why And What's New For Cytopathology?

Nayar R, Anderson S, Dyhdalo KS, Edgar L, Hatlak K, Henderson-Jackson E, McLean S, Rosenbaum MW, Rosenblum F, Naritoku WY. J Am Soc Cytopathol. 2021 Sep-Oct;10(5):485-494. doi: 10.1016/j.jasc.2021.04.003. Epub 2021 May 24. PMID: 34167909.

BACKGROUND:

Primary stakeholders in the Accreditation Council for Graduate Medical Education (ACGME) Milestones Project are: ACGME, Residency Programs, Residents, Fellowship Programs, Fellows, and Certification Boards. The intent of the Milestones is to describe the educational and professional developmental trajectory of a trainee from the first stages of their postgraduate education through the completion of their clinical training. The Milestones 2.0 project includes changes made based on experience with Milestones 1.0.

METHODS:

The ACGME solicited volunteers to participate in the development of subspecialty Milestones 2.0. The workgroup was charged with reviewing/making any additions to the four "Harmonized Milestones", developing subspecialty specific milestones for the Patient Care and Medical Knowledge competencies, and creating a supplemental guide. The Milestones were finalized following review of input from an open comment period.

RESULTS:

The Cytopathology Milestones 2.0 will go into effect July 2021. They include additional subcompetencies in the 4 harmonized competency areas and cytopathology-specific edits to the patient care and medical knowledge subcompetencies. Although the number of subcompetencies has increased from 18 to 21, within each subcompetency, the number of milestone trajectories has decreased. Additionally, within each subcompetency, the wording has been streamlined. A supplemental guide was created and Milestones 1.0 were compared to 2.0; however, curriculum mapping has been left to programs to develop.

CONCLUSIONS:

The ultimate goal of the Cytopathology Milestones 2.0 is to provide better real-time documentation of the progress of cytopathology fellows. The expected outcome is to produce highly competent cytopathologists, improving the care they provide, regardless of the program at which they trained.

The Anesthesiology Milestones 2.0: An Improved Competency-Based Assessment for Residency Training

Ambardekar AP, Walker KK, McKenzie-Brown AM, Brennan K, Jackson C, Edgar L, Ellinas H, Long TR, Trombetta CE, Laskey MG, Wargo BW, Dainer RJ, Draconi CS, Mitchell JD. *Anesth Analg*. 2021 Aug 1;133(2):353-361. doi: 10.1213/ANE.0000000000005499. PMID: 33764340.

ABSTRACT:

The evolution of medical education, from a time-based to a competency-based platform, began nearly 30 years ago and continues to slowly take shape. The development of valid and reproducible assessment tools is the first step. Medical educators across specialties acknowledge the challenges and remain motivated to develop a relevant, generalizable, and measurable system. The Accreditation Council for Graduate Medical Education (ACGME) remains committed to its responsibility to the public by assuring that the process and outcome of graduate medical education in the nation's residency programs produce competent, safe, and compassionate doctors. The Milestones Project is the ACGME's current strategy in the evolution to a competency-based system, which allows each specialty to develop its own set of subcompetencies and 5-level progression, or milestones, along a continuum of novice to expert. The education community has now had nearly 5 years of experience with these rubrics. While not perfect, Milestones 1.0 provided important foundational information and insights. The first iteration of the Anesthesiology Milestones highlighted some mismatch between subcompetencies and current and future clinical practices. They have also highlighted challenges with assessment and evaluation of learners, and the need for faculty development tools. Committed to an iterative process, the ACGME assembled representatives from stakeholder groups within the Anesthesiology community to develop the second generation of Milestones. This special article describes the foundational data from Milestones 1.0 that was useful in the development process of Milestones 2.0, the rationale behind the important changes, and the additional tools made available with this iteration.

The Emergency Medicine Milestones 2.0: Setting the Stage for 2025 and Beyond

Cooney RR, Murano T, Ring H, Starr R, Beeson MS, Edgar L. AEM Educ Train. 2021 Jul 1;5(3):e10640. doi: 10.1002/aet2.10640. PMID: 34471793; PMCID: PMC8325436.

INTRODUCTION:

Beginning in 1999, residents in emergency medicine have been expected to demonstrate competence in the six Accreditation Council on Graduate Medical Education (ACGME) Core Competencies. Expectations were further refined and clarified through the introduction of the Milestones in 2013. Emerging research and data from milestone reporting has illustrated the need for modification of the original milestones. Against this backdrop, the ACGME convened a committee to review and revise the original milestones.

METHODS:

The working group was convened in December 2018 and consisted of representatives from the American Board of Emergency Medicine, American Osteopathic Association, Council of Residency Directors in Emergency Medicine, Association of American Medical Colleges, ACGME-Emergency Medicine Review Committee, three community members, a resident member, and a public member. This group also included members from both academic and community emergency medicine programs. The group was overseen by the ACGME vice president for milestones development and met in person one time followed by four virtual sessions to revise and draft the Emergency Medicine Milestones and Supplemental Guide as part of the ACGME Milestones 2.0 Project.

RESULTS:

Using data from milestones reporting, needs assessment data, stakeholder interviews, and community commentary, the working group engaged in revisions and updates for the Emergency Medicine Milestones and created a supplemental guide to aid programs in the design of programmatic assessment for the milestones.

CONCLUSIONS:

The Emergency Medicine Milestones 2.0 provide updated specialty-specific, competency-based behavioral anchors to guide the assessment of residents, the design of curricula, and the advancement of emergency medicine training programs.

Stages of Milestones Implementation: A Template Analysis of 16 Programs Across 4 Specialties

Yaghmour NA, Poulin LJ, Bernabeo EC, Ekpenyong A, Li ST, Eden AR, Hauer KE, Tichter AM, Hamstra SJ, Holmboe ES. *J Grad Med Educ.* 2021 Apr;13(2 Suppl):14-44. doi: 10.4300/JGME-D-20-00900.1. Epub 2021 Apr 23. PMID: 33936531; PMCID: PMC8078079.

BACKGROUND:

Since 2013, US residency programs have used the competency-based framework of the Milestones to report resident progress and to provide feedback to residents. The implementation of Milestones-based assessments, clinical competency committee (CCC) meetings, and processes for providing feedback varies among programs and warrants systematic examination across specialties.

OBJECTIVE:

We sought to determine how varying assessment, CCC, and feedback implementation strategies result in different outcomes in resource expenditure and stakeholder engagement, and to explore the contextual forces that moderate these outcomes.

METHODS:

From 2017 to 2018, interviews were conducted of program directors, CCC chairs, and residents in emergency medicine (EM), internal medicine (IM), pediatrics, and family medicine (FM), querying their experiences with Milestone processes in their respective programs. Interview transcripts were coded using template analysis, with the initial template derived from previous research. The research team conducted iterative consensus meetings to ensure that the evolving template accurately represented phenomena described by interviewees.

RESULTS:

Forty-four individuals were interviewed across 16 programs (5 EM, 4 IM, 5 pediatrics, 3 FM). We identified 3 stages of Milestone-process implementation, including a resource-intensive early stage, an increasingly efficient transition stage, and a final stage for fine-tuning.

CONCLUSIONS:

Residency program leaders can use these findings to place their programs along an implementation continuum and gain an understanding of the strategies that have enabled their peers to progress to improved efficiency and increased resident and faculty engagement.

Developing a New Set of ACGME Milestones for Child Neurology Residency

Albert DVF, Bass N, Bodensteiner J, Draconi C, Duke ES, Felker M, Gropman A, Lotze T, Mink JW, Reese JJ Jr, Spiciarich M, Urion DK, Edgar L. *Pediatr Neurol.* 2021 Jan;114:47-52. doi: 10.1016/j.pediatrneurol.2020.10.008. Epub 2020 Oct 24. PMID: 33212335.

BACKGROUND:

The Educational Milestones developed by the Accreditation Council for Graduate Medical Education (ACGME) are a construct used to evaluate the development of core competencies during residency and fellowship training. The milestones were developed to create a framework for professional development during graduate medical education. The first iteration of milestones for the child neurology residency was implemented in 2015. In the years that followed, the ACGME received and reviewed feedback about the milestones and set out to revise them.

METHODS:

A committee was assembled to review the original milestones and develop a new set of milestones. The group was also encouraged to not only consider the child neurology residency graduate of today but also the graduate of tomorrow, taking into account growing fields such as genetics and technology.

RESULTS:

A diverse group of 12 individuals, including 10 child neurologists (all of whom were current or previous program directors or associate program directors), one child neurology resident, and one non-physician program coordinator, were recruited from programs of varying size across the country.

CONCLUSIONS:

The committee developed a revision to the child neurology milestones. All changes made were with a focus on how the milestones can be useful to trainees, program directors, and clinical competency committee members. Implementation and further feedback should help guide future revisions. These changes should help trainees, clinical competency committee members, and program directors find more meaning from their use.

Do Milestone Ratings Predict Physical Medicine and Rehabilitation Board Certification Examination Scores?

Francisco GE, Yamazaki K, Raddatz M, Sabharwal S, Robinson L, Kinney C, Holmboe E. *Am J Phys Med Rehabil.* 2021 Feb 1;100(2S Suppl 1):S34-S39. doi: 10.1097/PHM.0000000000001613. PMID: 33048889.

ABSTRACT

The Accreditation Council of Graduate Medical Education developed the Milestones to assist training programs in assessing resident physicians in the context of their participation in Accreditation Council of Graduate Medical Education-accredited training programs. Biannual assessments are done over a resident's entire training period to define the trajectory in achieving specialty-specific competencies. As part of its process of initial certification, the American Board of Physical Medicine and Rehabilitation requires successful completion of two examinations administered approximately 9 mos apart. The Part I Examination measures a single dimensional construct, physical medicine and rehabilitation medical knowledge, whereas Part II assesses the application of medical and physiatric knowledge to multiple domains, including data acquisition, problem solving, patient management, systems-based practice, and interpersonal and communication skills through specific patient case scenarios. This study aimed to investigate the validity of the Milestones by demonstrating its association with performance in the American Board of Physical Medicine and Rehabilitation certifying examinations. A cohort of 233 physical medicine and rehabilitation trainees in 3-yr residency programs (postgraduate year 2 entry) in the United States from academic years 2014-2016, who also took the American Board of Physical Medicine and Rehabilitation Parts I and II certifying examinations between 2016 and 2018, were included in the study. Milestones ratings in four distinct observation periods were correlated with scores in the American Board of Physical Medicine and Rehabilitation Parts I and II Examinations. Milestones ratings of medical knowledge (but not patient care, professionalism, problem-based learning, interpersonal and communication skills, and systems-based practice) predicted performance in subsequent Part I American Board of Physical Medicine and Rehabilitation Examination, but none of the Milestone ratings correlated with Part II Examination scaled scores.

Developing a New Set of ACGME Milestones for Child Neurology Residency

Albert DVF, Bass N, Bodensteiner J, Draconi C, Duke ES, Felker M, Gropman A, Lotze T, Mink JW, Reese JJ Jr, Spiciarich M, Urion DK, Edgar L. *Pediatr Neurol.* 2021 Jan;114:47-52. doi: 10.1016/j.pediatrneurol. 2020.10.008. Epub 2020 Oct 24. PMID: 33212335.

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METHODS:

A committee was assembled to review the original milestones and develop a new set of milestones. The group was also encouraged to not only consider the child neurology residency graduate of today but also the graduate of tomorrow, taking into account growing fields such as genetics and technology.

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CONCLUSIONS:

The committee developed a revision to the child neurology milestones. All changes made were with a focus on how the milestones can be useful to trainees, program directors, and clinical competency committee members. Implementation and further feedback should help guide future revisions. These changes should help trainees, clinical competency committee members, and program directors find more meaning from their use.

ACGME Diagnostic Radiology Milestones 2.0: the Time is Now

Grayev A, Catanzano TM, Sarkany D, Winkler N, Gaetke-Udager K, Mian A, Frederick J, Jordan SG. Acad Radiol. 2020 Dec 5:S1076-6332(20)30672-3. doi: 10.1016/j.acra.2020.11.020. Epub ahead of print. PMID: 33293257.

ABSTRACT:

The Accreditation Council for Graduate Medical Education oversees graduate medical education in the United States. Designed to provide broad based training in all aspects of imaging, the diagnostic radiology residency program must provide educational experiences that not only provide technical, professional, and patient centered training, but also meet accreditation standards. With the breadth of material to cover during training, carefully orchestrated educational experiences must be planned. This manuscript offers residency program leaders resources to meet the challenges of the new Accreditation Council for Graduate Medical Education Diagnostic Radiology Milestones 2.0 and highlights potential opportunities for future educational endeavors.

Association Between Entrustable Professional Activities and Milestones Evaluations: Real-time Assessments Correlate With Semiannual Reviews

Albright JB, Meier AH, Ruangvoravat L, VanderMeer TJ. *J Surg Educ.* 2020 Nov-Dec;77(6):e220-e228. doi: 10.1016/j.jsurg.2020.07.027. Epub 2020 Jul 31. PMID: 32747323.

OBJECTIVE:

Entrustable professional activities (EPAs) have been developed to refine competency-based education. The American Board of Surgery has initiated a 2-year pilot study to evaluate the impact of EPAs on the evaluation and feedback of surgical residents. The ACGME Milestones in Surgery is a semiannual competency-based evaluation program to measure resident progression through 16 professional attributes across 8 practice domains. The correlation between these 2 evaluation tools remains unclear. The purpose of this study is to evaluate this correlation through comparison of an EPA with the corresponding elements of the ACGME Milestones.

DESIGN:

From July, 2018 to October, 2019, all residents submitting EPA evaluations for gall bladder disease were evaluated for preoperative, intraoperative, and/or postoperative entrustability. The ratings were converted to a numerical rank from 0 to 4. Milestones scores from May 2019 and November 2019 were obtained for each resident, with scores ranging from 0 to 4. The gall bladder EPA incorporates the operative PC3 and MK2 and nonoperative PC1, PC2, and ICS3 components. Spearman rank correlation was conducted to evaluate the association between each resident's median EPA ranking and his/her milestones scores.

SETTING:

SUNY Upstate Medical University, Syracuse, NY, a university-based hospital.

PARTICIPANTS:

General surgery residents.

RESULTS:

Among 24 residents, 106 intraoperative EPA evaluations were. For both the May and November milestones, significant positive correlations were noted for PC3 (correlation coefficient $\rho = 0.690$, $p < 0.001$; $\rho = 0.876$, $p < 0.001$). Similarly, for MK2, a significant positive correlation was noted ($\rho = 0.882$, $p < 0.001$; $\rho = 0.759$, $p < 0.001$). Interestingly, significant positive correlations were also identified between the 3 nonoperative milestones and the intraoperative entrustability ranking.

CONCLUSIONS:

We observed significant correlations between EPAs for cholecystectomy and associated milestones evaluation scores. These findings indicate that EPAs may provide more timely and specific feedback than existing tools and, on aggregate, may improve upon existing formative feedback practices provided through the biannual evaluation of surgical residents.

Thoracic surgery milestones 2.0: Rationale and revision

Mitzman B, Beller JP, Edgar L. *J Thorac Cardiovasc Surg.* 2020 Nov;160(5):1399-1404. doi: 10.1016/j.jtcvs.2019.12.132. Epub 2020 Mar 31. PMID: 32245669.

In 1999, the American Board of Medical Specialties and Accreditation Commission for Graduate Medical Education (ACGME) jointly approved 6 core competencies aimed at providing a framework for developmental areas important for physicians in training. These were later launched as part of the Outcomes Project in 2001. The aim of this joint project was to improve the quality of graduate medical education through the avoidance of overspecialization while providing key developmental areas relevant to all specialties. The competencies include patient care and procedural skills, medical knowledge, professionalism, systems-based practice, interpersonal and communication skills, and practice-based learning and improvement. However, when first introduced, programs struggled with overall implementation of the competencies into individual training pathways and their application to different specialties. Many were unsure how to appropriately integrate the competencies into already-used evaluation models. In 2009, the ACGME introduced Milestones as part of the Next Accreditation System. To build on the initial competencies, subcompetencies were selected addressing a specific disease or discipline specific element. Milestones were developed as individual elements for each subcompetency. These milestones included a trajectory for a trainee to follow throughout their growth, with specific examples for the trainee's specialty. The expectation was that programs would identify and implement a variety of tools to assess their trainee's progress in acquiring these milestones. The actual tools used were left to the discretion of the programs. Twice each year, programs were required to report to the ACGME the progress their trainees were making in achieving their milestones. The ACGME is now in the process of updating the milestones as part of the Milestones 2.0 project. Thoracic Surgery is among the first subspecialty groups to near completion of the process. In the following, we describe the foundation for this work with the history of the initial milestone development and ongoing work for Milestones 2.0.

Rheumatology Milestones 2.0: A Roadmap for Competency-Based Medical Training of Rheumatology Fellows in the 21st Century

Liebowitz JE, Torralba KD, Kolfenbach J, Marston B, Dua AB, O'Rourke KS, McKown K, Battistone MJ, Valeriano-Marcet J, Edgar L, McLean S, Gouze KR, Bolster MB. *Arthritis Care Res (Hoboken)*. 2020 Nov 12. doi: 10.1002/acr.24507. Epub ahead of print. PMID: 33181000.

OBJECTIVE:

Since 2014, rheumatology fellows have been assessed not only based on their ability to provide patient care and possess medical knowledge but also on their skill in serving as patient advocates, navigators of health systems, and members of a health care team. Such assessments have been carried out through the use of competency-based "milestones" from the Accreditation Council of Graduate Medical Education (ACGME). However, a needs assessment demonstrated interest in more context validity and subspecialty-relevance since the development of the ACGME Internal Medicine (IM) Subspecialty Reporting Milestones. The ACGME thus charged a working group to develop Rheumatology Milestones 2.0, as well as a Supplemental Guide to assist with implementation.

METHODS:

The Working Group, consisting of seven rheumatology program directors, two division directors, a community practice rheumatologist, a rheumatology fellow-in-training, and a public member who is a rheumatology patient, was overseen by the ACGME Vice President for Milestones Development and met through three 12-hour in-person meetings to compose the Rheumatology Specialty Milestones and Supplemental Guide within the ACGME Milestones 2.0 Project.

RESULTS:

Informed by the needs assessment data and stakeholders, the Working Group revised and adapted the ACGME IM Subspecialty Reporting Milestones to create a rheumatology-specific set of milestones and a Supplemental Guide for their implementation.

CONCLUSIONS:

The Rheumatology Milestones 2.0 provide a specialty-specific, competency-based evaluation tool that can be used by program directors, Clinical Competency Committees (CCC), and others to assess the competencies of rheumatology fellows during training and help measure readiness for independent practice.

Sleep Medicine Milestones 2.0: designed for our field

Dredla BK, Edgar L, Samman H, Bagai K, Mohon R, Malkani R, Doo K, Zeidler M, Weir I, Kapur V, Shelgikar AV. J Clin Sleep Med. 2020 Nov 2. doi: 10.5664/jcsm.8962. Epub ahead of print. PMID: 33135628.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) published the first sleep medicine milestones in 2015. However, these milestones were the same among all internal medicine fellowship programs; they were not specific to the specialty. Based on stakeholder feedback, the ACGME called for the creation of specialty-specific milestones. Herein, we outline the history of ACGME reporting milestones, identification of knowledge, skills, and attitudes that define the practice of sleep medicine, and creation of the supplemental guide and sleep medicine-specific milestones (Sleep Medicine Milestones 2.0) to assess developmental progression during fellowship training.

Developing microsurgical milestones for psychomotor skills in neurological surgery residents as an adjunct to operative training: the home microsurgery laboratory

Abecassis IJ, Sen RD, Ellenbogen RG, Sekhar LN. J Neurosurg. 2020 Sep 4:1-11. doi: 10.3171/2020.5. JNS201590. Epub ahead of print. PMID: 32886917.

OBJECTIVE:

A variety of factors contribute to an increasingly challenging environment for neurological surgery residents to develop psychomotor skills in microsurgical technique solely from operative training. While adjunct training modalities such as cadaver dissection and surgical simulation are embraced and practiced at our institution, there are no formal educational milestones defined to help residents develop, measure, and advance their microsurgical psychomotor skills in a stepwise fashion when outside the hospital environment. The objective of this report is to describe an efficient and convenient "home microsurgery lab" (HML) assembled and tested by the authors with the goal of supporting a personalized stepwise advancement of microsurgical psychomotor skills.

METHODS:

The authors reviewed the literature on previously published simulation practice models and designed adjunct learning modules utilizing the HML. Five milestones were developed for achieving proficiency with each graduated exercise, referencing the Accreditation Council for Graduate Medical Education (ACGME) guidelines. The HML setup was then piloted with 2 neurosurgical trainees.

RESULTS:

The total cost for assembling the HML was approximately \$850. Techniques for which training was provided included microinstrument handling, tissue dissection, suturing, and microanastomoses. Five designated competency levels were developed, and training exercises were proposed for each competency level.

CONCLUSIONS:

The HML offers a unique, entirely home-based, affordable adjunct to the operative neurosurgical education mandated by the ACGME operative case logs, while respecting resident hospital-based education hours. The HML provides surgical simulation with specific milestones, which may improve confidence and the microsurgical psychomotor skills required to perform microsurgery, regardless of case type.

Lack of Telemedicine Training in Academic Medicine: Are We Preparing the Next Generation?

Pourmand A, Ghassemi M, Sumon K, Amini SB, Hood C, Sikka N. *Telemed J E Health*. 2020 Apr 15. doi: 10.1089/tmj.2019.0287. [Epub ahead of print]

BACKGROUND:

Telemedicine focuses on providing medical care to patients in remote locations using telecommunication technologies. It has been shown to be cost-effective, improve health outcomes, and enhance patient satisfaction. This study examines the extent to which medical students and resident physicians are exposed to telemedicine during training.

MATERIALS AND METHODS:

The authors accessed the American College of Graduate Medical Education (ACGME) Residency Milestones from specialties and subspecialties mentioned in the 2018 Milestones National Report and searched for key terms, including "Technology," "Telemedicine," "Telehealth," "EMR," "Electronic Medical Record," "EHR," "Electronic Health Record," "Electronics," and "Social Media." The authors also accessed the 2018 American Association of Medical Colleges (AAMC) "Curriculum Inventory and Reports" to retrieve data from surveys of medical schools that included telemedicine in required courses and electives for medical students from 2013 to 2018.

RESULTS:

From the 104 ACGME specialty milestones, only one specialty (Child and Adolescent Psychiatry) mentioned telehealth in its ACGME Milestone document. According to the AAMC data the number of medical schools surveyed increased every academic year from 140 in 2013/2014 to 147 in 2017/2018, telemedicine education in medical school increased significantly from 41% in 2013/2014 to 60% in 2017/2018 ($p = 0.0006$). However, the growth in telemedicine education plateaued from 56% in 2015/2016 to 60% in 2017/2018 ($p = 0.47$).

CONCLUSION:

Familiarizing medical students with telemedicine is essential; the next generation of health care providers should be equipped with knowledge of telemedicine as a valuable skill to serve populations that do not have direct access to quality medical care. Methods of implementing telemedicine education into more medical schools and residency programs merits further study.

Statement From the Society for the Advancement of Transplant Anesthesia: White Paper Advocating Desirable Milestones and Competencies for Anesthesiology Fellowship Training in the Field of Lung Transplantation

Wilkey BJ, Abrams BA, Del Rio JM, Kertai MD, Subramaniam K, Srinivas C, Peng YG, Berrio-Valencia M, Martin AK. *Semin Cardiothorac Vasc Anesth.* 2020 Mar;24(1):104-114. doi: 10.1177/1089253219867695. Epub 2019 Aug 8.

ABSTRACT:

The clinical, educational, and research facets of lung transplantation have advanced significantly since the first lung transplant in 1963. The formation of the International Society for Heart and Lung Transplantation (ISHLT) and subsequent Registry has forged a precedent of collaborative teamwork that has significantly affected current lung transplantation outcomes. The Society for the Advancement of Anesthesia (SATA) is dedicated to developing educational platforms for all facets of transplant anesthesia. Additionally, we believe that the anesthetic training for lung transplantation has not kept pace with other advances in the field. As such, SATA presents for consideration these educational milestones and competencies for anesthetic fellowship training in the field of lung transplantation. The proposed milestones were designed on the framework of 6 core competencies created by the Accreditation Council on Graduate Medical Education. The milestones were identified by combining the expert opinion of our Thoracic Transplant Committee, our experience as educators, and literature review. We offer this White Paper to the anesthesiology and transplant communities as a starting point for the discussion and evolution of perioperative anesthetic care in the field of lung transplantation.

Development of Subspecialty-Specific Reporting Milestones for Hospice and Palliative Medicine Fellowship Training in the US

Barnett M, Buckholz G, Christensen A, Hwang J, Johnston CB, Landzaat L, Lupu D, Morrison LJ, Okon T, Radwany S, Yang H, Edgar L, Gustin J. *J Pain Symptom Manage*. 2020 Jan 24. pii: S0885-3924(20)30060-9. doi: 10.1016/j.jpainsymman.2020.01.008. [Epub ahead of print]

ABSTRACT:

Continuing the transition to competency-based education, Hospice and Palliative Medicine (HPM) fellowship programs began using context-free reporting milestones (RMs) for Internal Medicine subspecialties in 2014 but quickly recognized they did not reflect the nuanced practice of the field. This article describes the development of 20 subspecialty-specific RMs through consensus group process and vetting by HPM educators. A workgroup of content experts employed an iterative consensus building process between December 2017 and February 2019 to draft new RMs and to create a Supplemental Guide that outlines the intent of each RM, examples of each developmental trajectory, assessment methods, and resources to guide educators. Program directors, program coordinators, and designated institutional officers were contacted directly to solicit feedback. The majority of respondents agreed or strongly agreed that each RM represented a realistic progression of knowledge, skills, and behaviors, and that the set of milestones adequately discriminated between meaningful levels of competency. Similarly, respondents felt that the Supplemental Guide was a useful resource. The result is a set of carefully developed and broadly vetted RMs that represent a progression of development for HPM physicians over one year of clinical fellowship training.

Which Emergency Medicine Milestone Sub-competencies are Identified Through Narrative Assessments?

Diller D, Cooper S, Jain A, Lam CN, Riddell J. West J Emerg Med. 2019 Dec 20;21(1):173-179. doi: 10.5811/westjem.2019.12.44468.

INTRODUCTION:

Evaluators use assessment data to make judgments on resident performance within the Accreditation Council for Graduate Medical Education (ACGME) milestones framework. While workplace-based narrative assessments (WBNA) offer advantages to rating scales, validity evidence for their use in assessing the milestone sub-competencies is lacking. This study aimed to determine the frequency of sub-competencies assessed through WBNA in an emergency medicine (EM) residency program.

METHODS:

We performed a retrospective analysis of WBNA of postgraduate year (PGY) 2-4 residents. A shared mental model was established by reading and discussing the milestones framework, and we created a guide for coding WBNA to the milestone sub-competencies in an iterative process. Once inter-rater reliability was satisfactory, raters coded each WBNA to the 23 EM milestone sub-competencies.

RESULTS:

We analyzed 2517 WBNA. An average of 2.04 sub-competencies were assessed per WBNA. The sub-competencies most frequently identified were multitasking, medical knowledge, practice-based performance improvement, patient-centered communication, and team management. The sub-competencies least frequently identified were pharmacotherapy, airway management, anesthesia and acute pain management, goal-directed focused ultrasound, wound management, and vascular access. Overall, the frequency with which WBNA assessed individual sub-competencies was low, with 14 of the 23 sub-competencies being assessed in less than 5% of WBNA.

CONCLUSION:

WBNA identify few milestone sub-competencies. Faculty assessed similar sub-competencies related to interpersonal and communication skills, practice-based learning and improvement, and medical knowledge, while neglecting sub-competencies related to patient care and procedural skills. These findings can help shape faculty development programs designed to improve assessments of specific workplace behaviors and provide more robust data for the summative assessment of residents.

How Well Do Core Faculty Understand The Emergency Medicine Milestones?

Sorge R, Li-Sauerwine S, Fernandez J, Hern G. West J Emerg Med. 2019 Dec 19;21(1):160-162. doi: 10.5811/westjem.2019.11.44289.

INTRODUCTION:

It is unclear how emergency medicine (EM) programs educate core faculty about the use of milestones in competency-based evaluations. We conducted a national survey to profile how programs educate core faculty regarding their use and to assess core faculty's understanding of the milestones.

METHODS:

Our survey tool was distributed over six months in 2017 via the Council of Emergency Medicine Residency Directors (CORD) listserv. Responses, which were de-identified, were solicited from program directors (PDs), assistant/associate program directors (APDs), and core faculty. A single response from a program was considered sufficient.

RESULTS:

Our survey had a 69.7% response rate (n=140/201). 62.9% of programs reported educating core faculty about the EM Milestones via the distribution of physical or electronic media. Although 82.6% of respondents indicated that it was important for core faculty to understand how the EM Milestones are used in competency-based evaluations, respondents estimated that 48.6% of core faculty possess "fair or poor" understanding of the milestones. Furthermore, only 50.7% of respondents felt that the EM Milestones were a valuable tool.

CONCLUSION:

These data suggest there is sub-optimal understanding of the EM Milestones among core faculty and disagreement as to whether the milestones are a valuable tool.

Recommendations From the Society for the Advancement of Transplant Anesthesiology: Liver Transplant Anesthesiology Fellowship Core Competencies and Milestones

Nguyen-Buckley C, Wray CL, Zerillo J, Gilliland S, Aniskevich S, Nicolau-Raducu R, Planinsic R, Srinivas C, Pretto EA Jr, Mandell MS, Chadha RM. *Semin Cardiothorac Vasc Anesth*. 2019 Dec;23(4):399-408. doi: 10.1177/1089253219868918. Epub 2019 Aug 12.

ABSTRACT:

Liver transplantation is a complex procedure performed on critically ill patients with multiple comorbidities, which requires the anesthesiologist to be facile with complex hemodynamics and physiology, vascular access procedures, and advanced monitoring. Over the past decade, there has been a continuing debate whether or not liver transplant anesthesia is a general or specialist practice. Yet, as significant data have come out in support of dedicated liver transplant anesthesia teams, there is not a guarantee of liver transplant exposure in domestic residencies. In addition, there are no standards for what competencies are required for an individual seeking fellowship training in liver transplant anesthesia. Using the Accreditation Council for Graduate Medical Education guidelines for residency training as a model, the Society for the Advancement of Transplant Anesthesia Fellowship Committee in conjunction with the Liver Transplant Anesthesia Fellowship Task Force has developed the first proposed standardized core competencies and milestones for fellowship training in liver transplant anesthesiology.

A Qualitative Study of Independent Home Visits by Hospice Fellows: Addressing Gaps in ACGME Milestones by Fostering Reflection and Self-Assessment

Samala RV, Hoeksema LJ, Colbert CY. *Am J Hosp Palliat Care*. 2019 Oct;36(10):885-892. doi: 10.1177/1049909119836218. Epub 2019 Mar 13.

BACKGROUND:

With the rapid growth in the number of fellowship programs in Hospice and Palliative Medicine (HPM), many are in the process of developing ways to demonstrate that fellows are attaining educational milestones. Reflection and self-assessment are key components of 2 Accreditation Council for Graduate Medical Education (ACGME) competencies, practice-based learning and improvement, and systems-based practice, which have both been historically challenging to learn and assess.

OBJECTIVE:

This article describes results of a content analysis of narrative data collected from HPM fellows' self-assessments as they performed hospice home visits independently in a new clinical rotation.

DESIGN:

This was a prospective qualitative study.

SETTINGS/PARTICIPANTS:

Eight fellows completed 217 unsupervised hospice home visits from 2014 to 2016.

MEASUREMENTS:

Fellows completed weekly self-assessment forms, which captured both clinical visit information and practice data elicited from responses to open-ended reflection prompts.

RESULTS:

Analysis of 29 self-assessment forms generated 6 themes: patient- and family-centered care, self-efficacy, systems-based care, commitment to doing their best, catalyst for professional growth, and purpose and meaning in work. The fellows recognized numerous barriers distinct to providing care in homes. All fellows felt prepared to perform home visits throughout the rotation and after training.

CONCLUSIONS:

Narrative data collected during the independent home visit rotation provided evidence that HPM fellows detected gaps in their performance, planned for practice improvements in subsequent visits, and valued working within an interprofessional team. Built-in opportunities for fellows to reflect during training are critical in meeting ACGME milestones, and are integral to their professional development.

A Content Analysis of the ACGME Specialty Milestones to Identify Performance Indicators Pertaining to the Development of Residents as Educators

Michael SH, Rougas S, Zhang XC, Clyne B. Teach Learn Med. 2019 Aug-Sep;31(4):424-433. doi: 10.1080/10401334.2018.1560298. Epub 2019 Jan 22.

CONSTRUCT:

For curriculum development purposes, this study examined how the development of residents as educators is reflected in the Accreditation Council for Graduate Medical Education (ACGME) Milestones.

BACKGROUND:

Residents teach patients, families, medical students, physicians, and other health professionals during and beyond their training. Despite this expectation, it is unclear how the development of residents as educators is reflected in the specialty-specific Milestones.

APPROACH:

We performed a textual content analysis of 25 specialty Milestone documents available as downloads from the ACGME website in December 2015. Syntactical units of interest included developmental progressions that describe the development of educators over the course of residency training and 16 keyterms identified during the analysis. We then categorized the terms by associated Milestone level, ACGME core competency, and targeted learner(s).

RESULTS:

We identified 10 developmental progressions and 546 instances of the 16 key terms that describe the development of physician educators. The frequency of terms among specialties was quite variable (5-46 terms per specialty, Mdn = 21). The majority of education-related terms appeared at advanced Milestone levels; there were 139 (26%) such instances in Level 4 and 296 (54%) in Level 5. Education-related terms were identified in all six ACGME core competencies, with greatest frequency in Patient Care (157, 29%). Other residents were the learners most frequently targeted by education-related Milestones (211, 40%).

CONCLUSIONS:

The current ACGME Milestones largely imply that resident teaching is a high-level or aspirational goal, achieved without a clear or consistently assessed developmental progression. These findings run counter to the theoretical basis that underlies the development of the Milestones. Wide variation among specialties indicates lack of consensus around the ideal skill set of the resident educator and limits the utility of these documents for curriculum development in this domain.

Annotated Bibliography for Supervising Psychiatry Residents in Psychodynamic Psychotherapy

Miller CWT, Hodzic V, Ross DR, Ehrenreich MJ. *Acad Psychiatry*. 2019 Aug;43(4):417-424. doi: 10.1007/s40596-019-01056-4. Epub 2019 Apr 17.

OBJECTIVE:

This paper sought to compile an annotated bibliography for the outpatient year of adult psychiatry residents, providing resources for a foundation in psychodynamic theory which can be utilized in supervision to aid in ongoing psychotherapeutic work.

METHODS:

In selecting the readings, the ACGME Milestones sub-competencies considered were (i) empathy and process, (ii) boundaries, (iii) alliance and provision of psychotherapies, (iv) seeking and providing supervision, and (v) knowledge of psychotherapy (theories, practice, and evidence base). Once the readings were selected, two authors independently reviewed the articles to determine which key sub-competencies each article addressed. Chance corrected agreement between the reviewers was assessed using the Cohen kappa statistic. The kappa for interrater agreement was 0.83.

RESULTS:

A list of 32 readings was compiled sequentially, allowing for theoretical concepts to be progressively built upon. The content of the papers aligned well with multiple sub-competencies in the medical knowledge (MK) and patient care (PC) domains. The bibliography allows for close examination of therapeutic frame; active listening and reflecting on the meaning of the therapist's interventions; transference and the use of countertransference as a diagnostic/therapeutic tool; defense mechanisms; patient pressures towards reenactment; theoretical viewpoints on therapeutic action (e.g., ego psychology, self-psychology, relational therapy, object relations, classical/modern Kleinian); and meaning of lateness, treatment breaks, and termination.

CONCLUSIONS:

This list serves as an ancillary resource which can augment discussions in therapy supervision, while also aiding in standardizing the minimal knowledge base achieved in psychodynamic theory.

Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Education Milestones for Resident Education

Sharma D, Easdown LJ, Zolyomi A, Ayrian E, Wheeler PJ, Edelman G, Mahla ME; Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Milestones Task Force. *J Neurosurg Anesthesiol.* 2019 Jul;31(3):337-341. doi: 10.1097/ANA.0000000000000586.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) has introduced competency-based assessments (milestones) for resident education. However, the existing milestones for Anesthesiology are not specific to Neuroanesthesiology. The Society for Neuroscience in Anesthesiology & Critical Care (SNACC) commissioned a task force to adapt the ACGME anesthesiology milestones for use in Neuroanesthesiology training, and to provide recommendations for implementing milestones.

METHODS:

A 7-member expert task force supported by an advisory committee developed the initial milestones by consensus. Written permission was given by the ACGME. The milestones were refined following 3-month pilot use in 14 departments across the United States and inputs from SNACC members. Final milestones were approved by the SNACC Board of Directors.

RESULTS:

Twelve Neuroanesthesiology-specific milestones in 5 major ACGME domains are recommended; these were identified as most pertinent to this subspecialty rotation. These pertain to patient care (7 milestones), medical knowledge (2 milestones), practice-based learning and improvement (1 milestone), and interpersonal and communication skills (2 milestones). Each milestone was described in detail, with clear outline of expectations at various levels of training.

CONCLUSIONS:

The SNACC Neuroanesthesiology milestones provide a framework for reviewing resident performance and are expected to facilitate improved use of ACGME milestones during Neuroanesthesiology subspecialty training. The task force recommends that the target should be to accomplish level 4 or higher milestones by the end of residency training. Individual programs should decide the implications of a resident not meeting the expected milestones.

What Do Quantitative Ratings and Qualitative Comments Tell Us about General Surgery Residents' Progress toward Independent Practice? Evidence from a 5-Year Longitudinal Cohort

Tekian A, Borhani M, Tilton S, Abasolo E, Park YS. Am J Surg. 2019 Feb;217(2):288-295. doi: 10.1016/j.amjsurg.2018.09.031. Epub 2018 Sep 29.

BACKGROUND:

This study examines the alignment of quantitative and qualitative assessment data in end-of-rotation evaluations using longitudinal cohorts of residents progressing throughout the five-year general surgery residency.

METHODS:

Rotation evaluation data were extracted for 171 residents who trained between July 2011 and July 2016. Data included 6069 rotation evaluations forms completed by 38 faculty members and 164 peer-residents. Qualitative comments mapped to general surgery milestones were coded for positive/negative feedback and relevance.

RESULTS:

Quantitative evaluation scores were significantly correlated with positive/negative feedback, $r = 0.52$ and relevance, $r = -0.20$, $p < .001$. Themes included feedback on leadership, teaching contribution, medical knowledge, work ethic, patient-care, and ability to work in a team-based setting. Faculty comments focused on technical and clinical abilities; comments from peers focused on professionalism and interpersonal relationships.

CONCLUSIONS:

We found differences in themes emphasized as residents progressed. These findings underscore improving our understanding of how faculty synthesize assessment data.

Integration of Entrustable Professional Activities with the Milestones for Emergency Medicine Residents

Hart D, Franzen D, Beeson M, Bhat R, Kulkarni M, Thibodeau L, Weizberg M, Promes S, West J. *Emerg Med.* 2019 Jan;20(1):35-42. doi: 10.5811/westjem.2018.11.38912. Epub 2018 Nov 30.

INTRODUCTION:

Medical education is moving toward a competency-based framework with a focus on assessment using the Accreditation Council for Graduate Medical Education Milestones. Assessment of individual competencies through milestones can be challenging. While competencies describe characteristics of the person, the entrustable professional activities (EPAs) concept refers to work-related activities. EPAs would not replace the milestones but would be linked to them, integrating these frameworks. Many core specialties have already defined EPAs for resident trainees, but EPAs have not yet been created for emergency medicine (EM). This paper describes the development of milestone-linked EPAs for EM.

METHODS:

Ten EM educators from across North America formed a consensus working group to draft EM EPAs, using a modified Glaser state-of-the-art approach. A reactor panel with EPA experts from the United States, Canada and the Netherlands was created, and an iterative process with multiple revisions was performed based on reactor panel input. Following this, the EPAs were sent to the Council of Residency Directors for EM (CORD-EM) listserv for additional feedback.

RESULTS:

The product was 11 core EPAs that every trainee from every EM program should be able to perform independently by the time of graduation. Each EPA has associated knowledge, skills, attitudes and behaviors (KSAB), which are either milestones themselves or KSABs linked to individual milestones. We recognize that individual programs may have additional focus areas or work-based activities they want their trainees to achieve by graduation; therefore, programs are also encouraged to create additional program-specific EPAs.

CONCLUSION:

This set of 11 core, EM-resident EPAs can be used as an assessment tool by EM residency programs, allowing supervising physicians to document the multiple entrustment decisions they are already making during clinical shifts with trainees. The KSAB list within each EPA could assist supervisors in giving specific, actionable feedback to trainees and allow trainees to use this list as an assessment-for-learning tool. Linking each KSAB to individual EM milestones allows EPAs to directly inform milestone assessment for clinical competency committees. These EPAs serve as another option for workplace-based assessment, and are linked to the milestones to create an integrated framework.

Aligning Geriatric Medicine Fellowships with the Program of All-Inclusive Care for the Elderly (PACE)

McNabney MK, Suh TT, Sellers V, Wilner D. Gerontol Geriatr Educ. 2018 Dec 18:1-11. doi: 10.1080/02701960.2018.1532891.

ABSTRACT:

Geriatric medicine fellowship programs provide comprehensive training to one-year clinical fellows and must demonstrate successful progression of competence among fellows by reporting on 23 milestones to the Accreditation Council for Graduate Medical Education (ACGME). The Program of All-inclusive Care for the Elderly (PACE) is a model of care located throughout the United States and can serve as a training venue for fellows. We surveyed 113 fellowship program directors with a response rate of 42% (n = 48). The purpose of the survey was to assess: (1) familiarity and access to PACE and (2) perceived value of PACE to the fellowship program with regard to training and ability to achieve success in the 23 reporting milestones. Milestones involving communication and team management skills were most consistently identified as very valuable with a PACE clinical rotation. We then convened a focus group of four PACE medical directors who developed a fellowship curriculum for use in training fellows at PACE. We discuss the limitations of our design as well as the opportunities to build on the strengths of that model as a training site for fellows.

Radiology Education in Medical School and Residency: The Views and Needs of Program Directors

Schiller PT, Phillips AW, Straus CM. Acad Radiol. 2018 Oct;25(10):1333-1343. doi: 10.1016/j.acra.2018.04.004. Epub 2018 May 7.

RATIONALE AND OBJECTIVES:

The authors of this study used the perspectives of residency program directors (PDs) nationally to explore whether trainees are adequately prepared to utilize and interpret medical imaging as interns, to identify the types of imaging skills most important for residency, and to begin to address current shortcomings in radiology education.

MATERIALS AND METHODS:

The authors created a survey using a modified version of Accreditation Council for Graduate Medical Education radiology milestones and sent it to 100 randomly selected PDs each in pediatrics, internal medicine, obstetrics and gynecology, and general surgery. The survey asked PDs to assess the actual and desired imaging skills of their incoming interns, the incoming interns' variability of skill level upon matriculation, and which imaging skills were most important from the PDs' perspective.

RESULTS:

PDs from all specialties identified a significant shortcoming relative to their expectations for both image interpretation and utilization skills. Additionally, PDs identified a significant variability in imaging skills, and described that variability as a hindrance to their programs. All of the potential imaging skills were rated as highly important with little clinically relevant difference between them.

DISCUSSION:

This multidisciplinary national survey found a deficiency in imaging education among interns across specialties and substantiates calls for formalized and improved radiology education in undergraduate medical education. Additionally, PDs had difficulty distinguishing which skills were most important, suggesting an unclear understanding of imaging ability needs for interns in respective specialties. More specific needs assessments are warranted on a national level.

Challenges in Measuring ACGME Competencies: Considerations for Milestones

Natesan P, Batley NJ, Bakhti R, El-Doueihi PZ. *Int J Emerg Med.* 2018 Sep 28;11(1):39. doi: 10.1186/s12245-018-0198-3.

BACKGROUND:

Measuring milestones, competencies, and sub-competencies as residents progress through a training program is an essential strategy in Accreditation Council for Graduate Medical Education (ACGME)'s attempts to ensure graduates meet expected professional standards.

Previous studies have found, however, that physicians make global ratings often by using a single criterion.

METHODS:

We use advanced statistical analysis to extend these studies by examining the validity of ACGME International competency measures for an international setting, across emergency medicine (EM) and neurology, and across evaluators. Confirmatory factor analysis (CFA) models were fitted to both EM and neurology data. A single-factor CFA was hypothesized to fit each dataset. This model was modified based on model fit indices. Differences in how different EM physicians perceived the core competencies were tested using a series of measurement invariance tests.

RESULTS:

Extremely high alpha reliability coefficients, factor coefficients ($> .93$), and item correlations indicated multicollinearity, that is, most items being evaluated could essentially replace the underlying construct itself. This was true for both EM and neurology data, as well as all six EM faculty.

CONCLUSIONS:

Evaluation forms measuring the six core ACGME competencies did not possess adequate validity. Severe multicollinearity exists for the six competencies in this study. ACGME is introducing milestones with 24 sub-competencies. Attempting to measure these as discrete elements, without recognizing the inherent weaknesses in the tools used will likely serve to exacerbate an already flawed strategy. Physicians likely use their "gut feelings" to judge a resident's overall performance. A better process could be conceived in which this subjectivity is acknowledged, contributing to more meaningful evaluation and feedback.

Gender Bias in Simulation-Based Assessments of Emergency Medicine Residents

Siegelman JN, Lall M, Lee L, Moran TP, Wallenstein J, Shah B. J Grad Med Educ. 2018 Aug;10(4): 411-415. doi: 10.4300/JGME-D-18-00059.1.

BACKGROUND:

Gender-related disparities persist in medicine and medical education. Prior work has found differences in medical education assessments based on gender.

OBJECTIVE:

We hypothesized that gender bias would be mitigated in a simulation-based assessment.

METHODS:

We conducted a retrospective cohort study of emergency medicine residents at a single, urban residency program. Beginning in spring 2013, residents participated in mandatory individual simulation assessments. Twelve simulated cases were included in this study. Rating forms mapped milestone language to specific observable behaviors. A Bayesian regression was used to evaluate the effect of resident and rater gender on assessment scores. Both 95% credible intervals (CrIs) and a Region of Practical Equivalence approach were used to evaluate the results.

RESULTS:

Participants included 48 faculty raters (25 men [52%]) and 102 residents (47 men [46%]). The difference in scores between male and female residents ($M = -0.58$, 95% CrI -3.31 - 2.11), and male and female raters ($M = 2.87$, 95% CrI -0.43 - 6.30) was small and 95% CrIs overlapped with 0. The 95% CrI for the interaction between resident and rater gender also overlapped with 0 ($M = 0.41$, 95% CrI -3.71 - 4.23).

CONCLUSIONS:

In a scripted and controlled system of assessments, there were no differences in scores due to resident or rater gender.

Competency Crosswalk: A Multispecialty Review of the Accreditation Council for Graduate Medical Education Milestones across Four Competency Domains

Edgar L, Roberts S, Yaghmour N, Hunderfund AL, Hamstra SJ, Conforti L, Holmboe ES. Acad Med. 2018 Jul;93(7):1035-1041. doi: 10.1097/ACM.0000000000002059.

PURPOSE:

To identify common and overlapping themes among the interpersonal and communication skills (ICS), practice-based learning and improvement (PBLI), professionalism (PROF), and systems-based practice (SBP) milestones of the transitional year and 26 specialties.

METHOD:

In May 2017, milestones were accessed from the Accreditation Council for Graduate Medical Education specialties website. A thematic analysis of the ICS, PBLI, PROF, and SBP milestones was performed to determine unique and common themes across these competencies and across specialties. Keywords from the common program requirements were initially applied as codes to the milestones. Codes were then grouped into common themes.

RESULTS:

Twenty-two themes were identified: 15 (68%) were unique to a given competency (3 related to ICS, 4 related to PBLI, 5 related to PROF, and 3 related to SBP), and 7 (32%) appeared in the milestones of more than one core competency. Eleven themes (50%) were used by 20 or more specialties, and 6 themes (27%) by 10 or fewer specialties. No theme was present across all specialties.

CONCLUSIONS:

The ICS, PBLI, PROF, and SBP milestones contain multiple themes with areas of overlap among these four competencies and substantial variability across specialties. This variability may create differential expectations of residents across specialties, complicate faculty development, and make sharing assessment tools difficult. The thematic analysis provides important insights into how individual specialties interpret and operationalize the ICS, PBLI, PROF, and SBP competency domains and can inform future revisions of milestones to enable harmonization and shared understanding of these competencies across specialties where appropriate.

What Every Graduating Resident Needs to Know About Quality Improvement and Patient Safety: A Content Analysis of 26 Sets of ACGME Milestones

Lane-Fall M, Davis JJ, Clapp J, Myers JS, Riesenber LA. Acad Med. 2018 Jun;93(6):904-910. doi: 10.1097/ACM.0000000000002039.

PURPOSE:

Quality improvement (QI) and patient safety (PS) are broadly relevant to the practice of medicine, but specialty-specific milestones demonstrate variable expectations for trainee competency in QI/PS. The purpose of this study was to develop a unifying portrait of QI/ PS expectations for graduating residents irrespective of specialty.

METHOD:

Milestones from 26 residency programs representing the 24 member boards of the American Board of Medical specialties were downloaded from the Accreditation Council for Graduate Medical Education (ACGME) website in 2015. A codebook was generated by in-depth reading of all milestone sets by two authors. Using a content analytic approach, milestones were then coded by a single author, with a 10% sample double-coded by another author. Descriptive statistics were used to characterize frequency counts.

RESULTS:

Of 612 total milestones, 249 (40.7%) made mention of QI/PS. A median 10 milestones per specialty (interquartile range, 5.25-11.75) mentioned QI/PS. There were 446 individual references to QI, 423 references to PS, and another 1,065 references to QI/PS-related concepts, including patient-centered care, cost-effective practice, documentation, equity, handoffs and care transitions, and teamwork. QI/PS references reflected expectations about both individual-level practice (531/869, 61.1%) and practice within a healthcare system (338/869, 38.9%). QI and PS references were linked to all six ACGME core competencies.

CONCLUSIONS:

Although there is variability in the emphasis placed on QI/PS across specialties, overall, QI/PS is reflected in more than 40% of residency milestones. Graduating residents in all specialties are expected to demonstrate competence in QI, PS, and multiple related concepts.

The American Society of Hematology and ASCO Curricular Milestones for Assessment of Fellows in Hematology/Oncology: Development, Reflection, and Next Steps

Collichio F, Muchmore EA. Am Soc Clin Oncol Educ Book. 2018 May 23;(38):887-893. doi: 10.1200/EDBK_201773.

ABSTRACT:

The American Society of Hematology (ASH)/ASCO Curricular Milestones is a tool for assessment and teaching for fellows in hematology/oncology. The expectations of the Next Accreditation System of the Accreditation Council of Graduate Medical Education (ACGME) was developed over years from the creation of the six core competencies in 1999 to the current data-driven outcomes-based system. The current internal medicine subspecialty milestones (ACGME reporting milestones) follow the general rubric of the general internal medicine milestones. The ASH/ASCO curricular milestones were developed from the foundational elements of the specialty, and they are interwoven with the ACGME reporting milestones. The 2017 ACGME Milestones Report shows that the milestones display progression in performance through clear anchors. Educational outcomes are available in many specialties. The internal medicine subspecialties have been given the opportunity to update the ACGME reporting milestones. The ACGME has acknowledged that these milestones may be different for each of the specialties. The program committees of ASH and ASCO agree that revision of the ACGME reporting milestones would decrease the overlap of domains, lack of clarity, and negative language that is present in version 1.0. ASH and ASCO are working with the ACGME and American Board of Internal Medicine (ABIM) to develop Curricular Milestones, version 2.0.

Teaching and Assessing Professionalism in Radiology: Resources and Scholarly Opportunities to Contribute to Required Expectations

Kelly AM, Mullan PB. *Acad Radiol.* 2018 May;25(5):599-609. doi: 10.1016/j.acra.2018.01.008. Epub 2018 Mar 1.

ABSTRACT:

Teaching and assessing trainees' professionalism now represents an explicit expectation for Accreditation Council Graduate Medical Education-accredited radiology programs. Challenges to meeting this expectation include variability in defining the construct of professionalism; limits of traditional teaching and assessment methods, used for competencies historically more prominent in medical education, for professionalism; and emerging expectations for credible and feasible professionalism teaching and assessment practices in the current context of health-care training and practice. This article identifies promising teaching resources and methods that can be used strategically to augment traditional teaching of the cognitive basis for professionalism, including role modeling, case-based scenarios, debriefing, simulations, narrative medicine (storytelling), guided discussions, peer-assisted learning, and reflective practice. This article also summarizes assessment practices intended to promote learning, as well as to inform how and when to assess trainees as their professional identities develop over time, settings, and autonomous practice, particularly in terms of measurable behaviors. This includes assessment tools (including mini observations, critical incident reports, and appreciative inquiry) for authentic assessment in the workplace; engaging multiple sources (self, peer, other health professionals, and patients) in assessment; and intentional practices for trainees to take responsibility for seeking our actionable feedback and reflection. This article examines the emerging evidence of the feasibility and value added of assessment of medical competency milestones, including professionalism, coordinated by the Accreditation Council Graduate Medical Education in radiology and other medical specialties. Radiology has a strategic opportunity to contribute to scholarship and inform policies in professionalism teaching and assessment practices.

Development of Hospice and Palliative Medicine Knowledge and Skills for Emergency Medicine Residents: Using the Accreditation Council for Graduate Medical Education Milestone Framework

Shoenberger J, Lamba S, Goett R, DeSandre P, Aberger K, Bigelow S, Brandtman T, Chan GK, Zalenski R, Wang D, Rosenberg M, Jubanyik K. AEM Educ Train. 2018 Mar 22;2(2):130-145. doi: 10.1002/aet2.10088. eCollection 2018 Apr.

OBJECTIVES:

Emergency medicine (EM) physicians commonly care for patients with serious life-limiting illness. Hospice and palliative medicine (HPM) is a subspecialty pathway of EM. Although a subspecialty level of practice requires additional training, primary-level skills of HPM such as effective communication and symptom management are part of routine clinical care and expected of EM residents. However, unlike EM residency curricula in disciplines like trauma and ultrasound, there is no nationally defined HPM curriculum for EM resident training. An expert consensus group was convened with the aim of defining content areas and competencies for HPM primary-level practice in the ED setting. Our overall objective was to develop HPM milestones within a competency framework that is relevant to the practice of EM.

METHODS:

The American College of Emergency Physicians Palliative Medicine Section assembled a committee that included academic EM faculty, community EM physicians, EM residents, and nurses, all with interest and expertise in curricular design and palliative medicine.

RESULTS:

The committee peer reviewed and assessed HPM content for validity and importance to EM residency training. A topic list was developed with three domains: provider skill set, clinical recognition of HPM needs, and logistic understanding related to HPM in the ED. The group also developed milestones in HPM-EM to identify relevant knowledge, skills, and behaviors using the framework modeled after the Accreditation Council for Graduate Medical Education (ACGME) EM milestones. This framework was chosen to make the product as user-friendly and familiar as possible to facilitate use by EM educators.

CONCLUSIONS:

Educators in EM residency programs now have access to HPM content areas and milestones relevant to EM practice that can be used for curriculum development in EM residency programs. The HPM-EM skills/competencies presented herein are structured in a familiar milestone framework that is modeled after the widely accepted ACGME EM milestones.

Mapping the Balint Groups to the Accreditation Council for Graduate Medical Education Family Medicine Competencies

Lichtenstein A, Antoun J, Rule C, Knowlton K, Sternlieb J. *Int J Psychiatry Med*. 2018 Jan- Mar;53(1-2):47-58. doi: 10.1177/0091217417745294. Epub 2017 Dec 13.

ABSTRACT:

Introduction Balint group discussions provide learning opportunities for many of the competencies and milestones put forward by the Accreditation Council for Graduate Medical Education. The current literature is mixed concerning the effect of Balint groups on communication skills and professionalism. Aim To map the content of the Balint discussion to the competencies and milestones put forward by the Accreditation Council for Graduate Medical Education.

METHODOLOGY:

A group who were both experts in Balint and members of the clinical competency committee of residency programs rated narratives that summarized Balint group discussions. Credentialed Leaders of the American Balint Society were invited via email to submit narratives (250 words) about Balint groups that they have led, or were leading, with residents.

RESULTS:

Only four narratives were submitted. Additional cases were recruited through literature review of published Balint discussion cases. A total of 25 cases were rated by the committee. There was agreement between three out of four raters on at least one core milestone in every case. The most frequent milestones were C1 (develops meaningful therapeutic relationships with patients and families), C2 (communicated effectively with patients, families, and public), Prof1 (completes a process of professionalization), and Prof3 (demonstrates humanism and cultural proficiency). Balint groups provided a learning opportunity for a subset of milestones in at least 36% of the cases.

CONCLUSION:

This pilot research suggests that Balint groups and the discussions of complex and challenging cases provide learning opportunities for multiple family medicine milestones, mainly communication skills and professionalism. Further research is needed to refine the methodology and the rating system.

Consensus Statement by the Congenital Cardiac Anesthesia Society: Milestones for the Pediatric Cardiac Anesthesia Fellowship

Nasr VG, Guzzetta NA, Miller-Hance WC, et al. *Anesthesia and Analgesia*. 2018;126(1):198- 207. doi:10.1213/ANE.0000000000002482.

ABSTRACT:

Pediatric cardiac anesthesiology has evolved as a subspecialty of both pediatric and cardiac anesthesiology and is devoted to caring for individuals with congenital heart disease ranging in age from neonates to adults. Training in pediatric cardiac anesthesia is a second-year fellowship with variability in both training duration and content and is not accredited by the Accreditation Council on Graduate Medical Education. Consequently, in this article and based on the Accreditation Council on Graduate Medical Education Milestones Model, an expert panel of the Congenital Cardiac Anesthesia Society, a section of the Society of Pediatric Anesthesiology, defines 18 milestones as competency-based developmental outcomes for training in the pediatric cardiac anesthesia fellowship.

Trapped as a Group, Escape as a Team: Applying Gamification to Incorporate Teambuilding Skills Through an 'Escape Room' Experience

Zhang XC, Lee H, Rodriguez C, Rudner J, Chan TM, Papanagnou D. *Cureus*. 2018;10(3):e2256. doi:10.7759/cureus.2256. DOI 10.7759/cureus.2256

ABSTRACT:

Teamwork, a skill critical for quality patient care, is recognized as a core competency by the Accreditation Council for Graduate Medical Education (ACGME). To date, there is no consensus on how to effectively teach these skills in a forum that engages learners, immerses members in life-like activities, and builds both trust and rapport. Recreational 'Escape Rooms' have gained popularity in creating a life-like environment that rewards players for working together, solving puzzles, and completing successions of mindbending tasks in order to effectively 'escape the room' in the time allotted. In this regard, escape rooms share many parallels with the multitasking and teamwork that is essential for a successful emergency department (ED) shift. A pilot group of nine emergency medicine (EM) residents and one senior EM faculty member underwent a commercial escape room as part of a teambuilding exercise in January 2018. The escape room required participants to practice teamwork, communication, task delegation, and critical thinking to tackle waves of increasingly complex puzzles, ranging from hidden objects, physical object assembly (i.e., jigsaw puzzles), and symbol matching.

Activities required members to recognize and utilize the collective experiences, skills, knowledge base, and physical abilities of the group. After the game, players underwent a structured 'game-master' debriefing facilitated by an employee of the commercial escape room; this was followed by a post-event survey facilitated by a faculty member, which focused on participants' feelings, experiences, and problem-solving techniques. Escape rooms afford learners the opportunity to engage in an activity that rewards teamwork and effective leadership through experiences that directly link to specific ACGME milestones and educational learning theories. EM participants were engaged in the activity and felt that the escape room reproduced an environment analogous to the ED. The debriefing that followed the activity provided a satisfactory conclusion to the experience; but learners preferred a more organized debriefing format that provided them with constructive and specific feedback on their performance.

Aligning In-Service Training Examinations in Plastic Surgery and Orthopaedic Surgery with Competency-Based Education

Ganesh Kumar N, Benvenuti MA, Drolet BC. J Grad Med Educ. 2017 Oct;9(5):650-653. doi: 10.4300/JGME-D-17-00116.1.

BACKGROUND:

In-service training examinations (ITEs) are used to assess residents across specialties. However, it is not clear how they are integrated with the Accreditation Council for Graduate Medical Education Milestones and competencies.

OBJECTIVE:

This study explored the distribution of specialty-specific milestones and competencies in ITEs for plastic surgery and orthopaedic surgery.

METHODS:

In-service training examinations were publicly available for plastic surgery (PSITE) and orthopaedics (OITE). Questions on the PSITE for 2014-2016 and the OITE for 2013-2015 were mapped to the specialty-specific milestones and the 6 competencies.

RESULTS:

There was an uneven distribution of milestones and competencies in ITE questions. Nine of the 36 Plastic Surgery Milestones represented 52% (341 of 650) of questions, and 3 were not included in the ITE. Of 41 Orthopaedic Surgery Milestones, 7 represented 51% (201 of 394) of questions, and 5 had no representation on the ITE. Among the competencies, patient care was the most common (PSITE = 62% [403 of 650]; OITE = 59% [233 of 394]), followed by medical knowledge (PSITE = 34% [222 of 650]; OITE = 31% [124 of 394]). Distribution of the remaining competencies differed between the 2 specialties (PSITE = 4% [25 of 650]; OITE = 9% [37 of 394]).

CONCLUSIONS:

The ITEs tested slightly more than half of the milestones for the 2 specialties, and focused predominantly on patient care and medical knowledge competencies.

Gender Differences in Attending Physicians' Feedback to Residents: A Qualitative Analysis

Mueller AS, Jenkins TM, Osborne M, Dayal A, O'Connor DM, Arora VM. J Grad Med Educ. 2017 Oct;9(5):577-585. doi: 10.4300/JGME-D-17-00126.1.

BACKGROUND:

Prior research has shown a gender gap in the evaluations of emergency medicine (EM) residents' competency on the Accreditation Council for Graduate Medical Education (ACGME) milestones, yet the practical implications of this are not fully understood.

OBJECTIVE:

To better understand the gender gap in evaluations, we examined qualitative differences in the feedback that male and female residents received from attending physicians.

METHODS:

This study used a longitudinal qualitative content analysis of narrative comments by attending physicians during real-time direct observation milestone evaluations of residents. Comments were collected over 2 years from 1 ACGME-accredited EM training program.

RESULTS:

In total, 1317 direct observation evaluations with comments from 67 faculty members were collected for 47 postgraduate year 3 EM residents. Analysis of the comments revealed that the ideal EM resident possesses many stereotypically masculine traits. Additionally, examination of a subset of the residents (those with 15 or more comments, n = 35) showed that when male residents struggled, they received consistent feedback from different attending physicians regarding aspects of their performance that needed work. In contrast, when female residents struggled, they received discordant feedback from different attending physicians, particularly regarding issues of autonomy and assertiveness.

CONCLUSIONS:

Our study revealed qualitative differences in the kind of feedback that male and female EM residents received from attending physicians. The findings suggest that attending physicians should endeavor to provide male and female residents with consistent feedback and guard against gender bias in their perceptions of residents' capabilities.

Ways to Write a Milestone: Approaches to Operationalizing the Development of Competence in Graduate Medical Education

Leep Hunderfund AN, Reed DA, Starr SR, Havyer RD, Lang TR, Norby SM. Acad Med. 2017 Sep;92(9):1328-1334. doi: 10.1097/ACM.0000000000001660.

PURPOSE:

To identify approaches to operationalizing the development of competence in Accreditation Council for Graduate Medical Education (ACGME) milestones.

METHOD:

The authors reviewed all 25 "Milestone Project" documents available on the ACGME Web site on September 11, 2013, using an iterative process to identify approaches to operationalizing the development of competence in the milestones associated with each of 601 subcompetencies.

RESULTS:

Fifteen approaches were identified. Ten focused on attributes and activities of the learner, such as their ability to perform different, increasingly difficult tasks (304/601; 51%), perform a task better and faster (171/601; 45%), or perform a task more consistently (123/601; 20%). Two approaches focused on context, inferring competence from performing a task in increasingly difficult situations (236/601; 29%) or an expanding scope of engagement (169/601; 28%). Two used socially defined indicators of competence such as progression from "learning" to "teaching," "leading," or "role modeling" (271/601; 45%). One approach focused on the supervisor's role, inferring competence from a decreasing need for supervision or assistance (151/601; 25%). Multiple approaches were often combined within a single set of milestones (mean 3.9, SD 1.6).

CONCLUSIONS:

Initial ACGME milestones operationalize the development of competence in many ways. These findings offer insights into how physicians understand and assess the developmental progression of competence and an opportunity to consider how different approaches may affect the validity of milestone-based assessments. The results of this analysis can inform the work of educators developing or revising milestones, interpreting milestone data, or creating assessment tools to inform milestone-based performance measures.

Competency-Based Medical Education and the Ghost of Kuhn: Reflections on the Messy and Meaningful Work of Transformation

Holmboe ES. Acad Med. 2018 Mar;93(3):350-353. doi: 10.1097/ACM.0000000000001866.

ABSTRACT:

The transition, if not transformation, to outcomes-based medical education likely represents a paradigm shift struggling to be realized. Paradigm shifts are messy and difficult but ultimately meaningful if done successfully. This struggle has engendered tension and disagreements, with many of these disagreements cast as either-or polarities. There is little disagreement, however, that the health care system is not effectively achieving the triple aim for all patients. Much of the tension and polarity revolve around how more effectively to prepare students and residents to work in and help change a complex health care system. Competencies were an initial attempt to facilitate this shift by creating frameworks of essential abilities needed by physicians. However, implementation of competencies has proven to be difficult. Entrustable professional activities (EPAs) in undergraduate and graduate medical education and Milestones in graduate medical education are recent concepts being tried and studied as approaches to guide the shift to outcomes. Their primary purpose is to help facilitate implementation of an outcomes-based approach by creating shared mental models of the competencies, which in turn can help to improve curricula and assessment. Understanding whether and how EPAs and Milestones effectively facilitate the shift to outcomes has been and will continue to be an iterative and ongoing reflective process across the entire medical education community using lessons from implementation and complexity science. In this Invited Commentary, the author reflects on what got the community to this point and some sources of tension involved in the struggle to move to outcomes-based education.

Critical Deficiency Ratings in Milestone Assessment: A Review and Case Study

Kinnear B, Bensman R, Held J, O'Toole J, Schauer D, Warm E. Acad Med. 2017 Jun;92(6):820-826. doi: 10.1097/ACM.0000000000001383.

PURPOSE:

The Accreditation Council for Graduate Medical Education (ACGME) requires programs to report learner progress using specialty-specific milestones. It is unclear how milestones can best identify critical deficiencies (CDs) in trainee performance. Specialties developed milestones independently of one another; not every specialty included CDs within milestones ratings. This study examined the proportion of ACGME milestone sets that include CD ratings, and describes one residency program's experiences using CD ratings in assessment.

METHOD:

The authors reviewed ACGME milestones for all 99 specialties in November 2015, determining which rating scales contained CDs. The authors also reviewed three years of data (July 2012-June 2015) from the University of Cincinnati Medical Center (UCMC) internal medicine residency assessment system based on observable practice activities mapped to ACGME milestones. Data were analyzed by postgraduate year, assessor type, rotation, academic year, and core competency. The Mantel-Haenszel chi-square test was used to test for changes over time.

RESULTS:

Specialties demonstrated heterogeneity in accounting for CDs in ACGME milestones, with 22% (22/99) of specialties having no language describing CDs in milestones assessment. Thirty-three percent (63/189) of UCMC internal medicine residents received at least one CD rating, with CDs accounting for 0.18% (668/364,728) of all assessment ratings. The authors identified CDs across multiple core competencies and rotations.

CONCLUSIONS:

Despite some specialties not accounting for CDs in milestone assessment, UCMC's experience demonstrates that a significant proportion of residents may be rated as having a CD during training. Identification of CDs may allow programs to develop remediation and improvement plans.

"The Actualized Neurosurgeon": A Proposed Model of Surgical Resident Development

Lipsman N, Khan O, Kulkarni AV. *World Neurosurg.* 2017 Mar; 99:381-386. doi: 10.1016/j.wneu.2016.12.039. Epub 2016 Dec 21.

BACKGROUND:

Modern neurosurgical training is both physically and emotionally demanding, posing significant challenges, new and old, to residents as well as programs attempting to train safe, competent surgeons. Models to describe resident development, such as the Accreditation Council for Graduate Medical Education competencies and milestones, address the acquisition of specific skills but largely ignore the stresses and pressures unique to each stage of resident training.

METHODS:

We propose an alternative model of resident development adapted from the developmental psychology literature.

RESULTS:

Our model identifies the challenges that must be met at each stage of junior, intermediate, and senior and chief residency, leading ultimately to an "actualized" neurosurgeon (i.e., one who has maximized his or her potential). Failure to overcome any 1 of these challenges can lead to specific long-lasting consequences, including regret, identity crisis, incompetence, and bitterness. In contrast, the actualized surgeon is one who has successfully acquired the virtues of hope, will, purpose, fidelity, productivity, leadership, competence, and wisdom. The actualized surgeon not only functions safely, confidently, and professionally, but also successfully navigates the challenges of residency and emerges from them having fulfilled his or her maximal potential.

CONCLUSIONS:

This developmental perspective provides an individualized description of healthy surgical development. Our model allows programs to identify the basis for residents who fail to progress, counsel residents during their training, and perhaps help identify resident candidates who are better prepared to meet the developmental challenges of residency training.

Implementation of a Needs-Based, Online Feedback Tool for Anesthesia Residents with Subsequent Mapping of the Feedback to the ACGME Milestones

Tanaka P, Bereknyei Merrell S, Walker K, Zocca J, Scotto L, Bogetz AL, Macario A. *Anesth Analg*. 2017 Feb;124(2):627-635. doi:10.1213/ANE.0000000000001647.

BACKGROUND:

Optimizing feedback that residents receive from faculty is important for learning. The goals of this study were to (1) conduct focus groups of anesthesia residents to define what constitutes optimal feedback; (2) develop, test, and implement a web-based feedback tool; and (3) then map the contents of the written comments collected on the feedback tool to the Accreditation Council for Graduate Medical Education (ACGME) anesthesiology milestones.

METHODS:

All 72 anesthesia residents in the program were invited to participate in 1 of 5 focus groups scheduled over a 2-month period. Thirty-seven (51%) participated in the focus groups and completed a written survey on previous feedback experiences. On the basis of the focus group input, an initial online feedback tool was pilot-tested with 20 residents and 62 feedback sessions, and then a final feedback tool was deployed to the entire residency to facilitate the feedback process. The completed feedback written entries were mapped onto the 25 ACGME anesthesiology milestones.

RESULTS:

Focus groups revealed 3 major barriers to good feedback: (1) too late such as, for example, at the end of month-long clinical rotations, which was not useful because the feedback was delayed; (2) too general and not specific enough to immediately remedy behavior; and (3) too many in that the large number of evaluations that existed that were unhelpful such as those with unclear behavioral anchors compromised the overall feedback culture. Thirty residents (42% of 72 residents in the program) used the final online feedback tool with 121 feedback sessions with 61 attendings on 15 rotations at 3 hospital sites. The number of feedback tool uses per resident averaged 4.03 (standard deviation 5.08, median 2, range 1-21, 25th-75th % quartile 1-4). Feedback tool uses per faculty averaged 1.98 (standard deviation 3.2, median 1, range 1-25, 25th-75th % quartile 1-2). For the feedback question item "specific learning objective demonstrated well by the resident," this yielded 296 milestone-specific responses. The majority (71.3%) were related to the patient care competency, most commonly the anesthetic plan and conduct (35.8%) and airway management (11.1%) milestones; 10.5% were related to the interpersonal and communication skills competency, most commonly the milestones communication with other professionals (4.4%) or with patients and families (4.4%); and 8.4% were related to the practice-based learning and improvement competency, most commonly self-directed learning (6.1%). For the feedback tool item "specific learning objective that resident may improve," 67.0% were related to patient care, most commonly anesthetic plan and conduct (33.5%) followed by use/interpretation of monitoring and equipment (8.5%) and airway management (8.5%); 10.2% were related to practice-based learning and improvement, most commonly self-directed learning (6.8%); and 9.7% were related to the systems-based practice competency.

CONCLUSIONS:

Resident focus groups recommended that feedback be timely and specific and be structured around a tool. A customized online feedback tool was developed and implemented. Mapping of the free-text feedback comments may assist in assessing milestones. Use of the feedback tool was lower than expected, which may indicate that it is just 1 of many implementation steps required for behavioral and culture change to support a learning environment with frequent and useful feedback.

New Roadmap for the Journey From Internist to Rheumatologist

Criscione-Schreiber LG, Brown CR, O'Rourke KS, et al. *Arthritis Care & Research*. 2017; 69(6):769-775. doi:10.1002/acr.23151.

OBJECTIVE:

Measurement is necessary to gauge improvement. US training programs have not previously used shared standards to assess trainees' mastery of the knowledge, skills, and attitudes necessary to practice rheumatology competently. In 2014, the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System began requiring semiannual evaluation of all medicine subspecialty fellows on 23 internal medicine subspecialty reporting milestones. Since these reporting milestones are not subspecialty specific, rheumatology curricular milestones were needed to guide rheumatology fellowship training programs and fellows on the training journey from internist to rheumatologist.

METHODS:

Rheumatology curricular milestones were collaboratively composed by expanding the internal medicine reporting milestones to delineate the specific targets of rheumatology fellowship training within 6 ACGME core competencies. The 2006 American College of Rheumatology core curriculum for rheumatology training programs was updated.

RESULTS:

A total of 80 rheumatology curricular milestones were created, defining progressive learning through training; most focus on patient care and medical knowledge. The core curriculum update incorporates the new curricular milestones and rheumatology entrustable professional activities.

CONCLUSION:

Rheumatology curricular milestones are now available for implementation by rheumatology fellowship training programs, providing a clear roadmap for specific training goals and a guide to track each fellow's achievement over a 2-year training period. The comprehensive core curriculum delineates the essential breadth of knowledge, skills, and attitudes that define rheumatology, and provides a guide for educational activities during fellowship training. These guiding documents are now used to train and assess fellows as they prepare for independent rheumatology practice as the next generation of rheumatologists.

Emergency Medicine Resident Assessment of the Emergency Ultrasound Milestones and Current Training Recommendations

Stolz LA, Stolz U, Fields JM, et al. Emergency Medicine Resident Assessment of the Emergency Ultrasound Milestones and Current Training Recommendations. *Academic Emergency Medicine*. 2017; (3):353. doi:10.1111/acem.13113.

OBJECTIVES

Emergency ultrasound (EUS) has been recognized as integral to the training and practice of emergency medicine (EM). The Council of Emergency Medicine Residency-Academy of Emergency Ultrasound (CORD-AEUS) consensus document provides guidelines for resident assessment and progression. The Accredited Council for Graduate Medical Education (ACGME) has adopted the EM Milestones for assessment of residents' progress during their residency training, which includes demonstration of procedural competency in bedside ultrasound. The objective of this study was to assess EM residents' use of ultrasound and perceptions of the proposed ultrasound milestones and guidelines for assessment.

METHODS

This study is a prospective stratified cluster sample survey of all U.S. EM residency programs. Programs were stratified based on their geographic location (Northeast, South, Midwest, West), presence/absence of ultrasound fellowship program, and size of residency with programs sampled randomly from each stratum. The survey was reviewed by experts in the field and pilot tested on EM residents. Summary statistics and 95% confidence intervals account for the survey design, with sampling weights equal to the inverse of the probability of selection, and represent national estimates of all EM residents.

RESULTS

There were 539 participants from 18 residency programs with an overall survey response rate of 85.1%. EM residents considered several applications to be core applications that were not considered core applications by CORD-AEUS (quantitative bladder volume, diagnosis of joint effusion, interstitial lung fluid, peritonsillar abscess, fetal presentation, and gestational age estimation). Of several core and advanced applications, the Focused Assessment with Sonography in Trauma examination, vascular access, diagnosis of pericardial effusion, and cardiac standstill were considered the most likely to be used in future clinical practice. Residents responded that procedural guidance would be more crucial to their future clinical practice than resuscitative or diagnostic ultrasound. They felt that an average of 325 (301-350) ultrasound examinations would be required to be proficient, but felt that number of examinations poorly represented their competency. They reported high levels of concern about medicolegal liability while using EUS. Eighty-nine percent of residents agreed that EUS is necessary for the practice of EM.

CONCLUSIONS

EM resident physicians' opinion of what basic and advanced skills they are likely to utilize in their future clinical practice differs from what has been set forth by various groups of experts. Their opinion of how many ultrasound examinations should be required for competency is higher than what is currently expected during training.

Goal-directed Focused Ultrasound Milestones Revised: A Multiorganizational Consensus

Nelson M, Abdi A, Adhikari S, Boniface M, Bramante RM, Egan DJ, Matthew Fields J, Leo MM, Liteplo AS, Liu R, Nomura JT, Pigott DC, Raio CC, Ruskis J, Strony R, Thom C, Lewiss RE. Acad Emerg Med. 2016 Nov;23(11):1274-1279. doi: 10.1111/acem.13069. Epub 2016 Oct 31.

ABSTRACT:

In 2012 the Accreditation Council for Graduate Medical Education and the American Board of Emergency Medicine released the emergency medicine milestones. The Patient Care 12 (PC12) subcompetency delineates staged and progressive accomplishment in emergency ultrasound. While valuable as an initial framework for ultrasound resident education, there are limitations to PC12. This consensus paper provides a revised description of criteria to define the subcompetency. A multiorganizational task force was formed between the American College of Emergency Physicians Ultrasound Section, the Council of Emergency Medicine Residency Directors, and the Academy of Emergency Ultrasound of the Society for Academic Emergency Medicine. Representatives from each organization created this consensus document and revision.

ASDS Cosmetic Dermatologic Surgery Fellowship Milestones

Waldman A, Arndt KA, Avram MM, Brown MR, Dover JS, Fabi SG, Friedmann DP, Geronemus RG, Goldberg DJ, Goldman MP, Green JB, Ibrahim OA, Jones DH, Kilmer SL, McDaniel DH, Obagi S, Ortiz AE, Rohrer TE, Taylor MB, Torres A, Weinkle SH, Weiss MA, Weiss ET, Weiss RA, Poon E, Alam M. *Dermatol Surg*. 2016 Oct;42(10):1164-73. doi: 10.1097/DSS.0000000000000860.

BACKGROUND:

The American Council of Graduate Medical Education, which oversees much of postgraduate medical education in the United States, has championed the concept of "milestones," standard levels of achievement keyed to particular time points, to assess trainee performance during residency.

OBJECTIVE:

To develop a milestones document for the American Society for Dermatologic Surgery (ASDS) Cosmetic Dermatologic Surgery (CDS) fellowship program.

METHODS:

An ad hoc milestone drafting committee was convened that included members of the ASDS Accreditation Work Group and program directors of ASDS-approved Cosmetic Dermatologic Surgery (CDC) fellowship training programs. Draft milestones were circulated through email in multiple rounds until consensus was achieved.

RESULTS:

Thirteen milestones were developed in the 6 Accreditation Council for Graduate Medical Education (ACGME) competency areas, with 8 of these being patient-care milestones. Additional instructions for milestone administration more specific to the CDS fellowship than general ACGME instructions were also approved. Implementation of semiannual milestones was scheduled for the fellowship class entering in July 2018.

CONCLUSION:

Milestones are now available for CDS fellowship directors to implement in combination with other tools for fellow evaluation.

A Survey of Ultrasound Milestone Incorporation into Emergency Medicine Training Programs

Smalley CM, Dorey A, Thiessen M, Kendall JL. J Ultrasound Med. 2016 Jul;35(7):1517-21. doi: 10.7863/ultra.15.09012. Epub 2016 Jun 7.

OBJECTIVES:

With the introduction of the Emergency Medicine Milestone Project in 2013, residencies now assess emergency ultrasound (US) skills at regular intervals. However, it is unclear how programs are implementing the emergency US milestones and assessing competency. With the use of the milestone tool, a survey was distributed to emergency US educators to determine when programs are providing emergency US education, when residents are expected to attain competency, and whether the milestones reflect their expectations of trainees.

METHODS:

We conducted a prospective cross-sectional survey study distributed electronically to designated emergency US experts at 169 programs. Participants were queried on education and competency evaluation within the context of the milestones by designating a postgraduate year when the 5 milestone levels were taught and competency was expected. Survey findings were reported as percentages of total respondents from descriptive statistics.

RESULTS:

Responses were received from 53% of programs, and 99% were familiar with the milestones. Most programs provide level 1 (88%) and 2 (85%) instruction during postgraduate year 1. Most programs expect level 1 competency before residency (61%) and expect mastery of level 2 by the end of postgraduate year 1 (60%). Sixty-two percent believe the milestones do not accurately reflect their expectations, citing insufficient minimum scan numbers, lack of specificity, and unattainable level 5 requirements.

CONCLUSIONS:

There is substantial variability in the frequency and methods of competency evaluation using the emergency US milestones. However, most responders agree that residents should obtain level 2 competency by postgraduate year 1. Variation exists regarding what year and what skills define level 3 or greater competency.

The Road Ahead in Education: Milestones for Geriatric Psychiatry Subspecialty Training

Swantek SS, Maixner SM, Llorente MD, Cheong JA, Edgar L, Thomas CR, Ahmed I. *Am J Geriatr Psychiatry*. 2016 Sep;24(9):675-89. doi: 10.1016/j.jagp.2016.03.011. Epub 2016 Apr 6.

OBJECTIVE:

The Accreditation Council of Graduate Medical Education (ACGME) Milestone Project is the next step in a series of changes revamping the system of graduate medical education. In 2013 the ACGME completed the general psychiatry milestones. The ACGME then pursued creation of milestones for accredited psychiatric subspecialty fellowships. This article documents the work of the geriatric psychiatry subspecialty milestones work group. It reports the history and rationale supporting the milestones, the milestone development process, and the implications for geriatric psychiatry fellowship training.

METHODS:

In consultation with the American Association for Geriatric Psychiatry, the American Board of Psychiatry and Neurology, and the ACGME Psychiatry Residency Review Committee, the ACGME appointed a working group to create the geriatric psychiatry milestones using the general psychiatry milestones as a guide.

CONCLUSION:

The geriatric psychiatry milestones are the result of an iterative process resulting in the definition of the characteristics vital to a fellowship-trained geriatric psychiatrist. It is premature to assess their effect on psychiatric training. The true impact of the milestones will be determined as each training director uses the milestones to re-evaluate their program curriculum and the educational and clinical learning environment. The ACGME is currently collecting the information about the milestone performance of residents and fellows to further refine and determine how the milestones can best be used to assist programs in improving training.

Milestones for the Final Mile: Interspecialty Distinctions in Primary Palliative Care Skills Training

Harris JA, Herrel LA, Healy MA, Wancata LM, Perumalswami CR. *J Pain Symptom Manage*. 2016 Sep;52 (3):345-352.e5. doi: 10.1016/j.jpainsymman.2016.03.007. Epub 2016 Jun 1.

CONTEXT:

Primary palliative care (PPC) skills are useful in a wide variety of medical and surgical specialties, and the expectations of PPC skill training are unknown across graduate medical education.

OBJECTIVES:

We characterized the variation and quality of PPC skills in residency outcomes-based Accreditation Council for Graduate Medical Education (ACGME) milestones.

METHODS:

We performed a content analysis with structured implicit review of 2015 ACGME milestone documents from 14 medical and surgical specialties chosen for their exposure to clinical situations requiring PPC. For each specialty milestone document, we characterized the variation and quality of PPC skills in residency outcomes-based ACGME milestones.

RESULTS:

We identified 959 occurrences of 29 palliative search terms within 14 specialty milestone documents. Within these milestone documents, implicit review characterized 104 milestones with direct saliency to PPC skills and 196 milestones with indirect saliency. Initial interrater agreement of the saliency rating among the primary reviewers was 89%. Specialty milestone documents varied widely in their incorporation of PPC skills within milestone documents. PPC milestones were most commonly found in milestone documents for Anesthesiology, Pediatrics, Urology, and Physical Medicine and Rehabilitation. PPC-relevant milestones were most commonly found in the Interpersonal and Communication Skills core competency with 108 (36%) relevant milestones classified under this core competency.

CONCLUSIONS:

Future revisions of specialty-specific ACGME milestone documents should focus on currently underrepresented, but important PPC skills.

What Is a Rheumatologist and How Do We Make One?

Brown CR Jr, Criscione-Schreiber L, O'Rourke KS, Fuchs HA, Putterman C, Tan IJ, Valeriano-Marcet J, Hsieh E, Zirkle S, Bolster MB. *Arthritis Care Res (Hoboken)*. 2016 Aug;68(8):1166-72. doi: 10.1002/acr.22817.

OBJECTIVE:

Graduate medical education is a critical time in the training of a rheumatologist, and purposeful evaluation of abilities during this time is essential for long-term success as an independent practitioner. The internal medicine subspecialties collectively developed a uniform set of reporting milestones by which trainees can be assessed and receive formative feedback, providing clarity of accomplishment as well as areas for improvement in training. Furthermore, the reporting milestones provide a schema for assessment and evaluation of fellows by supervisors. The internal medicine subspecialties were also tasked with considering entrustable professional activities (EPAs), which define the abilities of a subspecialty physician who has attained sufficient mastery of the field to be accountable to stakeholders and participate in independent practice. Although EPAs have been established for a few specialties, they had not yet been described for rheumatology. EPAs have value as descriptors of the comprehensive abilities, knowledge, and skills of a practicing rheumatologist. The rheumatology EPAs have a role in defining a specialist in rheumatology upon completion of training, and also represent the ways our specialty defines our abilities that are enduring throughout practice.

METHODS:

We describe the collaborative process of the development of both the subspecialty reporting milestones and the rheumatology EPAs. The reporting milestones evolved through discussions and collaborations among representatives from the Association of Specialty Professors, the Alliance for Academic Internal Medicine, the American Board of Internal Medicine, and the Accreditation Council for Graduate Medical Education. The EPAs were a product of deliberations by the Next Accreditation System (NAS) working group of the American College of Rheumatology (ACR) Committee on Rheumatology Training and Workforce Issues.

RESULTS:

Twenty-three subspecialty reporting milestones and 14 rheumatology EPAs were advanced and refined over the course of 3 subspecialty reporting milestone development summits and 3 ACR NAS working group meetings, respectively.

CONCLUSION:

The subspecialty reporting milestones and rheumatology EPAs presented here stipulate reasonable and measurable expectations for rheumatologists-in-training. Together, these tools aim to promote enrichment and greater accountability in the training of fellows. Additionally, the EPAs define, for all stakeholders, the expertise of a rheumatologist in practice.

What's New in 10 Years? A Revised Cardiothoracic Curriculum for Diagnostic Radiology Residency with Goals and Objectives Related to General Competencies

Nguyen ET, Ackman JB, Rajiah P, Little B, Wu C, Bueno JM, Gilman MD, Christensen JD, Madan R, Laroia AT, Lee C, Kanne JP, Collins J. *Acad Radiol*. 2016 Jul;23(7):911-8. doi: 10.1016/j.acra.2016.01.022. Epub 2016 May 27.

ABSTRACT:

This is a cardiothoracic curriculum document for radiology residents meant to serve not only as a study guide for radiology residents but also as a teaching and curriculum reference for radiology educators and radiology residency program directors. This document represents a revision of a cardiothoracic radiology resident curriculum that was published 10 years ago in *Academic Radiology*. The sections that have been significantly revised, expanded, or added are (1) lung cancer screening, (2) lung cancer genomic profiling, (3) lung adenocarcinoma revised nomenclature, (4) lung biopsy technique, (5) nonvascular thoracic magnetic resonance, (6) updates to the idiopathic interstitial pneumonias, (7) cardiac computed tomography updates, (8) cardiac magnetic resonance updates, and (9) new and emerging techniques in cardiothoracic imaging. This curriculum was written and endorsed by the Education Committee of the Society of Thoracic Radiology. This curriculum operates in conjunction with the Accreditation Council for Graduate Medical Education (ACGME) milestones project that serves as a framework for semiannual evaluation of resident physicians as they progress through their training in an ACGME-accredited residency or fellowship programs. This cardiothoracic curriculum document is meant to serve not only as a more detailed guide for radiology trainees, educators, and program directors but also complementary to and guided by the ACGME milestones.

Mapping Direct Observations From Objective Structured Clinical Examinations to the Milestones Across Specialties

Baker-Genaw K, Kokas MS, Ahsan SF, Darnley-Fisch D, Drake S, Goyal N, Inamdar K, Moutzouros V, Prabhakar D, Rolland L, Sangha R, Shreve M, Woodward A. *J Grad Med Educ.* 2016 Jul;8(3):429-34. doi: 10.4300/JGME-D-15-00385.1.

BACKGROUND:

Little is known about residents' performance on the milestones at the institutional level. Our institution formed a work group to explore this using an institutional-level curriculum and residents' evaluation of the milestones.

OBJECTIVE:

We assessed whether beginner-level milestones for interpersonal and communication skills (ICS) related to observable behaviors in ICS-focused objective structured clinical examinations (OSCEs) for postgraduate year (PGY) 1 residents across specialties.

METHODS:

The work group compared ICS subcompetencies across 12 programs to identify common beginner-level physician-patient communication milestones. The selected ICS milestone sets were compared for common language with the ICS-OSCE assessment tool-the Kalamazoo Essential Elements of Communication Checklist-Adapted (KEECC-A). To assess whether OSCE scores related to ICS milestone scores, all PGY-1 residents from programs that were part of Next Accreditation System Phase 1 were identified; their OSCE scores from July 2013 to June 2014 and ICS subcompetency scores from December 2014 were compared.

RESULTS:

The milestones for 10 specialties and the transitional year had at least 1 ICS subcompetency that related to physician-patient communication. The language of the ICS beginner-level milestones appears similar to behaviors outlined in the KEECC-A. All 60 residents with complete data received at least a beginner-level ICS subcompetency score and at least a satisfactory score on all 3 OSCEs.

CONCLUSIONS:

The ICS-OSCE scores for PGY-1 residents appear to relate to beginner-level milestones for physician-patient communication across multiple specialties.

Pathology Informatics Essentials for Residents: A Flexible Informatics Curriculum Linked to Accreditation Council for Graduate Medical Education Milestones (a secondary publication)

Henricks WH, Karcher DS, Harrison JH Jr, Sinard JH, Riben MW, Boyer PJ, Plath S, Thompson A, Pantanowitz L. Acad Pathol. 2016 Jul 11;3:2374289516659051. doi: 10.1177/2374289516659051. eCollection 2016 Jan-Dec.

BACKGROUND:

Recognition of the importance of informatics to the practice of pathology has surged. Training residents in pathology informatics has been a daunting task for most residency programs in the United States because faculty often lacks experience and training resources. Nevertheless, developing resident competence in informatics is essential for the future of pathology as a specialty.

OBJECTIVE:

To develop and deliver a pathology informatics curriculum and instructional framework that guides pathology residency programs in training residents in critical pathology informatics knowledge and skills, and meets Accreditation Council for Graduate Medical Education Informatics Milestones.

DESIGN:

The College of American Pathologists, Association of Pathology Chairs, and Association for Pathology Informatics formed a partnership and expert work group to identify critical pathology informatics training outcomes and to create a highly adaptable curriculum and instructional approach, supported by a multiyear change management strategy.

RESULTS:

Pathology Informatics Essentials for Residents (PIER) is a rigorous approach for educating all pathology residents in important pathology informatics knowledge and skills. PIER includes an instructional resource guide and toolkit for incorporating informatics training into residency programs that vary in needs, size, settings, and resources. PIER is available at <http://www.apcprods.org/PIER> (accessed April 6, 2016).

CONCLUSIONS:

PIER is an important contribution to informatics training in pathology residency programs. PIER introduces pathology trainees to broadly useful informatics concepts and tools that are relevant to practice. PIER provides residency program directors with a means to implement a standardized informatics training curriculum, to adapt the approach to local program needs, and to evaluate resident performance and progress over time.

Direct Observation Assessment of Milestones: Problems with Reliability

Schott M, Kedia R, Promes SB, Swoboda T, O'Rourke K, Green W, Liu R, Stansfield B, Santen SA. West J Emerg Med. 2015 Nov;16(6):871-6. doi: 10.5811/westjem.2015.9.27270. Epub 2015 Oct 22.

INTRODUCTION:

Emergency medicine (EM) milestones are used to assess residents' progress. While some milestone validity evidence exists, there is a lack of standardized tools available to reliably assess residents. Inherent to this is a concern that we may not be truly measuring what we intend to assess. The purpose of this study was to design a direct observation milestone assessment instrument supported by validity and reliability evidence. In addition, such a tool would further lend validity evidence to the EM milestones by demonstrating their accurate measurement.

METHODS:

This was a multi-center, prospective, observational validity study conducted at eight institutions. The Critical Care Direct Observation Tool (CDOT) was created to assess EM residents during resuscitations. This tool was designed using a modified Delphi method focused on content, response process, and internal structure validity. Paying special attention to content validity, the CDOT was developed by an expert panel, maintaining the use of the EM milestone wording. We built response process and internal consistency by piloting and revising the instrument. Raters were faculty who routinely assess residents on the milestones. A brief training video on utilization of the instrument was completed by all. Raters used the CDOT to assess simulated videos of three residents at different stages of training in a critical care scenario. We measured reliability using Fleiss' kappa and interclass correlations.

RESULTS:

Two versions of the CDOT were used: one used the milestone levels as global rating scales with anchors, and the second reflected a current trend of a checklist response system. Although the raters who used the CDOT routinely rate residents in their practice, they did not score the residents' performances in the videos comparably, which led to poor reliability. The Fleiss' kappa of each of the items measured on both versions of the CDOT was near zero.

CONCLUSION:

The validity and reliability of the current EM milestone assessment tools have yet to be determined. This study is a rigorous attempt to collect validity evidence in the development of a direct observation assessment instrument. However, despite strict attention to validity evidence, inter-rater reliability was low. The potential sources of reducible variance include rater- and instrument-based error. Based on this study, there may be concerns for the reliability of other EM milestone assessment tools that are currently in use.

Reviewing Residents' Competence: A Qualitative Study of the Role of Clinical Competency Committees in Performance Assessment

Hauer KE, Chesluk B, Iobst W, Holmboe E, Baron RB, Boscardin CK, Cate OT, O'Sullivan PS. Acad Med. 2015 Aug;90(8):1084-92. doi: 10.1097/ACM.0000000000000736.

PURPOSE:

Clinical competency committees (CCCs) are now required in graduate medical education. This study examined how residency programs understand and operationalize this mandate for resident performance review.

METHOD:

In 2013, the investigators conducted semi-structured interviews with 34 residency program directors at five public institutions in California, asking about each institution's CCCs and resident performance review processes. They used conventional content analysis to identify major themes from the verbatim interview transcripts.

RESULTS:

The purpose of resident performance review at all institutions was oriented toward one of two paradigms: a problem identification model, which predominated; or a developmental model. The problem identification model, which focused on identifying and addressing performance concerns, used performance data such as red-flag alerts and informal information shared with program directors to identify struggling residents. In the developmental model, the timely acquisition and synthesis of data to inform each resident's developmental trajectory was challenging. Participants highly valued CCC members' expertise as educators to corroborate the identification of struggling residents and to enhance credibility of the committee's outcomes. Training in applying the milestones to the CCC's work was minimal. Participants were highly committed to performance review and perceived the current process as adequate for struggling residents but potentially not for others.

CONCLUSIONS:

Institutions orient resident performance review toward problem identification; a developmental approach is uncommon. Clarifying the purpose of resident performance review and employing efficient information systems that synthesize performance data and engage residents and faculty in purposeful feedback discussions could enable the meaningful implementation of milestones-based assessment.

Implementation of Nephrology Subspecialty Curricular Milestones

Yuan CM, Prince LK, Oliver JD 3rd, Abbott KC, Nee R. Am J Kidney Dis. 2015 Jul;66(1):15-22. doi: 10.1053/j.ajkd.2015.01.020. Epub 2015 Mar 12.

ABSTRACT:

Beginning in the 2014-2015 training year, the US Accreditation Council for Graduate Medical Education (ACGME) required that nephrology Clinical Competency Committees assess fellows' progress toward 23 subcompetency "context nonspecific" internal medicine subspecialty milestones. Fellows' advancement toward the "ready for unsupervised practice" target milestone now is tracked in each of the 6 competencies: Patient Care, Medical Knowledge, Professionalism, Interpersonal Communication Skills, Practice-Based Learning and Improvement, and Systems-Based Practice. Nephrology program directors and subspecialty societies must define nephrology-specific "curricular milestones," mapped to the nonspecific ACGME milestones. Although the ACGME goal is to produce data that can discriminate between successful and underperforming training programs, the approach is at risk to produce biased, inaccurate, and unhelpful information. We map the ACGME internal medicine subspecialty milestones to our previously published nephrology-specific milestone schema and describe entrustable professional activities and other objective assessment tools that inform milestone decisions. Mapping our schema onto the ACGME subspecialty milestone reporting form allows comparison with the ACGME subspecialty milestones and the curricular milestones developed by the American Society of Nephrology Program Directors. Clinical Competency Committees may easily adapt and directly translate milestone decisions reached using our schema onto the ACGME internal medicine subspecialty competency milestone-reporting format.

The New Milestones: Do We Need to Take a Step Back to Go a Mile Forward?

Dewan M, Manring J, Satish U. Acad Psychiatry. 2015 Apr;39(2):147-50. doi: 10.1007/s40596-014-0213-9. Epub 2014 Aug 9.

ABSTRACT:

The Milestones Project, like all previous systems and changes in graduate psychiatric education, for example, moving from 3 to 4 years of training or adopting six competency domains, has been devised without any supporting data and does not assess meaningful outcomes, such as improved patient outcomes. No evidence is presented that Milestones-based training will produce better psychiatrists. There is a path forward. First, replace unproven expert consensus with scientific and evidence-based approaches. Second, exchange endpoints that are easy to assess but uncorrelated with real world functioning (e.g., multiple-choice examinations) for outcomes that are meaningful and external to the training program (e.g., patient outcomes). Finally, to prevent possible waste, excess burden, or harm, no changes should be mandated until proven in prospective studies.

The Milestones for Psychosomatic Medicine Subspecialty Training

Boland RJ, Becker M, Levenson JL, Servis M, Crone CC, Edgar L, Thomas CR. Psychosomatics. 2015 Mar-Apr;56(2):153-67. doi: 10.1016/j.psych.2014.11.003. Epub 2014 Nov 13.

BACKGROUND:

The Accreditation Council of Graduate Medical Education Milestones project is a key element in the Next Accreditation System for graduate medical education. On completing the general psychiatry milestones in 2013, the Accreditation Council of Graduate Medical Education began the process of creating milestones for the accredited psychiatric subspecialties.

METHODS:

With consultation from the Academy of Psychosomatic Medicine, the Accreditation Council of Graduate Medical Education appointed a working group to create the psychosomatic medicine milestones, using the general psychiatry milestones as a starting point.

RESULTS:

This article represents a record of the work of this committee. It describes the history and rationale behind the milestones, the development process used by the working group, and the implications of these milestones on psychosomatic medicine fellowship training.

CONCLUSIONS:

The milestones, as presented in this article, will have an important influence on psychosomatic medicine training programs. The implications of these include changes in how fellowship programs will be reviewed and accredited by the Accreditation Council of Graduate Medical Education and changes in the process of assessment and feedback for fellows.

CORR® Curriculum—Orthopaedic Education: Operative Assessment and the ACGME Milestones: Time for Change

Van Heest AE, Dougherty PJ. Clin Orthop Relat Res. 2015 Mar;473(3):775-8. doi: 10.1007/s11999-014-4131-7. Epub 2015 Jan 11.

ABSTRACT:

The article offers information on the implementation of the Milestones program outlined by the Accreditation Council on Graduate Medical Education (ACGME) which provides a detailed framework for determining residency knowledge within specific core competencies in Orthopaedic medical education. Topics discussed include a residency program initiated by surgeon, William S. Halsted, development of formal orthopaedic postgraduate education, and expansion of the education after World War II.

2015 APDS SPRING MEETING: Milestones: The Road to Faculty Development

Shah D, Goettler CE, Torrent DJ, et al. *Journal of Surgical Education*. 2015;72:e226-e235. doi:10.1016/j.jsurg.2015.06.017.

PURPOSE:

Milestones for the assessment of residents in graduate medical education mark a change in our evaluation paradigms. The Accreditation Council for Graduate Medical Education has created milestones and defined them as significant points in development of a resident based on the 6 competencies. We propose that a similar approach be taken for resident assessment of teaching faculty. We believe this will establish parity and objectivity for faculty evaluation, provide improved data about attending surgeons' teaching, and standardize faculty evaluations by residents.

METHODS:

A small group of advanced surgery educators determined appropriate educational characteristics, resulting in creation of 11 milestones (Fig. 2) that were reviewed by faculty and residents. The residents have historically answered 16 questions, developed by our surgical education committee (Fig. 3), on a 5-point Likert score (never to very often). Three weeks after completing this Likert-type evaluation, the residents were asked to again evaluate attending faculty using the Faculty Milestones evaluation. The residents then completed a survey of 7 questions (scale of 1-9—disagree to strongly agree, neutral = 5), assessing the new milestones and compared with the previous Likert evaluation system.

RESULTS:

Of 32 surgery residents, 13 completed the Likert evaluations (3760 data points) and 13 completed the milestones evaluations (1800 data points). The number completing both or neither is not known, as the responses are anonymous when used for faculty feedback. The Faculty Milestones attending physicians' scores have far fewer top of range scores (21% vs 42%) and have a wider spread of data giving better indication of areas for improvement in teaching skills. The residents completed 17 surveys (116 responses) to evaluate the new milestones system. Surveys indicated that milestones were easier to use (average rating 6.13 ± 0.42 Standard Error (SE)), effective (6.82 ± 0.39) and efficient (6.11 ± 0.53), and more objective ($6.69 \pm 0.39/6.75 \pm 0.38$) than the Likert evaluations are. Average response was 6.47 ± 0.46 for overall satisfaction with the Faculty Milestones evaluation. More surveys were completed than evaluations, as all residents had an opportunity to review both evaluation systems.

CONCLUSIONS:

Faculty Milestones are more objective in evaluating surgical faculty and mirror the new paradigm in resident evaluations. Residents found this was an easier, more effective, efficient, and objective evaluation of our faculty. Although our Faculty Milestones are designed for surgical educators, they are likely to be applicable with appropriate modifications to other medical educators as well.

Cytopathology Fellowship Milestones

Naritoku WY, Black-Schaffer WS. Cancer Cytopathol. 2014 Dec;122(12):859-65. doi: 10.1002/cncy.21483. Epub 2014 Sep 18.

ABSTRACT:

The American Society of Cytopathology has provided guidelines for goals and objectives for cytopathology fellows. There are 90 Accreditation Council for Graduate Medical Education- accredited cytopathology fellowship training programs in the United States, each with its own unique curriculum designed to achieve these goals and objectives. The Accreditation Council for Graduate Medical Education cytopathology fellowship milestones were developed to ensure some uniformity in the outcomes of the various skill sets and competencies expected of a graduating cytopathology fellow. The rationale, development, and details of the cytopathology fellowship milestones are described herein.

Survey of Developmental Milestones in Internal Medicine among Residents and Faculty

Marhatta A, Messina D, Petrini JR, Lecaj A, Ahmadi R. Conn Med. 2014 May;78(5):293-8.

OBJECTIVES:

The published Accreditation Council for Graduate Medical Education (ACGME) milestones represent a novel method of evaluation of trainees in graduate medical education. We surveyed a group of teaching faculty and residents, regarding the new ACGME milestones project. We obtained their input on the expected timeline for the developmental milestones and compared their responses to the ACGME recommendations.

METHODS:

A 42-item survey questionnaire, derived from the original 142 item publication, was completed by 26 internal medicine teaching faculty and 34 internal medicine residents.

RESULTS:

We found statistically significant differences in the responses given by residents and faculty compared to those in the standard recommendations. The differences were more pronounced with the residents than with the faculty.

CONCLUSIONS:

The results of our survey showed significantly different responses as compared to the standard recommended timelines. Since this is a novel evaluation process, substantial faculty development and resident education regarding the process can help improve its implementation. Future studies should focus on how learners might better understand and refine the milestone evaluation process.

Progress toward Improved Leadership and Management Training in Pathology

Weiss RL, Hassell LA, Parks ER. Arch Pathol Lab Med. 2014 Apr;138(4):492-7. doi: 10.5858/ arpa.2013-0288-RA.

CONTEXT:

Competency gaps in leadership and laboratory management skills continue to exist between what training programs deliver and what recent graduates and future employers expect. A number of recent surveys substantiate this. Interest in delivering content in these areas is challenged by time constraints, the presence of knowledgeable faculty role models, and the necessary importance placed on diagnostic skills development, which overshadows any priority trainees have toward developing these skills.

OBJECTIVE:

To describe the problem, the near-future horizon, the current solutions, and the recommendations for improving resident training in laboratory management.

DATA SOURCES:

The demands of new health care delivery models and the value being placed on these skills by the Pathology Milestones and Next Accreditation System initiative of the Accreditation Council for Graduate Medical Education for training programs emphasizes their importance. This initiative includes 6 milestone competencies in laboratory management. Organizations like the American Society for Clinical Pathology, the American Pathology Foundation, the College of American Pathologists, and the Association of Pathology Chairs Program Directors Section recognize these competencies and are working to create new tools for training programs to deploy.

CONCLUSIONS:

It is our recommendation that (1) every training program develop a formal educational strategy for management training, (2) greater opportunity and visibility be afforded for peer-reviewed publications on management topics in mainstream pathology literature, and (3) pathology milestones-oriented tools be developed to assist program directors and their trainees in developing this necessary knowledge and skills.

The Pathology Milestones and the Next Accreditation System

Naritoku WY, Alexander CB, Bennett BD, Black-Schaffer WS, Brissette MD, Grimes MM, Hoffman RD, Hunt JL, Iezzoni JC, Johnson R, Kozel J, Mendoza RM, Post MD, Powell SZ, Procop GW, Steinberg JJ, Thorsen LM, Nestler SP. *Arch Pathol Lab Med.* 2014 Mar;138(3):307-15. doi: 10.5858/arpa.2013-0260-SA.

BACKGROUND:

In the late 1990s, the Accreditation Council for Graduate Medical Education developed the Outcomes Project and the 6 general competencies with the intent to improve the outcome of graduate medical education in the United States. The competencies were used as the basis for developing learning goals and objectives and tools to evaluate residents' performance. By the mid-2000s the stakeholders in resident education and the general public felt that the Outcomes Project had fallen short of expectations.

OBJECTIVE:

To develop a new evaluation method to track trainee progress throughout residency using benchmarks called milestones. A change in leadership at the Accreditation Council for Graduate Medical Education brought a new vision for the accreditation of training programs and a radically different approach to the evaluation of residents.

DATA SOURCES:

The Pathology Milestones Working Group reviewed examples of developing milestones in other specialties, the literature, and the Accreditation Council for Graduate Medical Education program requirements for pathology to develop pathology milestones. The pathology milestones are a set of objective descriptors for measuring progress in the development of competency in patient care, procedural skill sets, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

CONCLUSIONS:

The milestones provide a national standard for evaluation that will be used for the assessment of all residents in Accreditation Council for Graduate Medical Education-accredited pathology training programs.

The "Zing Factor" – How Do Faculty Describe the Best Pediatrics Residents?

Rosenbluth G, O'Brien B, Asher EM, Cho CS. J Grad Med Educ. 2014 Mar;6(1):106-11. doi: 10.4300/JGME-D-13-00146.1.

BACKGROUND:

Faculty in graduate medical education programs may not have uniform approaches to differentiating the quality of residents, and reviews of evaluations suggest that faculty use different standards when assessing residents. Standards for assessing residents also do not consistently map to items on evaluation forms. One way to improve assessment is to reach consensus on the traits and behaviors that are (or should be) present in the best residents.

METHODS:

A trained interviewer conducted semistructured interviews with faculty affiliated with 2 pediatrics residency programs until content saturation was achieved. Interviewees were asked to describe specific traits present in residents they identify as the best. Interviews were recorded and transcribed. We used an iterative, inductive approach to generate a coding scheme and identify common themes.

RESULTS:

From 23 interviews, we identified 7 thematic categories of traits and behaviors: personality, energy, professionalism, team behaviors, self-improvement behaviors, patient-interaction behaviors, and medical knowledge and clinical skills (including a subcategory, knowledge integration). Most faculty interviewees focused on traits like passion, enthusiasm, maturity, and reliability. Examination score or intelligence was mentioned less frequently than traits and behaviors categorized under personality and professionalism.

CONCLUSIONS:

Faculty identified many traits and behaviors in the residents they define as the best. The thematic categories had incomplete overlap with Accreditation Council for Graduate Medical Education (ACGME) and CanMEDS competencies. This research highlights the ongoing need to review our assessment strategies, and may have implications for the ACGME Milestone Project.

Early Feedback on the Use of the Internal Medicine Reporting Milestones in Assessment of Resident Performance

Aagaard E, Kane GC, Conforti L, Hood S, Caverzagie KJ, Smith C, Chick DA, Holmboe ES, Iobst WF. J Grad Med Educ. 2013 Sep;5(3):433-8

BACKGROUND:

The educational milestones were designed as a criterion-based framework for assessing resident progression on the 6 Accreditation Council for Graduate Medical Education competencies.

OBJECTIVE:

We obtained feedback on, and assessed the construct validity and perceived feasibility and utility of, draft Internal Medicine Milestones for Patient Care and Systems-Based Practice.

METHODS:

All participants in our mixed-methods study were members of competency committees in internal medicine residency programs. An initial survey assessed participant and program demographics; focus groups obtained feedback on the draft milestones and explored their perceived utility in resident assessment, and an exit survey elicited input on the value of the draft milestones in resident assessment. Surveys were tabulated using descriptive statistics. Conventional content analysis method was used to assess the focus group data.

RESULTS:

Thirty-four participants from 17 programs completed surveys and participated in 1 of 6 focus groups. Overall, the milestones were perceived as useful in formative and summative assessment of residents. Participants raised concerns about the length and complexity of some draft milestones and suggested specific changes. The focus groups also identified a need for faculty development. In the exit survey, most participants agreed that the Patient Care and Systems-Based Practice Milestones would help competency committees assess trainee progress toward independent practice.

CONCLUSIONS:

Draft reporting milestones for 2 competencies demonstrated significant construct validity in both the content and response process and the perceived utility for the assessment of resident performance. To ensure success, additional feedback from the internal medicine community and faculty development will be necessary.

The Emergency Medicine Milestones: A Validation Study

Korte RC, Beeson MS, Russ CM, Carter WA; Emergency Medicine Milestones Working Group, Reisdorff EJ. Acad Emerg Med. 2013 Jul;20(7):730-5. doi: 10.1111/acem.12166.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties sought to define milestones for skill and knowledge acquisition during residency training. Milestones are significant objective observable events. The milestones are listed within a structure that is derived from the ACGME general competencies. Major groups of milestones are called "subcompetencies." The original 24 subcompetencies containing 255 milestones for emergency medicine (EM) were developed through a multiorganizational group representing most EM stakeholder groups. To assure that the milestones reflected EM resident progress throughout training, the EM Milestones Working Group (EM MWG) sought to validate the individual milestones.

METHODS:

A computer-based survey was sent to all EM residency programs. The survey period began on April 30, 2012, and concluded on May 15, 2012. Respondents were asked to assign each milestone to a specific level of skill or knowledge acquisition. These levels ranged from a beginning resident to an accomplished clinician. There were two different forms that divided the milestones into two groups of 12 subcompetencies each. Surveys were randomly assigned to programs.

RESULTS:

There were five respondents (the program director and four key faculty) requested from each of the 159 residences. There were responses from 96 programs (60.4%). Of the 795 survey recipients, 28 were excluded due to prior exposure to the EM milestones. Of the remaining 767 potential respondents, 281 completed the survey (36.6%) within a 16-day period. Based on the survey results, the working group adjusted the milestones in the following ways: one entire subcompetency (teaching) was eliminated, six new milestones were created, 34 milestones were eliminated, 26 milestones were reassigned to a lower level score, and 20 were reassigned to a higher level. Nineteen milestones were edited to provide greater clarity. The final result was 227 discrete milestones among 23 subcompetencies.

CONCLUSIONS:

The EM milestones were validated through a milestone assignment process using a computer-based survey completed by program directors and key faculty. Milestones were revised in accordance with the results to better align assignment within each performance level.

Educational Milestone Development in the First 7 Specialties to Enter the Next Accreditation System

Swing SR, Beeson MS, Carraccio C, Coburn M, Iobst W, Selden NR, Stern PJ, Vydareny K. *J Grad Med Educ.* 2013 Mar;5(1):98-106. doi: 10.4300/JGME-05-01-33.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) Outcome Project introduced 6 general competencies relevant to medical practice but fell short of its goal to create a robust assessment system that would allow program accreditation based on outcomes. In response, the ACGME, the specialty boards, and other stakeholders collaborated to develop educational milestones, observable steps in residents' professional development that describe progress from entry to graduation and beyond.

OBJECTIVES:

We summarize the development of the milestones, focusing on 7 specialties, moving to the next accreditation system in July 2013, and offer evidence of their validity.

METHODS:

Specialty workgroups with broad representation used a 5-level developmental framework and incorporated information from literature reviews, specialty curricula, dialogue with constituents, and pilot testing.

RESULTS:

The workgroups produced richly diverse sets of milestones that reflect the community's consideration of attributes of competence relevant to practice in the given specialty. Both their development process and the milestones themselves establish a validity argument, when contemporary views of validity for complex performance assessment are used.

CONCLUSIONS:

Initial evidence for validity emerges from the development processes and the resulting milestones. Further advancing a validity argument will require research on the use of milestone data in resident assessment and program accreditation.

The Pediatrics Milestones: Initial Evidence for their Use as Learning Road Maps for Residents

Schumacher DJ, Lewis KO, Burke AE, Smith ML, Schumacher JB, Pitman MA, Ludwig S, Hicks PJ, Guralnick S, Englander R, Benson B, Carraccio C. *Acad Pediatr*. 2013 Jan-Feb;13(1):40-7. doi: 10.1016/j.acap.2012.09.003. Epub 2012 Nov 17.

OBJECTIVE:

As the next step in competency-based medical education, the Pediatrics Milestone Project seeks to provide a learner-centered approach to training and assessment. To help accomplish this goal, this study sought to determine how pediatric residents understand, interpret, and respond to the Pediatrics Milestones.

METHODS:

Cognitive interviews with 48 pediatric residents from all training levels at 2 training programs were conducted. Each participant reviewed one Pediatrics Milestone document (PMD). Eight total Pediatrics Milestones, chosen for their range of complexity, length, competency domain, and primary author, were included in this study. Six residents, 2 from each year of residency training, reviewed each PMD. Interviews were transcribed and coded using inductive methods, and codes were grouped into themes that emerged.

RESULTS:

Four major themes emerged through coding and analysis: 1) the participants' degree of understanding of the PMDs is sufficient, often deep; 2) the etiology of participants' understanding is rooted in their experiences; 3) there are qualities of the PMD that may contribute to or detract from understanding; and 4) participants apply their understanding by noting the PMD describes a developmental progression that can provide a road map for learning. Additionally, we learned that residents are generally comfortable being placed in the middle of a series of developmental milestones. Two minor themes focusing on interest and practicality were also identified.

CONCLUSIONS:

This study provides initial evidence for the Pediatrics Milestones as learner-centered documents that can be used for orientation, education, formative feedback, and, ultimately, assessment.

Milestones for Apheresis Education

Marshall CS, Andrzejewski C, Carey PM, Crookston KP, Li Y, Lopez-Plaza I, Sachais BS, Schwartz J, Winters JL, Wong EC, Wu Y. J Clin Apher. 2012 Nov;27(5):242-6. doi: 10.1002/jca.21235. Epub 2012 Jul 6.

ABSTRACT:

Milestones represent the essential knowledge, skills, and attitudes required for the practice of a medical discipline. Defining these milestones for each medical specialty has become a focus for the American Council of Graduate Medical Education (ACGME). Practitioners of Apheresis Medicine come from a variety of medical specialties making it challenging to establish the essential educational milestones for all. The American Society for Apheresis (ASFA) has an interest in promoting standards of excellence for Apheresis Medicine. ASFA's Physician's Curriculum Content Committee is a group of physician educators in the field of Apheresis Medicine, both donor and therapeutic, from across the United States, who have met regularly for several years to discuss the appropriate educational milestones in Apheresis training. The committee members teach residents and fellows from Pathology, Transfusion Medicine, Hematology/Oncology, Nephrology and other specialties. In this document, we have outlined the basic set of Apheresis milestones required in the ACGME defined competency areas of Patient Care and Medical Knowledge. We have also recommended methods of evaluation and estimated the time necessary for the acquisition of these cognitive and behavioral elements.

From Theory to Actual Practice: Creation and Application of Milestones in an Internal Medicine Residency Program, 2004-2010

Meade LB, Borden SH, McArdle P, Rosenblum MJ, Picchioni MS, Hinchey KT. Med Teach. 2012;34(9):717-23. doi: 10.3109/0142159X.2012.689441. Epub 2012 May 30.

BACKGROUND:

In the USA, the Accreditation Council of Graduate Medical Education, Educational Innovations Project is a partner in reshaping residency training to meet increasingly complex systems of health care delivery.

AIM:

We describe the creation and implementation of milestones as a vehicle for translating educational theory into practice in preparing residents to provide safe, autonomous patient care.

METHOD:

Six program faculty leaders, all with advanced medical education training, met in an iterative process of developing, implementing, and modifying milestones until a final set were vetted.

RESULTS:

We first formed the profile of a Master Internist. We then translated it into milestone language and implemented its integration across the program. Thirty-seven milestones were applied in all settings and rotations to reach explicit educational outcomes. We created three types of milestones: Progressive, build one on top of the other to mastery; additive, adding multiple behaviors together to culminate in mastery; and descriptive, using a proscribed set of complex, predetermined steps toward mastery.

CONCLUSIONS:

Using milestones, our program has enhanced an educational model into explicit, end of training goals. Milestone implementation has yielded positive results toward competency-based training and others may adapt our strategies in a similar effort.



How Residents Can Use Milestones Data

Do Pediatric Emergency Medicine Fellows Meet the Milestone Targets for Graduation?

Roskind, C. G., Leonard, K., Baghdassarian, A., Kou, M., Levasseur, K., Rose, J., Shabanova, V., Vu, T., Zuckerbraun, N. S., & Langan, M. L. *Academic Pediatrics*. 2020;20(7):e35-e36.

ABSTRACT:

The ACGME Milestone Project is a competency-based assessment tool. Subcompetencies (SC) are scored on a 5-point scale, and level 4 is recommended for graduation. The 2018 Milestones Report found that across subspecialties, not all graduates are attaining a level 4 for every SC. To describe the number of pediatric emergency medicine (PEM) fellows who achieve level 4 in all 23 SC at graduation and to identify SC and predictive factors where a level 4 is not achieved. This is a multicenter, retrospective cohort study of PEM fellows. Program directors provided de-identified milestone reports from 2015- 2018. Descriptive analysis of milestone scores at graduation was performed. Demographics were compared between fellows who did and did not meet level 4 at graduation for each SC. Sub-analyses assessed differences in residency and first year milestone scores and the rate of milestone attainment between fellows who did and did not attain level 4 at graduation. Data from 48 PEM fellowship programs yielded graduation scores for 392 fellows (62% of total). 87% completed pediatric residency and 60% were female. Residency scores were available for 45 fellows. There were no SC in which all fellows attained at least level 4 at graduation; the range of fellows scoring < level 4 per SC was 7-39%. (Table 1) 67% of fellows did not attain level 4 on one or more of the 23 SC at graduation. While some fellows failed to attain a level 4 on up to all 23 SC, 26% failed to meet level 4 on only 1 or 2 SC. In 19/23 SC, residency and/or first year milestones scores were significantly lower for those who did not attain level 4 at graduation compared to those who did (mean difference 0.74 points). Those who did not attain level 4 at graduation had a significantly faster rate of improvement in milestone scores for 10/23 SC compared to those who did attain level 4. In our sample, 67% of PEM fellows did not attain level 4 for at least 1 of the 23 SC at graduation. Low scores during residency or early in fellowship may predict difficulty in meeting level 4 by fellowship completion.

Cytopathology Milestones: Can You Get to Level 5?

Dyhdalo KS, Oshilaja O, Chute DJ, Booth CN, Suchy P, Smith K, Procop GW, Reynolds JP. *J Am Soc Cytopathol.* 2020 Mar 30. pii: S2213-2945(20)30046-6. doi: 10.1016/j.jasc.2020.03.002. [Epub ahead of print]

INTRODUCTION:

ACGME Milestones describe 6 areas of proficiency, indicating readiness for practice. Each is divided into 5 levels of mastery; Level 1 (new trainees) through Levels 4 (graduation) and 5 (aspirational). Milestones reporting began Spring 2016. We used Milestones to assess graduated fellows.

MATERIALS AND METHODS:

We conducted phone interviews with previous fellows and collected demographic information including practice setting. We asked graduates if they fulfilled each example of mastery and recorded their answers.

RESULTS:

A total of 22 fellows graduated from 2010 to 2017; 15 responded (10 academic, 5 private). Milestones in which nearly all respondents performed well (Level 4+) were: PC1, MK1, SBP2, SBP4, PROF1-4, ICS1-3. Some were more challenging (PC2, MK2, SBP1/3/5, PBL1). For PC2, 2 respondents achieved Level 1 (did not perform fine-needle aspirations). For MK2, 2 respondents achieved Level 1 (did not evaluate Papanicolaou). For SBP1, 80% in private practice achieved Level 5; 50% in academics achieved Level 3. For SBP3, 80% in private practice achieved Level 4+; 100% in academics achieved maximum Level 2. For SBP5, 60% of all respondents achieved maximum Level 3; only 1 achieved Level 5.

CONCLUSIONS:

Many Milestones are attainable. Eleven of 18 yielded Level 4+ from most respondents. Three (PC2, MK1, MK2) yielded rare Level 1 due to scope of practice. Others (SBP1, SBP3) reflect more of an all-or-nothing phenomenon. For SBP5, most respondents achieved Level 3; only 1 achieved Level 5. Some Milestones are highly dependent on practice setting, and others remain aspirational.

Using an Entrustable Professional Activity to Assess Consultation Requests Called on an Internal Medicine Teaching Service

Kang AJ, Gielissen K, Windish D. MedEdPORTAL. 2019 Nov 22;15:10854. doi: 10.15766/mep_2374-8265.10854.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education's milestones require internal medicine residents to have competency in calling consults. Based on a literature review, we developed an Entrustable Professional Activity (EPA) to delineate the knowledge, skills, and attitudes required for a consultation request and, building on the EPA, implemented an assessment instrument to provide feedback to interns calling consultation requests and assess the quality of their consult questions and the level of supervision required in performing this milestone.

METHODS:

Assessments were done on internal medicine inpatient teaching services. Consultation requests were performed by interns and observed by residents using the assessment instrument. Feedback was provided to the interns. Interns then completed a self-reflection instrument based on the feedback.

RESULTS:

Twenty-six paired observations were collected over three 1-month rotations. There was a moderate positive correlation ($r = .43$) comparing resident and intern responses to how they felt about the intern's ability to make a consultation request. There was a strong positive correlation ($r = .65$) comparing resident opinion of how strong the intern's ability in calling a consult to how well the consult question used the PICO (patient, intervention, comparators, outcomes of interest) framework. Twenty-five out of 28 interns (89%) said they would make a change during their next consultation request due to feedback from their resident.

DISCUSSION:

Our EPA-based assessment instrument provided an opportunity to give interns feedback and to assess the quality of the consultation requests they made.

Family Medicine Residency Graduates' Preparation for Quality Improvement Leadership

Lichkus J, Fang B, Peterson LE. J Grad Med Educ. 2019 Oct;11(5):558-564. doi: 10.4300/JGME-D-18-01060.1.

BACKGROUND:

Training in quality improvement (QI) is a standard component of family medicine residency education. Graduating family medicine residents' ability to lead QI initiatives is unknown.

OBJECTIVE:

We assessed the preparedness of graduating family medicine residents to lead QI projects and to identify factors that may increase such readiness.

METHODS:

Milestone data for all graduating family medicine residents were linked to a practice demographic questionnaire completed by the same residents who registered for the American Board of Family Medicine certification examination between 2014 and 2017. The change in self-assessed QI preparedness over time and its association with faculty-assigned milestone ratings were examined using descriptive and regression analyses.

RESULTS:

The questionnaire had a 100% response rate (12 208 responded). Between 2014 and 2017, the percentage of residents who self-reported being "extremely" or "moderately" prepared to lead QI projects increased from 72.7% (2208 of 3038) to 75.8% (2434 of 3210, $P = .009$). Self-reported QI team leadership was associated with 93% higher odds of feeling extremely prepared compared to moderately prepared (odds ratio 1.93, 95% CI 1.58-2.35). The average midyear faculty-assigned milestone rating for QI among residents who felt "extremely" prepared was 3.28 compared to 3.14 among those who felt "not at all" prepared.

CONCLUSIONS:

Over the past 4 years, family medicine residents' self-assessed preparedness to lead QI projects has barely increased. There was no correlation between self-assessed preparation and faculty-assigned milestone rating. However, we found a small association between self-reported QI leadership and self-assessed QI preparedness.

An Emergency Medicine Milestone-Based Simulation Curriculum: Acute Ischemic Stroke

Turner-Lawrence D, Hang BS, Shah P, Levasseur K. MedEdPORTAL. 2019 Jun 18;15:10829. doi: 10.15766/mep_2374-8265.10829.

INTRODUCTION:

The emergency medicine (EM) resident's ability to make independent decisions in the setting of acute ischemic stroke has been reduced as a result of the involvement of multidisciplinary teams. This simulation was created to give EM residents the opportunity to independently manage the early stages of ischemic stroke and its complications.

METHODS:

A solo learner was presented with a 55-year-old male with complaints consistent with an acute stroke. The resident had to calculate stroke severity; coordinate hospital resources; discuss risks, benefits, and alternatives to thrombolysis; and deal with subsequent complications. The learner had to keep a broad differential for sudden change in mental status and consider alternative interventions. Strategies to decrease intracranial pressure needed to be implemented while obtaining neurosurgical consultation. Debriefing included discussion of expected actions in the context of the Accreditation Council for Graduate Medical Education (ACGME) milestones. Residents' review of their video performance added additional self-reflection.

RESULTS:

A total of 69 PGY 3 EM residents independently participated in this simulation over a 5-year period. Thirty-two completed a postsimulation evaluation. Nearly all learners felt that this case reflected an actual patient encounter and increased their confidence in managing stroke. The milestone-based feedback tool was completed with all learners. Anticipated actions linked to Level 1 and 2 milestones were regularly achieved while acquisition of Level 3 and 4 actions varied.

DISCUSSION:

Case actions were uniquely characterized by the ACGME milestones, which helped to delineate learners' knowledge gaps and provided concrete areas for improvement.

The Implementation of an Introductory Surgical Pathology Didactic Series to Transition First Year Residents and Facilitate Upper Level Resident Teaching

Mehr CR, Montone KT, Schwartz LE. *Adv Anat Pathol*. 2019 May;26(3):210-214. doi: 10.1097/PAP.000000000000229.

ABSTRACT:

The increasing complexity of the practice of pathology and health care in general requires that pathology residents acquire a vast number of skills during their training. This has been reflected by the broad range of skills addressed in the Accreditation Council for Graduate Medical Education (ACGME) milestones. In order to address some of these milestones, our residency program instituted an introductory didactic series in surgical pathology that focused on 2 objectives. First, the didactics provided basic grossing and histology training to first year residents transitioning from medical school.

Second, the sessions allowed upper level residents to refine their teaching and communication skills at the microscope and therefore served as an important career development tool. Surveys of both first year residents and the upper level residents that led these sessions confirm the utility of these didactics and the use of upper level residents to teach junior trainees. In addition, these sessions led to a dramatic increase in RISE scores among first year trainees. An introductory series with upper level residents leading slide sessions could easily be replicated at other institutions and provide similar benefits.

Resident Case Volume Correlates with Clinical Performance: Finding the Sweet Spot

Agarwal V, Bump GM, Heller MT, Chen LW, Branstetter BF 4th, Amesur NB, Hughes MA. Acad Radiol. 2019 Jan;26(1):136-140. doi: 10.1016/j.acra.2018.06.023. Epub 2018 Aug 4.

RATIONALE AND OBJECTIVES:

To determine whether the total number of studies interpreted during radiology residency correlates with clinical performance as measured by objective criteria.

MATERIALS AND METHODS:

We performed a retrospective cohort study of three graduating classes of radiology residents from a single residency program between the years 2015-2017. The total number of studies interpreted by each resident during residency was tracked. Clinical performance was determined by tracking an individual resident's major discordance rate. A major discordance was recorded when there was a difference between the preliminary resident interpretation and final attending interpretation that could immediately impact patient care. Accreditation council for graduate medical education milestones at the completion of residency, Diagnostic radiology in-training scores in the third year, and score from the American board of radiology core exam were also tabulated. Pearson correlation coefficients and polynomial regression analysis were used to identify correlations between the total number of interpreted films and clinical, test, and milestone performance.

RESULTS:

Thirty-seven residents interpreted a mean of 12,709 studies (range 8898-19,818; standard deviation [SD] 2351.9) in residency with a mean major discordance rate of 1.1% (range 0.34%- 2.54%; stand dev 0.49%). There was a nonlinear correlation between total number of interpreted films and performance. As the number of interpreted films increased to approximately 16,000, clinical performance ($p = 0.004$) and test performance ($p = 0.01$) improved, but volumes over 16,000 correlated with worse performance.

CONCLUSION:

The total number of studies interpreted during radiology training correlates with performance. Residencies should endeavor to find the "sweet spot": the amount of work that maximizes clinical exposure and knowledge without overburdening trainees.

Intern Self-Reported Preparedness for Residency: An ACGME Milestone-Based Study

McLean ME, Huls TA, Park JC, Anana MC, Chen AS, Chien GK, Cygan L, Gupta SJ, Husain A, Mishra DN, Ng KM, Russell JT, Surlles RT, Kulkami ML. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*. 2019;20:S10.

OBJECTIVE:

Transitioning from medical school to internship is challenging. While several curricula for medical students and interns have been proposed during this transition period, there has not been a large-scale self assessment of incoming emergency medicine (EM) interns' preparedness for EM milestones. While many medical schools and EM residencies host "boot camps" or other intensive orientation programs for EM-bound students, having knowledge of incoming EM residents' self-perceived strengths and weaknesses will help clerkship directors and EM residency leadership better serve this group of learners. Milestones in EM are used in the United States to measure residents' progress and determine competence at residency completion.⁴ Incoming interns are expected to have achieved level 1 milestones by the time they enter residency, to have achieved level 2 milestones between the first and second year, and to have achieved level 4 milestones before completion of residency. We reached out to 151 newly-matched interns at 11 different sites to ask about their self-perceived "preparedness" for levels 1, 2, and 3 of our eight selected EM milestones (numbers 1, 3, 4, 5, 7, 9, 10, and 12).

DESIGN AND METHOD:

This was a prospective, cross-sectional study of 151 newly-matched pre-interns at 11 EM residency programs. We included all newly-matched interns at each program. Interns were invited via email from their programs to complete a voluntary, anonymous survey prior to the start of residency. The survey used a Likert scale (1 = very unprepared to 5 = extremely prepared) to assess self-reported preparedness to perform levels 1 and 2 of milestones 1, 3, 4, 5, 7, 9, 10, and 12. Milestones were chosen based on ease of teaching in an EM case curriculum that was later implemented.

RESULTS:

A total of 126 pre-interns completed the survey (response rate 83.4%).

CONCLUSION:

Subjects reported highest level of preparedness for emergency stabilization (PC1), and lowest levels of preparedness for airway management (PC10) and pharmacological management (PC5). The data suggest that teachers of fourth-year medical students and new EM interns may want to emphasize milestones 5 and 10 early in internship or late in medical school.

Radiology Resident Assessment and Feedback Dashboard

Durojaiye AB, Snyder E, Cohen M, Nagy P, Hong K, Johnson PT. Radiographics. 2018 Sep-Oct;38 (5):1443-1453. doi: 10.1148/rg.2018170117. Epub 2018 Aug 10.

ABSTRACT:

Assessment of residents is optimally performed through processes and platforms that provide daily feedback, which can be immediately acted on. Given the documentation required by the Accreditation Council for Graduate Medical Education (ACGME), effective data management, integration, and presentation are crucial to ease the burden of manual documentation and increase the timeliness of actionable information. To this end, the authors modeled the learning activities of residents using the Experience Application Programming Interface (xAPI) framework, which is a standard framework for the learning community. On the basis of the xAPI framework and using open-source software to extend their existing infrastructure, the authors developed a Web-based dashboard that provides residents with a more holistic view of their educational experience. The dashboard was designed around the ACGME radiology milestones and provides real-time feedback to residents using various assessment metrics derived from multiple data sources. The purpose of this article is to describe the dashboard's architecture and components, the design and technical considerations, and the lessons learned in implementing the dashboard.

A Cross-Specialty Examination of Resident Error Disclosure and Communication Skills Using Simulation

Gardner AK, Lim G, Minard CG, Guffey D, Pillow MT. J Grad Med Educ. 2018 Aug;10(4):438- 441. doi: 10.4300/JGME-D-17-00603.1.

BACKGROUND:

Disclosure of medical errors is important to patients and physicians, but formal disclosure training during the graduate medical education curriculum is limited.

OBJECTIVE:

We examined resident competence related to error disclosure, using standardized patient (SP) ratings of resident communication skills.

METHODS:

All first-year residents from medicine, radiology, emergency medicine, orthopedic surgery, and neurological surgery completed a 20-minute simulated session in which they were provided background information on a medical error they had made and were asked to disclose the error to an SP acting as a family member. Residents were then debriefed and completed a post-scenario questionnaire. The SPs completed an 11-item communication assessment and 3 milestone rating tools on professionalism (PROF-1, PROF-3) and interpersonal and communication skills (ICS-1).

RESULTS:

Ninety-six residents from a single institution participated toward the end of the intern year. Communication assessment scores ranged from 23% to 100% (mean [SD], 80.6 [17.0]). Mean (SD) milestone ratings across specialties were 2.80 ± 0.92 for PROF-1, 2.48 ± 0.92 for PROF-3, and 2.45 ± 0.92 for ICS-1. One-way analysis of variance revealed no significant differences among specialties on milestone or communication ratings. Residents who accepted personal responsibility for the error (84.55 [14.06]) received significantly higher communication ratings from SPs compared with residents who did not (66.67 [19.52], $P < .001$).

CONCLUSIONS:

This SP assessment of error disclosure by first-year residents from multiple specialties was feasible and acceptable. It revealed areas of improvement as well as considerable variation in communication skills and professionalism among residents.

A Survey on Recent Medical School Graduate Comfort With the Level 1 Milestones

Petravick ME, Marsh JL, Karam MD, Dirschl DR. J Surg Educ. 2018 Jul - Aug;75(4):911-917. doi: 10.1016/j.j Surg.2017.10.004. Epub 2017 Nov 7.

OBJECTIVE:

The Next Accreditation System implemented 5 levels of milestones for orthopedic surgery residents in 2013. The Level 1 milestones were noted as those "expected of an incoming resident." While the milestones were intended for assessing resident progression and readiness for independent practice, this designation can also be used to assess how well prepared graduating medical students are for beginning an orthopedic surgery residency. The primary objective of this paper is to measure recent medical school graduate comfort with the Level 1 milestones.

DESIGN, SETTING, AND PARTICIPANTS:

In June 2015, the program directors for the Midwest Orthopaedic Surgical Skills (MOSS) Consortium affiliated residency programs were sent an online survey for distribution to the recent medical school graduates who matched at their respective programs. The survey was about recent graduate comfort with the Level 1 milestone handles associated with 16 orthopedic milestones spanning multiple subspecialties. Responses were grouped based on comfort with individual milestone handles with orthopedic conditions (e.g., carpal tunnel) or with broader categories spanning orthopedic milestones (e.g., imaging).

RESULTS:

In all, 66 of 112 graduates (58.9%) responded. Of 60 milestone handles surveyed, respondents were "Comfortable" with an average of 31.6 ± 14.2 handles with some conditions performing much better than others. The median "Comfortable" response rate was 31 handles. The 8 broader categories had "Comfortable" response rates between 35% and 70%. All 8 orthopedic conditions had significantly higher "Comfortable" response rates for "Evaluation & Knowledge" handles than for "Decision Making & Treatment" handles.

CONCLUSIONS:

Most recent medical student graduates who matched into an orthopedic surgery residencies are only comfortable with about half of the Level 1 milestone handles even though they are expected to meet the Level 1 milestones upon beginning residency. This finding suggests the development of an assessment based on the Level 1 milestones would be appropriate to better inform both graduate and undergraduate medical education in orthopedic surgery.

Resident and Program Director's Perceptions of Milestone-Based Feedback in Obstetrics and Gynecology

Hariton E, Bortoletto P, Barnes KL, Kaimal AJ, Stagg AR. J Med Educ Curric Dev. 2018 May 20;5:2382120518774794. doi: 10.1177/2382120518774794. eCollection 2018 Jan-Dec.

INTRODUCTION:

In July 2014, US residency programs fully implemented the Next Accreditation System including the use of milestone evaluation and reporting. Currently, there has been little investigation into the result of implementation of this new system. Therefore, this study sought to evaluate perceptions of Obstetrics and Gynecology residents and program directors regarding the use of milestone-based feedback and identify areas of deficiency.

METHODS:

A Web-based survey was sent to US-based Obstetrics and Gynecology residents and program directors regarding milestone-based assessment implementation.

RESULTS:

Out of 245 program directors, 84 responded to our survey (34.3% response rate). Of responding program directors, most reported that milestone-based feedback was useful (74.7%), fair (83.0%), and accurate (76.5%); however, they found it administratively burdensome (78.1%). Residents felt that milestone-based feedback was useful (62.7%) and fair (70.0%). About 64.3% of residents and 74.7% of program directors stated that milestone-based feedback is an effective tool to track resident progression; however, a sizable minority of both groups believe that it does not capture surgical aptitude. Qualitative analysis of free response comments was largely negative and highlighted the administrative burden and lack of accuracy of milestone-based feedback.

CONCLUSION:

Overall, both Obstetrics and Gynecology program directors and residents report that milestone-based feedback is useful and fair. Issues of administrative burden, timeliness, evaluation of surgical aptitude, and ability to act on assigned milestone levels were identified. Although this study is limited to one specialty, such issues are likely important to all residents, faculty, and program directors who have implemented the Next Accreditation System requirements.

Shadowing Emergency Medicine Residents by Medical Education Specialists to Provide Feedback on Non-Medical Knowledge-Based ACGME Subcompetencies

Waterbrook AL, Spear Ellinwood KC, Pritchard TG, Bertels K, Johnson AC, Min A, Stoneking LR. *Adv Med Educ Pract.* 2018 May 4;9:307-315. doi: 10.2147/AMEP.S151216. eCollection 2018.

OBJECTIVE:

Non-medical knowledge-based subcompetencies (multitasking, professionalism, accountability, patient-centered communication, and team management) are challenging for a supervising emergency medicine (EM) physician to evaluate in real-time on shift while also managing a busy emergency department (ED). This study examines residents' perceptions of having a medical education specialist shadow and evaluate their nonmedical knowledge skills.

METHODS:

Medical education specialists shadowed postgraduate year 1 and postgraduate year 2 EM residents during an ED shift once per academic year. In an attempt to increase meaningful feedback to the residents, these specialists evaluated resident performance in selected non-medical knowledge-based Accreditation Council of Graduate Medical Education (ACGME) sub-competencies and provided residents with direct, real-time feedback, followed by a written evaluation sent via email. Evaluations provided specific references to examples of behaviors observed during the shift and connected these back to ACGME competencies and milestones.

RESULTS:

Twelve residents participated in this shadow experience (six postgraduate year 1 and six postgraduate year 2). Two residents emailed the medical education specialists ahead of the scheduled shadow shift requesting specific feedback. When queried, five residents voluntarily requested their feedback to be included in their formal biannual review. Residents received milestone scores and narrative feedback on the non-medical knowledge-based ACGME subcompetencies and indicated the shadow experience and subsequent feedback were valuable.

CONCLUSION:

Medical education specialists who observe residents over the course of an entire shift and evaluate non-medical knowledge-based skills are perceived by EM residents to provide meaningful feedback and add valuable information for the biannual review process.

Interim Analysis of a Prospective Multi-Institutional Study of Surgery Resident Experience with Flexibility in Surgical Training

Cullinan DR, Wise PE, Delman KA, Potts JR, Awad MM, Eberlein TJ, Klingensmith ME. J Am Coll Surg. 2018 Apr;226(4):425-431. doi: 10.1016/j.jamcollsurg.2017.12.024. Epub 2018 Jan 5.

BACKGROUND:

The Flexibility in Surgical Training (FIST) consortium project was designed to evaluate the feasibility and resident outcomes of optional subspecialty-focused training within general surgery residency training.

STUDY DESIGN:

After approval by the American Board of Surgery, R4 and R5 residents were permitted to customize up to 12 of the final 24 months of residency for early tracking into 1 of 9 subspecialty tracks. A prospective IRB-approved study was designed across 7 institutions to evaluate the impact of this option on operative experience, in-service exam (American Board of Surgery In-Training Examination [ABSITE]) and ACGME milestone performance, and resident and program director (PD) perceptions. The FIST residents were compared with chief residents before FIST initiation (controls) as well as residents during the study period who did not participate in FIST (no specialization track, NonS).

RESULTS:

From 2013 to 2017, 122 of 214 chief residents (57%) completed a FIST subspecialty track. There were no differences in median ABSITE scores between FIST, NonS residents, and controls. The ACGME milestones at the end of the R5 year favored the FIST residents in 13 of 16 milestones compared with NonS. Case logs demonstrated an increase in track-specific cases compared with NonS residents. Resident and PD surveys reported a generally favorable experience with FIST.

CONCLUSIONS:

In this prospective study, FIST is a feasible option in participating institutions. All FIST residents, regardless of track, met requirements for ABS Board eligibility, despite modifications to rotations and case experience. Future studies will assess the impact of FIST on ABS exam results and fellowship success.

The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs

Conforti LN, Yaghmour NA, Hamstra SJ, Holmboe ES, Kennedy B, Liu JJ, Waldo H, Selden NR. *J Surg Educ*.

2018 Jan - Feb;75(1):147-155. doi: 10.1016/j.jsurg.2017.06.001. Epub 2017 Jun 22.

OBJECTIVES:

The purpose of this study was to determine the effect of the Accreditation Council for Graduate Medical Education Milestones on the assessment of neurological surgery residents. The authors sought to determine the feasibility, acceptability, and utility of this new framework in making judgments of progressive competence, its implementation within programs, and the influence on curricula. Residents were also surveyed to elicit the effect of Milestones on their educational experience and professional development.

DESIGN, SETTING, AND PARTICIPANTS:

In 2015, program leadership and residents from 21 neurological surgery residency programs participated in an online survey and telephone interview in which they reflected on their experiences with the Milestones. Survey data were analyzed using descriptive statistics. Interview transcripts were analyzed using grounded theory.

RESULTS:

Response themes were categorized into 2 groups: outcomes of the Milestones implementation process, and facilitators and barriers. Because of Milestones implementation, participants reported changes to the quality of the assessment process, including the ability to identify struggling residents earlier and design individualized improvement plans. Some programs revised their curricula based on training gaps identified using the Milestones. Barriers to implementation included limitations to the adoption of a developmental progression model in the context of rotation block schedules and misalignment between progression targets and clinical experience. The shift from time-based to competency-based evaluation presented an ongoing adjustment for many programs. Organized preparation before clinical competency committee meetings and diverse clinical competency committee composition led to more productive meetings and perceived improvement in promotion decisions.

CONCLUSIONS:

The results of this study can be used by program leadership to help guide further implementation of the Milestones and program improvement. These results also help to guide the evolution of Milestones language and their implementation across specialties.

How Effective are New Milestones Assessments at Demonstrating Resident Growth? 1 Year of Data

Goldman RH, Tuomala RE, Bengtson JM, Stagg AR. J Surg Educ. 2017 Jan-Feb;74(1):68-73. doi: 10.1016/j.jsurg.2016.06.009. Epub 2016 Jul 6.

OBJECTIVE:

Assessment tools that accrue data for the Accreditation Council for Graduate Medical Education Milestones must evaluate residents across multiple dimensions, including medical knowledge, procedural skills, teaching, and professionalism. Our objectives were to: (1) develop an assessment tool to evaluate resident performance in accordance with the Milestones and (2) review trends in resident achievements during the inaugural year of Milestone implementation.

DESIGN:

A novel venue and postgraduate year (PGY) specific assessment tool was built, tested, and implemented for both operating room and labor and delivery "venues." Resident development of competence and independence was captured over time. To account for variable rotation schedules, the year was divided into thirds and compared using two-tailed Fisher's exact test.

SETTING:

Brigham and Women's and Massachusetts General Hospitals, Boston MA.

PARTICIPANTS:

Faculty evaluators and obstetrics and gynecology residents.

RESULTS:

A total of 822 assessments of 44 residents were completed between 9/2014 and 6/2015. The percentage of labor and delivery tasks completed "independently" increased monotonically across the start of all years: 8.4% for PGY-1, 60.3% for PGY-2, 73.7% for PGY-3, and 87.5% for PGY-4. Assessments of PGY-1 residents demonstrated a significant shift toward "with minimal supervision" and "independent" for the management of normal labor ($p = 0.03$). PGY-3 residents demonstrated an increase in "able to be primary surgeon" in the operating room, from 36% of the time in the first 2/3 of the year, to 62.3% in the last 1/3 ($p < 0.01$).

CONCLUSION:

Assessment tools developed to assist with Milestone assignments capture the growth of residents over time and demonstrate quantifiable differences in achievements between PGY classes. These tools will allow for targeted teaching opportunities for both individual residents and residency programs.

Using the ACGME Milestones for Resident Self-Evaluation and Faculty Engagement

Meier AH, Gruessner A, Cooney RN. J Surg Educ. 2016 Nov-Dec;73(6):e150-e157. doi: 10.1016/j.jsurg.2016.09.001.

BACKGROUND:

Since July 2014 General Surgery residency programs have been required to use the Accreditation Council for Graduate Medical Education milestones twice annually to assess the progress of their trainees. We felt this change was a great opportunity to use this new evaluation tool for resident self-assessment and to furthermore engage the faculty in the educational efforts of the program.

METHODS:

We piloted the milestones with postgraduate year (PGY) II and IV residents during the 2013/2014 academic year to get faculty and residents acquainted with the instrument. In July 2014, we implemented the same protocol for all residents. Residents meet with their advisers quarterly. Two of these meetings are used for milestones assessment. The residents perform an independent self-evaluation and the adviser grades them independently. They discuss the evaluations focusing mainly on areas of greatest disagreement. The faculty member then presents the resident to the clinical competency committee (CCC) and the committee decides on the final scores and submits them to the Accreditation Council for Graduate Medical Education website. We stored all records anonymously in a MySQL database. We used Anova with Tukey post hoc analysis to evaluate differences between groups. We used intraclass correlation coefficients and Krippendorff's α to assess interrater reliability.

RESULTS:

We analyzed evaluations for 44 residents. We created scale scores across all Likert items for each evaluation. We compared score differences by PGY level and raters (self, adviser, and CCC). We found highly significant increases of scores between most PGY levels ($p < 0.05$). There were no significant score differences per PGY level between the raters. The interrater reliability for the total score and 6 competency domains was very high (ICC: 0.87-0.98 and α : 0.84-0.97). Even though this milestone evaluation process added additional work for residents and faculty we had very good participation (93.9% by residents and 92.9% by faculty) and feedback was generally positive.

CONCLUSION:

Even though implementation of the milestones has added additional work for general surgery residency programs, it has also opened opportunities to furthermore engage the residents in reflection and self-evaluation and to create additional venues for faculty to get involved with the educational process within the residency program. Using the adviser as the initial rater seems to correlate closely with the final CCC assessment. Self-evaluation by the resident is a requirement by the RRC and the milestones seem to be a good instrument to use for this purpose. Our early assessment suggests the milestones provide a useful instrument to track trainee progression through their residency.

The Internal Medicine Reporting Milestones: Cross-Sectional Description of Initial Implementation in US Residency Programs

Hauer KE, Clauser J, Lipner RS, Holmboe ES, Caverzagie K, Hamstra SJ, Hood S, Iobst W, Warm E, McDonald FS. *Ann Intern Med.* 2016 Sep 6;165(5):356-62. doi: 10.7326/M15-2411. Epub 2016 May 10.

BACKGROUND:

High-quality assessment of resident performance is needed to guide individual residents' development and ensure their preparedness to provide patient care. To facilitate this aim, reporting milestones are now required across all internal medicine (IM) residency programs.

OBJECTIVE:

To describe initial milestone ratings for the population of IM residents by IM residency programs.

DESIGN:

Cross-sectional study.

SETTING:

IM residency programs.

PARTICIPANTS:

All IM residents whose residency program directors submitted milestone data at the end of the 2013-2014 academic year.

MEASUREMENTS:

Ratings addressed 6 competencies and 22 subcompetencies. A rating of "not assessable" indicated insufficient information to evaluate the given subcompetency. Descriptive statistics were calculated to describe ratings across competencies and training years.

RESULTS:

Data were available for all 21 774 U.S. IM residents from all 383 programs. Overall, 2889 residents (1621 in postgraduate year 1 [PGY-1], 902 in PGY-2, and 366 in PGY-3) had at least 1 subcompetency rated as not assessable. Summaries of average ratings by competency and training year showed higher ratings for PGY-3 residents in all competencies. Overall ratings for each of the 6 individual competencies showed that fewer than 1% of third-year residents were rated as "unsatisfactory" or "conditional on improvement." However, when subcompetency milestone ratings were used, 861 residents (12.8%) who successfully completed training had at least 1 competency with all corresponding subcompetencies graded below the threshold of "readiness for unsupervised practice."

LIMITATION:

Data were derived from a point in time in the first reporting period in which milestones were used.

CONCLUSION:

The initial milestone-based evaluations of IM residents nationally suggest that documenting developmental progression of competency is possible over training years. Subcompetencies may identify areas in which residents might benefit from additional feedback and experience. Future work is needed to explore how milestones are used to support residents' development and enhance residency curricula.

A Pilot Study of Orthopaedic Resident Self-Assessment Using a Milestones Survey just Prior to Milestones Implementation

Bradley KE, Andolsek KM. Int J Med Educ. 2016 Jan 11;7:11-8. doi: 10.5116/ijme.5682.6dfd.

OBJECTIVE:

To pilot test if Orthopaedic Surgery residents could self-assess their performance using newly created milestones, as defined by the Accreditation Council on Graduate Medical Education.

METHODS:

In June 2012, an email was sent to Program Directors and administrative coordinators of the 154 accredited Orthopaedic Surgery Programs, asking them to send their residents a link to an online survey. The survey was adapted from the Orthopaedic Surgery Milestone Project.

Completed surveys were aggregated in an anonymous, confidential database. SAS 9.3 was used to perform the analyses.

RESULTS:

Responses from 71 residents were analyzed. First and second year residents indicated through self-assessment that they had substantially achieved Level 1 and Level 2 milestones. Third year residents reported they had substantially achieved 30/41, and fourth year residents, all Level 3 milestones. Fifth year, graduating residents, reported they had substantially achieved 17 Level 4 milestones, and were extremely close on another 15. No milestone was rated at Level 5, the maximum possible. Earlier in training, Patient Care and Medical Knowledge milestones were rated lower than the milestones reflecting the other four competencies of Practice Based Learning and Improvement, Systems Based Practice, Professionalism, and Interpersonal Communication. The gap was closed by the fourth year.

CONCLUSIONS:

Residents were able to successfully self-assess using the 41 Orthopaedic Surgery milestones. Respondents' rate improved proficiency over time. Graduating residents report they have substantially, or close to substantially, achieved all Level 4 milestones. Milestone self-assessment may be a useful tool as one component of a program's overall performance assessment strategy.

Emergency Medicine Residents Consistently Rate Themselves Higher than Attending Assessments on ACGME Milestones

Goldflam K, Bod J, Della-Giustina D, Tsyrluk A. West J Emerg Med. 2015 Nov;16(6):931-5. doi: 10.5811/westjem.2015.8.27247. Epub 2015 Nov 12.

INTRODUCTION:

In 2012, the Accreditation Council for Graduate Medical Education (ACGME) introduced the Next Accreditation System (NAS), which implemented milestones to assess the competency of residents and fellows. While attending evaluation and feedback is crucial for resident development, perhaps equally important is a resident's self-assessment. If a resident does not accurately self-assess, clinical and professional progress may be compromised. The objective of our study was to compare emergency medicine (EM) resident milestone evaluation by EM faculty with the same resident's self-assessment.

METHODS:

This is an observational, cross-sectional study that was performed at an academic, four-year EM residency program. Twenty-five randomly chosen residents completed milestone self-assessment using eight ACGME sub-competencies deemed by residency leadership as representative of core EM principles. These residents were also evaluated by 20 faculty members. The milestone levels were evaluated on a nine-point scale. We calculated the average difference between resident self-ratings and faculty ratings, and used sample t-tests to determine statistical significance of the difference in scores.

RESULTS:

Eighteen residents evaluated themselves. Each resident was assessed by an average of 16 attendings (min=10, max=20). Residents gave themselves statistically significant higher milestone ratings than attendings did for each sub-competency examined ($p < 0.0001$).

CONCLUSION:

Residents over-estimated their abilities in every sub-competency assessed. This underscores the importance of feedback and assessment transparency. More attention needs to be paid to methods by which residency leadership can make residents' self-perception of their clinical ability more congruent with that of their teachers and evaluators. The major limitation of our study is small sample size of both residents and attendings.



Policymakers - Impact of Milestones

Well-being curriculum for anesthesiology residents: Development, processes, and preliminary outcomes

Janosy NR, Beacham A, Vogeli J, Brainard A. Paediatr Anaesth. 2021 Jan;31(1):103-111. doi: 10.1111/pan.14062. Epub 2020 Dec 12. PMID: 33145909.

ABSTRACT:

Physician burnout and healthcare worker stress are well-covered topics in both the medical and lay press. Burnout in physicians can start as early as medical school. Well-being initiatives, programming, and access to support for all medical professionals are of paramount importance. In 2014, the Accreditation Council for Graduate Medical Education (ACGME) Milestones for Resident/Fellow Education in Anesthesiology added Professionalism as a milestone. A subcategory of Professionalism includes: A responsibility to maintain personal, emotional, physical, and mental health. This subcategory charges all residency and fellowship programs with establishing a curriculum in well-being. The development, execution, and evaluation of these programs are left to the individual institutions. In this paper, the development, processes, and preliminary outcomes of a resident well-being curriculum are presented.

ACGME Diagnostic Radiology Milestones 2.0: the Time is Now

Grayev A, Catanzano TM, Sarkany D, Winkler N, Gaetke-Udager K, Mian A, Frederick J, Jordan SG. Acad Radiol. 2020 Dec 5:S1076-6332(20)30672-3. doi: 10.1016/j.acra.2020.11.020. Epub ahead of print. PMID: 33293257.

ABSTRACT:

The Accreditation Council for Graduate Medical Education oversees graduate medical education in the United States. Designed to provide broad based training in all aspects of imaging, the diagnostic radiology residency program must provide educational experiences that not only provide technical, professional, and patient centered training, but also meet accreditation standards. With the breadth of material to cover during training, carefully orchestrated educational experiences must be planned. This manuscript offers residency program leaders resources to meet the challenges of the new Accreditation Council for Graduate Medical Education Diagnostic Radiology Milestones 2.0 and highlights potential opportunities for future educational endeavors.

Communication Skills of Grandview/Southview Medical Center General Surgery Residents

Johnson W, Ngo NA, Elrod M. J Am Osteopath Assoc. 2020 Dec 1;120(12):865-870. doi: 10.7556/jaoa.2020.122. PMID: 33227127.

CONTEXT:

In the transition of osteopathic programs to the single-accreditation graduate medical education (GME) system, residents are required to demonstrate skill in a set of core competencies identified by the Accreditation Council of Graduate Medical Education (ACGME) prior to graduation. Included in those core competencies are interpersonal and communication skills along with professionalism.

OBJECTIVES:

To assess strengths and weaknesses of residents' interpersonal communication skills and professionalism in the Grandview/Southview Medical Center (Dayton, OH) osteopathic general surgery program using the validated Communication Assessment Tool (CAT).

METHODS:

From November 2014 to June 2018, all patients who presented for an appointment at the Cassano General Surgery Clinic were asked by a medical assistant to complete a CAT questionnaire following their encounter with a resident physician. Patients at Cassano, an outpatient office-based facility directed to the underserved local community, are seen first by an intern, then by a 4th or 5th year resident and later by an attending physician. Patients 18 years of age or older were included; patients were excluded if they were unable to understand or read English. Patient demographics were collected, including age, gender, race/ethnicity, and previous exposure to this resident physician. Each resident's name was replaced on the CAT with a number for data analysis. The resident variables collected for this study included year of training, gender, and native language.

RESULTS:

The mean response for all CAT items was 4.5 out of 5, indicating that responses to resident performance were largely positive. Patients responded to 4 of the 14 CAT items with only excellent, very good, or good responses and no fair or poor responses. Four items had only 1 fair or poor response. The remaining 6 items received more than 1 fair or poor response: "greeted me in a way that made me feel comfortable" (#1), "talked in terms I could understand" (#8), "encouraged me to ask questions" (#10), "involved me in decisions as much as I wanted" (#11), "showed care and concern" (#13), and "spent the right amount of time with me" (#14).

CONCLUSIONS:

Attending surgeons evaluate residents in multiple areas from a doctor's perspective, but there is a potential lack of correlation between that evaluation and a patient's experience, which is paramount in osteopathic medicine. Patient responses to the CAT questionnaire can be used by program directors to identify deficiencies in milestone/competency achievement and facilitate improvement both individually and programmatically for residents according to ACGME standards.

Developing microsurgical milestones for psychomotor skills in neurological surgery residents as an adjunct to operative training: the home microsurgery laboratory

Abecassis IJ, Sen RD, Ellenbogen RG, Sekhar LN. J Neurosurg. 2020 Sep 4:1-11. doi: 10.3171/2020.5. JNS201590. Epub ahead of print. PMID: 32886917.

OBJECTIVE:

A variety of factors contribute to an increasingly challenging environment for neurological surgery residents to develop psychomotor skills in microsurgical technique solely from operative training. While adjunct training modalities such as cadaver dissection and surgical simulation are embraced and practiced at our institution, there are no formal educational milestones defined to help residents develop, measure, and advance their microsurgical psychomotor skills in a stepwise fashion when outside the hospital environment. The objective of this report is to describe an efficient and convenient "home microsurgery lab" (HML) assembled and tested by the authors with the goal of supporting a personalized stepwise advancement of microsurgical psychomotor skills.

METHODS:

The authors reviewed the literature on previously published simulation practice models and designed adjunct learning modules utilizing the HML. Five milestones were developed for achieving proficiency with each graduated exercise, referencing the Accreditation Council for Graduate Medical Education (ACGME) guidelines. The HML setup was then piloted with 2 neurosurgical trainees.

RESULTS:

The total cost for assembling the HML was approximately \$850. Techniques for which training was provided included microinstrument handling, tissue dissection, suturing, and microanastomoses. Five designated competency levels were developed, and training exercises were proposed for each competency level.

CONCLUSIONS:

The HML offers a unique, entirely home-based, affordable adjunct to the operative neurosurgical education mandated by the ACGME operative case logs, while respecting resident hospital-based education hours. The HML provides surgical simulation with specific milestones, which may improve confidence and the microsurgical psychomotor skills required to perform microsurgery, regardless of case type.

Best Approaches to Evaluation and Feedback in Post-Graduate Medical Education

Perkins SQ, Dabaja A, Atiemo H. Curr Urol Rep. 2020 Aug 13;21(10):36. doi: 10.1007/s11934-020-00991-2. PMID: 32789759.

PURPOSE OF REVIEW:

The objectives of this literature review are to appraise current approaches and assess new technologies that have been utilized for evaluation and feedback of residents, with focus on surgical trainees.

RECENT FINDINGS:

In 1999, the Accreditation Council for Graduate Medical Education introduced the Milestone system as a tool for summative evaluation. The organization allows individual program autonomy on how evaluation and feedback are performed. In the past, questionnaire evaluations and informal verbal feedback were employed. However, with the advent of technology, they have taken a different shape in the form of crowdsourcing, mobile platforms, and simulation. Limited data is available on new methods but studies show promise citing low cost and positive impact on resident education. No one "best approach" exists for evaluation and feedback. However, it is apparent that a multimodal approach that is based on the ACGME Milestones can be effective and aid in guiding programs.

North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Position Paper on Entrustable Professional Activities: Development of Pediatric Gastroenterology, Hepatology, and Nutrition Entrustable Professional Activities

Sauer CG, Robson J, Turmelle YP, Cerezo CS, Loomes KM, Huang JS, Quiros-Tejeira RE, Benkov KJ, Narkewicz MR, Leichtner A, Weinstein T. *J Pediatr Gastroenterol Nutr.* 2020 Jul;71(1):136-143. doi: 10.1097/MPG.0000000000002684.

ABSTRACT:

Quality training in pediatric gastroenterology, hepatology, and nutrition is essential for the future of our specialty from advancing the science through research to providing clinical care for children with gastrointestinal, hepatic and nutritional disorders. As educational theory has developed, both the American Board of Pediatrics (ABP) and the Accreditation Council for Graduate Medical Education (ACGME) have commissioned projects to better define training including core competencies, and milestones with the goal of competency-based assessment. Seeking to provide a clinical context for these competencies and milestones, the ABP commissioned a project for each pediatric subspecialty to develop entrustable professional activities (EPA) while at the same time developing EPAs that are common to all pediatric subspecialties. North American Society for Pediatric Gastroenterology, Hepatology, Nutrition (NASPGHAN) commissioned an EPA Task Force to develop the pediatric gastroenterology, hepatology and nutrition EPAs. This document serves as an introduction to EPAs, including their historical background, underlying educational theory, and the process used to develop the pediatric gastroenterology, hepatology and nutrition EPAs in the United States of America.

Competency-based Medical Education for the Clinician-Educator: The Coming of Milestones Version 2

Torralba KD, Jose D, Katz JD. Clin Rheumatol. 2020 Jun;39(6):1719-1723. doi: 10.1007/s10067-020-04942-7. Epub 2020 Feb 13.

ABSTRACT:

Competency-based medical education is emphasized by institutions overseeing medical school and postgraduate training worldwide. The high rate of preventable errors in medicine underscores this need. Expanding physician competency beyond the domains of patient care and medical knowledge towards goals that emphasize a more holistic view of the healthcare system is one aspect of this emphasis. The Accreditation Council on Graduate Medical Education (ACGME), which oversees postgraduate training programs in the USA, has recently expanded to oversee training programs internationally. The original ACGME Milestones effort unveiled in 2013 was met with skepticism. Nevertheless, other outcomes-based education programs worldwide, including the CanMEDS framework (Canada), Tomorrow's Doctor (UK), and Scottish Doctor (Scotland), have suggested that milestones do offer advantages. Missing from the milestone rollout, however, was collaborative buy-in from multiple stakeholders such as from clinician-educators. Consequently, Milestones version 2 is in development. Specifically, these will address the need for specialty-specific milestones, and the usage of harmonized milestones. A concise history of the push towards outcomes-based medical education is presented and contextualized for physicians who must embrace the transition from teacher-based to learner-based outcomes.

Improving Our Ability to Predict Resident Applicant Performance: Validity Evidence for a Situational Judgment Test

Cullen MJ, Zhang C, Marcus-Blank B, Braman JP, Tiryaki E, Konia M, Hunt MA, Lee MS, Heest AV, Englander R, Sackett PR, Andrews JS. Teach Learn Med. 2020 May 19;1-14. doi: 10.1080/10401334.2020.1760104.

CONSTRUCT:

We investigated whether a situational judgment test (SJT) designed to measure professionalism in physicians predicts residents' performance on (a) Accreditation Council for Graduate Medical Education (ACGME) competencies and (b) a multisource professionalism assessment (MPA).

BACKGROUND:

There is a consensus regarding the importance of assessing professionalism and interpersonal and communication skills in medical students, residents, and practicing physicians. Nonetheless, these noncognitive competencies are not well measured during medical education selection processes. One promising method for measuring these noncognitive competencies is the SJT. In a typical SJT, respondents are presented with written or video-based scenarios and asked to make choices from a set of alternative courses of action. Interpersonally oriented SJTs are commonly used for selection to medical schools in the United Kingdom and Belgium and for postgraduate selection of trainees to medical practice in Belgium, Singapore, Canada, and Australia. However, despite international evidence suggesting that SJTs are useful predictors of in-training performance, end-of-training performance, supervisory ratings of performance, and clinical skills licensing objective structured clinical examinations, the use of interpersonally oriented SJTs in residency settings in the United States has been infrequently investigated. The purpose of this study was to investigate whether residents' performance on an SJT designed to measure professionalism-related competencies—conscientiousness, integrity, accountability, aspiring to excellence, teamwork, stress tolerance, and patient-centered care—predicts both their current and future performance as residents on two important but conceptually distinct criteria: ACGME competencies and the MPA.

APPROACH:

We developed an SJT to measure seven dimensions of professionalism. During calendar year 2017, 21 residency programs from 2 institutions administered the SJT. We conducted analyses to determine the validity of SJT and USMLE scores in predicting milestone performance in ACGME core competency domains and the MPA in June 2017 and 3 months later in September 2017 for the MPA and 1 year later, in June 2018, for ACGME domains.

RESULTS:

At both periods, the SJT score predicted overall ACGME milestone performance ($r = .13$ and $.17$, respectively; $p < .05$) and MPA performance ($r = .19$ and $.21$, respectively; $p < .05$). In addition, the SJT predicted ACGME patient care, systems-based practice, practice-based learning and improvement, interpersonal and communication skills, and professionalism competencies ($r = .16$, $.15$, $.15$, $.17$, and $.16$, respectively; $p < .05$) 1 year later. The SJT score contributed incremental validity over USMLE scores in predicting overall ACGME milestone performance ($\Delta R = .07$) 1 year later and MPA performance ($\Delta R = .05$) 3 months later.

CONCLUSIONS:

SJTs show promise as a method for assessing noncognitive attributes in residency program applicants. The SJT's incremental validity to the USMLE series in this study underscores the importance of moving beyond these standardized tests to a more holistic review of candidates that includes both cognitive and noncognitive measures.

Lack of Telemedicine Training in Academic Medicine: Are We Preparing the Next Generation?

Pourmand A, Ghassemi M, Sumon K, Amini SB, Hood C, Sikka N. *Telemed J E Health*. 2020 Apr 15. doi: 10.1089/tmj.2019.0287. [Epub ahead of print]

BACKGROUND:

Telemedicine focuses on providing medical care to patients in remote locations using telecommunication technologies. It has been shown to be cost-effective, improve health outcomes, and enhance patient satisfaction. This study examines the extent to which medical students and resident physicians are exposed to telemedicine during training.

MATERIALS AND METHODS:

The authors accessed the American College of Graduate Medical Education (ACGME) Residency Milestones from specialties and subspecialties mentioned in the 2018 Milestones National Report and searched for key terms, including "Technology," "Telemedicine," "Telehealth," "EMR," "Electronic Medical Record," "EHR," "Electronic Health Record," "Electronics," and "Social Media." The authors also accessed the 2018 American Association of Medical Colleges (AAMC) "Curriculum Inventory and Reports" to retrieve data from surveys of medical schools that included telemedicine in required courses and electives for medical students from 2013 to 2018.

RESULTS:

From the 104 ACGME specialty milestones, only one specialty (Child and Adolescent Psychiatry) mentioned telehealth in its ACGME Milestone document. According to the AAMC data the number of medical schools surveyed increased every academic year from 140 in 2013/2014 to 147 in 2017/2018, telemedicine education in medical school increased significantly from 41% in 2013/2014 to 60% in 2017/2018 ($p = 0.0006$). However, the growth in telemedicine education plateaued from 56% in 2015/2016 to 60% in 2017/2018 ($p = 0.47$).

CONCLUSION:

Familiarizing medical students with telemedicine is essential; the next generation of health care providers should be equipped with knowledge of telemedicine as a valuable skill to serve populations that do not have direct access to quality medical care. Methods of implementing telemedicine education into more medical schools and residency programs merits further study.

Advancing Competency-Based Medical Education Through Assessment and Feedback in Breast Imaging

Anna I Holbrook , Claudia Kasales . 2020 Mar;27(3):442-446. doi: 10.1016/j.acra.2019.04.017. Epub 2019 May 27.

ABSTRACT:

Competency-based medical education (CBME) is a method of educating and assessing trainees that focuses on outcomes, rather than process. In this review, we inform radiologists involved in breast imaging training on the tenets of CBME and its relationship to the milestones, feedback and assessment. We also describe multiple methods for assessment specific to the breast imaging curriculum, and techniques for improving feedback to trainees in breast imaging.

Statement From the Society for the Advancement of Transplant Anesthesia: White Paper Advocating Desirable Milestones and Competencies for Anesthesiology Fellowship Training in the Field of Lung Transplantation

Wilkey BJ, Abrams BA, Del Rio JM, Kertai MD, Subramaniam K, Srinivas C, Peng YG, Berrio-Valencia M, Martin AK. *Semin Cardiothorac Vasc Anesth.* 2020 Mar;24(1):104-114. doi: 10.1177/1089253219867695. Epub 2019 Aug 8.

ABSTRACT:

The clinical, educational, and research facets of lung transplantation have advanced significantly since the first lung transplant in 1963. The formation of the International Society for Heart and Lung Transplantation (ISHLT) and subsequent Registry has forged a precedent of collaborative teamwork that has significantly affected current lung transplantation outcomes. The Society for the Advancement of Anesthesia (SATA) is dedicated to developing educational platforms for all facets of transplant anesthesia. Additionally, we believe that the anesthetic training for lung transplantation has not kept pace with other advances in the field. As such, SATA presents for consideration these educational milestones and competencies for anesthetic fellowship training in the field of lung transplantation. The proposed milestones were designed on the framework of 6 core competencies created by the Accreditation Council on Graduate Medical Education. The milestones were identified by combining the expert opinion of our Thoracic Transplant Committee, our experience as educators, and literature review. We offer this White Paper to the anesthesiology and transplant communities as a starting point for the discussion and evolution of perioperative anesthetic care in the field of lung transplantation.

Trends in United States Neurosurgery Residency Education and Training over the Last Decade (2009-2019)

Yaeger KA, Munich SA, Byrne RW, Germano IM. *Neurosurg Focus*. 2020 Mar 1;48(3):E6. doi: 10.3171/2019.12.FOCUS19827.

OBJECTIVE:

Postgraduate training in medicine has been under scrutiny in the last 10 years, with a focus on improving residents' education. The aim of this study was to quantify trends in neurosurgery residency (NSR) training and education over the last 10 years.

METHODS:

The authors assessed Accreditation Council for Graduate Medical Education (ACGME), National Resident Matching Program, and American Board of Neurological Surgeons records and searched PubMed to collate 2009-2019 data. Analyzed trends included residents' demographic data, programs' characteristics, graduation and attrition rates, match data, resident case logs, and qualitative educational curriculum changes.

RESULTS:

Significant increases in residents' demographic data ($p < 0.05$) included the number of female residents (from 12.7% to 17.6%) and the absolute number of residents (from 1112 to 1462). Age (mean 28.8 years), ethnicity, and number of residents per program (mean 13 residents per program) were unchanged. There were 16 new ACGME NSR programs, with currently 115 programs nationwide. The number of applicants per year (324 applicants per year) and the matching rate (mean 64%) remained stable. The mean attrition rate of 2.6% (range 2%-4%) was higher than the mean 2.1% ACGME attrition rate, a rate that decreased from 3% in 2009 to 1.6% in 2019. Education curriculum changes aimed at the standardization of training across the US included residents' boot camp (2009), the Milestones project (2012), and mandatory 7-year training initiated in 2013. An increase in endovascular, functional, trauma, and spine resident caseload was noted. The number of yearly publications about US NSR education has significantly increased ($p < 0.05$).

CONCLUSIONS:

NSR education has received greater attention over the last decade in the US. Standardization of training has been implemented. A steady number of students remain interested in neurosurgery, with an increased number of women entering the field. Attention to wellness, in addition to high-quality education, should be further assessed as a factor to improve the overall NSR training and retention rate.

Comparison of Male and Female Resident Milestone Assessments During Emergency Medicine Residency Training: A National Study

Santen SA, Yamazaki K, Holmboe ES, Yarris LM, Hamstra SJ. Acad Med. 2020 Feb;95(2):263-268. doi: 10.1097/ACM.0000000000002988.

PURPOSE:

A previous study found that milestone ratings at the end of training were higher for male than female residents in emergency medicine (EM). However, that study was restricted to a sample of 8 EM residency programs, and used individual faculty ratings from milestone reporting forms that were designed for use by the program's Clinical Competency Committee (CCC). The objective of this study was to investigate whether similar results would be found when examining the entire national cohort of EM milestone ratings reported by programs after CCC consensus review.

METHOD:

This study examined longitudinal milestone ratings for all EM residents (n = 1,363; 125 programs) reported to the Accreditation Council for Graduate Medical Education every 6 months from 2014-2017. A multilevel linear regression model was used to estimate differences in slope for all subcompetencies, and predicted marginal means between genders were compared at time of graduation.

RESULTS:

There were small but statistically significant differences between males' and females' increase in ratings from initial rating to graduation on 6 of the 22 subcompetencies. Marginal mean comparisons at time of graduation demonstrated gender effects for 4 patient care subcompetencies. For these subcompetencies, males were rated as performing better than females; differences ranged from 0.048 to 0.074 milestone ratings.

CONCLUSIONS:

In this national dataset of EM resident milestone assessments by CCCs, males and females were rated similarly at the end of their training for the majority of subcompetencies. Statistically significant but small absolute differences were noted in 4 patient care subcompetencies.

A National Survey of Integrated Vascular Surgery Residents' Experiences With and Attitudes About Quality Improvement During Residency

Purnell SM, Wolf L, Millar MM, Smith BK. *J Surg Educ.* 2020 Jan - Feb;77(1):158-165. doi: 10.1016/j.j Surg.2019.09.003. Epub 2019 Dec 4.

BACKGROUND:

Integrated vascular surgery residency, or "0+5," programs provide education in the Accreditation Council for Graduate Medical Education (ACGME) competencies of Systems-Based Practice (SBP) and Practice-Based Learning and Improvement (PBLI), which include milestones related to quality improvement (QI). It is unclear what QI curricula are in place in 0+5 programs nationally or how 0+5 residents perceive the importance of QI.

OBJECTIVE:

The purpose of this study is to assess current 0+5 residents' knowledge, experiences with, and attitudes about QI.

DESIGN:

A survey was developed using the ACGME Common Program Requirements and Milestones pertaining to QI. All 0+5 residents from 2017 to 2018 academic year were emailed an electronic link to the survey. Descriptive statistics and cross-tabulations were calculated using Stata/MP version 13.1.

SETTING:

All 0+5 vascular surgery residency programs in the United State (n = 52).

PARTICIPANTS:

The survey was completed by 35% (n = 90/257) of 0+5 residents, representing 75% of 0+5 programs in the United States (n = 39/52).

RESULTS:

Forty-one percent of respondents felt that applying QI methods is very important and 33% felt that QI education is very important for their future work, however, just 13% felt very prepared to lead a QI initiative. Residents' perceptions of preparedness to lead QI projects and the importance they attached to QI education were significantly influenced by their participation in a QI project (p = 0.003 and p = 0.038 respectively). Finally, just 8% (n = 6) of residents responded correctly to all 13 knowledge-based questions and these residents felt better prepared to lead a QI initiative compared to those who answered incorrectly (p = 0.002).

CONCLUSIONS:

Most 0+5 residents report participation in a QI project during residency, however, few feel prepared to lead a QI initiative in practice. Furthermore, only half of PGY5 0+5 residents report achieving specific ACGME targets for graduation pertaining to QI. Current QI curricula in 0+5 programs may be inadequate in teaching fundamental QI concepts and achieving ACGME competency targets for graduation.

Content Analysis of Family Medicine Resident Peer Observations

Page C, Reid A, Brown MM, Baker HM, Coe C, Myerholtz L. *Fam Med.* 2020 Jan;52(1):43-47. doi: 10.22454/FamMed.2020.855292

BACKGROUND AND OBJECTIVES:

Direct observation is a critical part of assessing learners' achievement of the Accreditation Council for Graduate Medical Education (ACGME) Milestones and subcompetencies. Little research exists identifying the content of peer feedback among residents; this study explored the content of residents' peer assessments as they relate to ACGME Milestone subcompetencies in a family medicine residency program.

METHODS:

Using content from a mobile app-based observation tool (M3App), we examined resident peer observations recorded between June 2014 and November 2017, tabulating frequency of observation for each ACGME subcompetency and calculating the proportion of observations categorized under each subcompetency, as well as for each postgraduate year (PGY) class. We also coded each observation on three separate dimensions: "positive," "constructive," and "actionable." We used the χ^2 test for independence, and estimated odds ratios and 95% confidence intervals for two-by-two comparisons to compare numbers of observations within each category.

RESULTS:

Our data include 886 peer observations made by 54 individual residents. The most frequently observed competencies were in patient care, communication, and professionalism (56%, 47%, and 38% of observations, respectively). Practice-based learning and improvement was observed least frequently (16% of observations). On average, 97.25% of the observations were positive, 85% were actionable, and 6% were constructive.

CONCLUSIONS:

When asked to review their peers, residents provide comments that are primarily positive and actionable. In addition, residents tend to provide more feedback on certain subcompetencies compared to others, suggesting that programs may rely on peer feedback for specific subcompetencies. Peers can provide perspective on the behaviors and skills of fellow residents.

Development of a Novel Competency-Based Evaluation System for HIV Primary Care Training: the HIV Entrustable Professional Activities

Dunne D, Green M, Tetrault J, Barakat LA. J Gen Intern Med. 2020 Jan;35(1):331-335. doi: 10.1007/s11606-019-04956-1.

BACKGROUND:

There is an anticipated shortage of primary care providers trained to care for patients with HIV. The Yale School of Medicine developed and implemented a novel HIV training track within our Primary Care Internal Medicine Residency Program. A set of 12 Entrustable Professional Activities (EPAs) were developed to guide curriculum development and resident assessment.

AIM:

To describe the process of implementing a novel EPA-based curriculum for the HIV Primary Care Training Track including EPA-based trainee evaluation tools.

PARTICIPANTS/SETTINGS:

Two to three residents were enrolled annually from 2012 to 2017 (total n = 11). Training sites included the outpatient academic center HIV clinic and inpatient HIV ward.

PROGRAM DESCRIPTION:

An expert panel developed 12 HIV-specific EPAs. These were mapped to curricular and reporting internal medicine milestones. Curricular activities and evaluation tools were developed to guide EPA progress.

PROGRAM EVALUATION:

Graduating residents were ready for unsupervised practice in 91% of EPAs at the end of the 3-year program.

DISCUSSION:

Development of HIV-specific training EPAs was effective for driving curricular development and resident evaluation, and served as an effective method to communicate expectations to resident participants. These HIV-specific EPAs could serve as a useful template to enhance HIV education in academic settings.

Orthopaedic Surgery Residency Milestones: Initial Formulation and Future Directions

Ames SE, Ponce BA, Marsh JL, Hamstra SJ. J Am Acad Orthop Surg. 2020 Jan 1;28(1):e1-e8. doi: 10.5435/JAAOS-D-18-00786.

ABSTRACT:

Milestones specific to orthopaedic surgical training document individual resident progress through skill development in multiple dimensions. Residents increasingly interact with and are assessed by surgeons in both academic and private practice environments. Milestones describe the skills that support competence. One of the primary goals of milestones is to provide continuous data for educational quality improvement of residency programs. They provide a dialogue between surgeons who supervise residents or fellows and the program's Clinical Competency Committee throughout a resident's education. The orthopaedic milestones were developed jointly by the Accreditation Council for Graduate Medical Education and the American Board of Orthopaedic Surgery. The working team was designed with broad representation within the specialty. The milestones were introduced to orthopaedic residencies in 2013. Orthopaedics is a 5-year training program; the first comprehensive longitudinal data set is now available for study. This summary provides historical perspective on the development of the milestones, state of current milestone implementation, attempts to establish validity, challenges with the milestones, and the development of next-generation assessment tools.

Using Longitudinal Milestones Data and Learning Analytics to Facilitate the Professional Development of Residents: Early Lessons from Three Specialties

Holmboe ES, Yamazaki K, Nasca TJ, Hamstra SJ. Acad Med. 2020 Jan;95(1):97-103. doi: 10.1097/ACM.0000000000002899.

PURPOSE:

To investigate the effectiveness of using national, longitudinal milestones data to provide formative assessments to identify residents at risk of not achieving recommended competency milestone goals by residency completion. The investigators hypothesized that specific, lower milestone ratings at earlier time points in residency would be predictive of not achieving recommended Level (L) 4 milestones by graduation.

METHOD:

In 2018, the investigators conducted a longitudinal cohort study of emergency medicine (EM), family medicine (FM), and internal medicine (IM) residents who completed their residency programs from 2015 to 2018. They calculated predictive values (PVs) and odds ratios (ORs), adjusting for nesting within programs, for specific milestone rating thresholds at 6-month intervals for all subcompetencies within each specialty. They used final milestone ratings (May/June 2018) as the outcome variables, setting L4 as the ideal educational outcome.

RESULTS:

The investigators included 1,386 (98.9%) EM residents, 3,276 (98.0%) FM residents, and 7,399 (98.0%) IM residents in their analysis. The percentage of residents not reaching Level 4 by graduation ranged from 11-31% in EM, 16-53% in FM, and 5-15% in IM. Using a milestone rating of Level 2.5 or lower at the end of PGY2, the predictive probability of not attaining the L4 milestone graduation goal ranged from 32-56% in EM, 32-67% in FM, and 15-36% in IM.

CONCLUSIONS:

Longitudinal milestones ratings may provide educationally useful, predictive information to help individual residents address potential competency gaps, but the predictive power of the milestones ratings varies by specialty and subcompetency within these three adult care specialties.

Utility of Residency Milestones Reported to Fellowship Directors: A National Survey of Pediatric Fellowship Program Directors

Reed S, Mink R, Li ST. Acad Pediatr. 2020 Jan 21. pii: S1876-2859(20)30005-X. doi: 10.1016/j.acap.2020.01.004. [Epub ahead of print]

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) requires milestone-based assessments of residents and fellows. The ACGME recently allowed fellowship programs access to the final residency milestones for incoming fellows through the ACGME Accreditation Data System. It is unknown if fellowship programs are downloading residency milestones and if fellowship program directors (FPDs) believe they have value.

OBJECTIVE:

Determine how many pediatric FPDs downloaded residency milestones and FPD perspectives on usefulness of residency milestones for first-year fellows.

METHODS:

Cross-sectional survey of pediatric FPDs in the US, with assistance from the Subspecialty Pediatrics Investigator Network (SPIN) Steering Committee. Respondents were asked whether they downloaded residency milestones and their programs' specific use of these milestones for their first-year fellows. FPDs were asked open-ended questions about why residency milestones were or were not useful, how they could be more useful, and if they would be useful in recruitment. Descriptive statistics were used to explore quantitative data and content analysis was used to analyze qualitative data.

RESULTS:

66.5% (532/800) of FPDs responded, representing all 14 pediatric subspecialties. Most programs (60.7%; 323/532) did not download residency milestones for their first-year fellows. Of these, 67.5% (218/323) did not know they could. Of FPDs that downloaded and reviewed residency milestones, only 27% (50/185) used them for individualized education. Only 24% (129/532) of all FPDs thought residency milestones were useful or very useful. 41% (218/532) thought residency milestones would be useful or very useful during recruitment, but some believed this may harm applicants. FPDs felt residency milestones allowed for identification of trainee needs and baseline assessments, but felt that these milestones had limited usefulness during fellowship due to concerns about lack of validity evidence, relevance, and how milestones are assessed and reported (Table).

CONCLUSIONS:

Most pediatric subspecialty programs do not use residency milestones to tailor education for their first-year fellows and most think they have limited usefulness. While more FPDs felt that residency milestones might be useful during recruitment, there was not universal agreement. Further studies to improve validity of residency milestones may make them more useful to fellowship programs.

A Systematic Review of the Use of Google Glass in Graduate Medical Education

Carrera JF, Wang CC, Clark W, Southerland AM. J Grad Med Educ. 2019 Dec;11(6):637-648. doi: 10.4300/JGME-D-19-00148.1.

BACKGROUND:

Graduate medical education (GME) has emphasized the assessment of trainee competencies and milestones; however, sufficient in-person assessment is often constrained. Using mobile hands-free devices, such as Google Glass (GG) for telemedicine, allows for remote supervision, education, and assessment of residents.

OBJECTIVE:

We reviewed available literature on the use of GG in GME in the clinical learning environment, its use for resident supervision and education, and its clinical utility and technical limitations.

METHODS:

We conducted a systematic review in accordance with 2009 PRISMA guidelines. Applicable studies were identified through a review of PubMed, MEDLINE, and Web of Science databases for articles published from January 2013 to August 2018. Two reviewers independently screened titles, abstracts, and full-text articles that reported using GG in GME and assessed the quality of the studies. A systematic review of these studies appraised the literature for descriptions of its utility in GME.

RESULTS:

Following our search and review process, 37 studies were included. The majority evaluated GG in surgical specialties (n = 23) for the purpose of surgical/procedural skills training or supervision. GG was predominantly used for video teleconferencing, and photo and video capture. Highlighted positive aspects of GG use included point-of-view broadcasting and capacity for 2-way communication. Most studies cited drawbacks that included suboptimal battery life and HIPAA concerns.

CONCLUSIONS:

GG shows some promise as a device capable of enhancing GME. Studies evaluating GG in GME are limited by small sample sizes and few quantitative data. Overall experience with use of GG in GME is generally positive.

Could Blockchain Technology Empower Patients, Improve Education, and Boost Research in Radiology Departments? An Open Question for Future Applications

Verde F, Stanzione A, Romeo V, Cuocolo R, Maurea S, Brunetti A. J Digit Imaging. 2019 Dec;32(6):1112-1115. doi: 10.1007/s10278-019-00246-8.

ABSTRACT:

Blockchain can be considered as a digital database of cryptographically validated transactions stored as blocks of data. Copies of the database are distributed on a peer-to-peer network adhering to a consensus protocol for authentication of new blocks into the chain. While confined to financial applications in the past, this technology is quickly becoming a hot topic in healthcare and scientific research. Potential applications in radiology range from upgraded monitoring of training milestones achievement for residents to improved control of clinical imaging data and easier creation of secure shared databases.

Professionalism Milestones Assessments Used by Emergency Medicine Residency Programs: A Cross-sectional Survey

Stehman CR, Hochman S, Fernández-Frackelton M, Volz EG, Domingues R, Love JN, Soares W. *West J Emerg Med.* 2019 Dec 19;21(1):152-159. doi: 10.5811/westjem.2019.11.44456.

INTRODUCTION:

Professionalism is a vital component of quality patient care. While competency in professionalism is Accreditation Council for Graduate Medical Education (ACGME)-mandated, the methods used to evaluate professionalism are not standardized, calling into question the validity of reported measurements. We aimed to determine the type and frequency of methods used by United States (US) -based emergency medicine (EM) residencies to assess accountability (Acc) and professional values (PV), as well as how often graduating residents achieve competency in these areas.

METHODS:

We created a cross-sectional survey exploring assessment and perceived competency in Acc and PV, and then modified the survey for content and clarity through feedback from emergency physicians not involved in the study. The final survey was sent to the clinical competency committee (CCC) chair or program director (PD) of the 185 US-based ACGME-accredited EM residencies. We summarized results using descriptive statistics and Fisher's exact testing.

RESULTS:

A total of 121 programs (65.4%) completed the survey. The most frequently used methods of assessment were faculty shift evaluation (89.7%), CCC opinion (86.8%), and faculty summative evaluation (76.4%). Overall, 37% and 42% of residency programs stated that nearly all (greater than 95%) of their graduating residents achieve mastery of Acc and PV non-technical skills, respectively. Only 11.2% of respondents felt their programs were very effective at determining mastery of non-technical skills.

CONCLUSION:

EM residency programs relied heavily on faculty shift evaluations and summative opinions to determine resident competency in professionalism, with feedback from peers, administrators, and other staff less frequently incorporated. Few residency programs felt their current methods of evaluating professionalism were very effective.

Recommendations From the Society for the Advancement of Transplant Anesthesiology: Liver Transplant Anesthesiology Fellowship Core Competencies and Milestones

Nguyen-Buckley C, Wray CL, Zerillo J, Gilliland S, Aniskevich S, Nicolau-Raducu R, Planinsic R, Srinivas C, Pretto EA Jr, Mandell MS, Chadha RM. *Semin Cardiothorac Vasc Anesth*. 2019 Dec;23(4):399-408. doi: 10.1177/1089253219868918. Epub 2019 Aug 12.

ABSTRACT:

Liver transplantation is a complex procedure performed on critically ill patients with multiple comorbidities, which requires the anesthesiologist to be facile with complex hemodynamics and physiology, vascular access procedures, and advanced monitoring. Over the past decade, there has been a continuing debate whether or not liver transplant anesthesia is a general or specialist practice. Yet, as significant data have come out in support of dedicated liver transplant anesthesia teams, there is not a guarantee of liver transplant exposure in domestic residencies. In addition, there are no standards for what competencies are required for an individual seeking fellowship training in liver transplant anesthesia. Using the Accreditation Council for Graduate Medical Education guidelines for residency training as a model, the Society for the Advancement of Transplant Anesthesia Fellowship Committee in conjunction with the Liver Transplant Anesthesia Fellowship Task Force has developed the first proposed standardized core competencies and milestones for fellowship training in liver transplant anesthesiology.

The Case for Observation Medicine Education and Training in Emergency Medicine

Pena ME, Wheatley MA, Suri P, Mace SE, Kwan E, Baugh CW. AEM Educ Train. 2019 Dec 19;4(Suppl 1):S47-S56. doi: 10.1002/aet2.10413. eCollection 2020 Feb.

BACKGROUND:

Many hospitals have or will be opening an observation unit (OU), the majority managed by the emergency department (ED). Graduating emergency medicine (EM) residents will be expected to have the knowledge and skills necessary to appropriately identify and manage patients in this setting. Our objective is to examine the current state of observation medicine (OM) education and prevalence in EM training.

METHODS:

In a follow-up to the 2019 Society for Academic Emergency Medicine (SAEM) OM Interest Group meeting, we convened an expert panel of OM physicians who are members of both the SAEM OM Interest Group and the American College of Emergency Physicians Section of OM. The panel of six emergency physicians representing geographic diversity was formed. A structured literature review was performed yielding 16 educational publications and sources pertaining to OM education and training across all specialties.

REPORT ON THE EXISTING LITERATURE:

Only a small number of EM residencies have a required or elective OM rotation in an OU. An OM rotation in a protocol-driven ED OU gives residents experience managing patients in this setting and improves skills integral to EM and part of the EM milestones and Accreditation Council for Graduate Medical Education (ACGME) core competencies: reassessment, disposition decision making, risk stratification, team management, and practicing cost-appropriate care. Even without a formal rotation, multiple OM educational resources can be incorporated into EM resident education and didactics. Education research opportunity exists.

CONCLUSIONS:

This panel believes that OM is an important component of EM that should be incorporated into EM residency as the knowledge and skills learned such as risk stratification, disposition decision making, and team management augment those needed for the practice of EM. There is a distinct opportunity for EM educators to better equip their trainees for a career in EM by including OM education and experience in EM residency training.

Palliative Care and Communication Training in Neurosurgery Residency: Results of a Trainee Survey

Miranda SP, Schaefer KG, Vates GE, Gormley WB, Buss MK. J Surg Educ. 2019 Nov - Dec;76(6):1691-1702. doi: 10.1016/j.jsurg.2019.06.010. Epub 2019 Jun 22.

OBJECTIVE:

Neurosurgeons care for critically ill patients near the end of life, yet little is known about how well their training prepares them for this role. We surveyed a random sample of neurosurgery residents to describe the quantity and quality of teaching activities related to serious illness communication and palliative care, and resident attitudes and perceived preparedness to care for seriously ill patients.

METHODS:

A previously validated survey instrument was adapted to reflect required communication and palliative care competencies in the 2015 the Accreditation Council for Graduate Medical Education (ACGME) Milestones for Neurological Surgery. The survey was reviewed for content validity by independent faculty neurosurgeons, piloted with graduating neurosurgical residents, and distributed online in August 2016 to neurosurgery residents in the United States using the American Association of Neurological Surgeons (AANS)/Congress of Neurological Surgeons (CNS) Joint Section on Neurotrauma and Critical Care email listserv. Multiple choice and Likert scale responses were analyzed using descriptive statistics.

RESULTS:

Sixty-two responses were recorded between August 2016 and October 2016. Most respondents reported no explicit teaching on: explaining risks and benefits of intubation and ventilation (69%), formulating prognoses in neurocritical care (60%), or leading family meetings (69%). Compared to performing craniotomies, respondents had less frequent practice leading discussions about withdrawing life-sustaining treatment (61% vs. 90%, $p < 0.01$, "weekly or more frequently"), and were less often observed (18% vs. 87%, $p < 0.01$) and given feedback on their performance (11% vs. 58%, $p < 0.01$). Nearly all respondents (95%) felt "prepared to discuss withdrawing life-sustaining treatments," however half (48%) reported they "would benefit from more communication training during residency." Most (87%) reported moral distress, agreeing that they "participated in operations and worried whether surgery aligned with patient goals."

CONCLUSIONS:

Residents in our sample reported limited formal training, and relatively less observation and feedback, on required ACGME competencies in palliative care and communication. Most reported preparedness in this domain, but many were receptive to more training. Better quality and more consistent palliative care education in neurosurgery residency could improve competency and help ensure that neurosurgical care aligns with patient goals.

Urology Milestones 2.0: The Future Looks Bright

Hamawy KJ, Edgar L. *Curr Urol Rep.* 2019 Nov 28;20(12):85. doi: 10.1007/s11934-019-0946-9.

ABSTRACT:

One of the major functions of the Accreditation Council for Graduate Medical Education (ACGME) is to accredit all approved residency programs. This accreditation system is based on both common and program-specific requirements that form the foundation of all ACGME-accredited training programs. Embedded within the program requirements are the essential elements of the Competencies and Milestones. In this review article, we hope to provide the reader with an overview of the current Milestones and a preview of what lies ahead.

RECENT FINDINGS:

Milestones for resident education were implemented approximately 7 years ago. The milestones were intended to create a logical trajectory of professional growth which could be measured and tracked for each sub-specialty. However, substantial variability in both content and developmental progression was seen in many specialties. The ACGME has been actively reviewing the Milestones to insure that there exists harmony across all specialties. Much has been learned about the milestones since their implementation. As educators, we need to provide a robust and reproducible system for all to use. The future of resident education, Milestones 2.0, will provide the necessary groundwork for a more user friendly system that will allow adequate evaluation of our trainees.

Milestones as a Guide for Academic Career Development

Blake GH, Kemmet RK, Jenkins J, Heidel RE, Wilson GA. Fam Med. 2019 Oct;51(9):760-765. doi: 10.22454/ FamMed.2019.109290.

BACKGROUND AND OBJECTIVES:

Faced with a limited supply of applicants for faculty positions, increasing demands for residency faculty, and a growing number of programs, our program has increasingly filled ranks with recent residency graduates with broad scope but limited experience and training in academics. These early-career clinicians often require further mentorship as they seek advancement in clinical skills and development of teaching and scholarly activity skill sets.

METHODS:

To educate our recent residency graduates in teaching/scholarly activity skills, and to provide a career trajectory, we created a process to guide their maturation with milestones using the six core competencies from the Accreditation Council for Graduate Medical Education. The milestones consist of four levels of clinician/academician maturation. Each competence has goals and activities for each level of development. We validated the milestones using our physician faculty assessing time spent in academic medicine and academic rank.

RESULTS:

Faculty of higher academic rank scored higher in all competencies than faculty of lower academic rank. Correlation between systems-based practice and years in academics demonstrated statistical significance, and all other categories showed nonsignificant associations.

CONCLUSIONS:

The milestones are consistent with faculty academic development and career progression, and may serve as a guide for career advancement and as a guideline for professional progression for residency clinicians. Further testing for validation in other family medicine programs is necessary, but preliminary findings indicate this milestone project may be of service to our profession.

Design and Implementation of Competency Based Postgraduate Medical Education in Otorhinolaryngology: The Pilot Experience in India.

Karthikeyan P, Pulimoottil DT. Indian J Otolaryngol Head Neck Surg. 2019 Oct;71(Suppl 1):671-678. doi: 10.1007/s12070-018-1474-5. Epub 2018 Aug 23.

ABSTRACT:

The worldwide call for a shift towards competency based postgraduate medical education has until recently gone largely unheeded in India, despite the Medical Council of India enshrining the principle in its regulations for postgraduate institutions. This paper details the first concrete attempt at establishing a CBME curriculum in Otorhinolaryngology in India. The design and implementation of the CBME curriculum was carried out in four phases, in a time-bound manner over a period of 6 months. Phase I consisted of an extensive literature review and a clarification of the major objectives of the program. Phase II involved the listing out of 20-30 entrustable professional activities (EPAs) for each specialty and the 13 core EPAs common to all incoming residents and the subsequent mapping of these EPAs to their respective domains of competence and year-wise levels of competence. This was followed by the development of milestones for each EPA and appropriate clinical vignettes. Phase III focused on development of 360° assessment strategies, including the in-house development of an e-portfolio. Phase IV was dedicated to the implementation of the CBME curriculum, and involved various sensitization and orientation programs for faculty and the new residents. This exercise in designing and implementing a CBME program showed the important role that intra-departmental and inter-institutional cross-communication and exchange of ideas vies-a-vie workshops and personal communication play in bridging the lapses in knowledge in this emerging area, reaching consensus to achieve project goals and for finding relevant solutions to common problems. Medical education in India presents its own peculiar set of logistical and cultural challenges. Keeping in line with the recommendations of the Medical Council of India regarding Postgraduate Medical Education, it is essential that medical colleges in India not fall behind the international paradigm shift towards CBME.

Building Provider-Caregiver Partnerships: Curricula for Medical Students and Residents

Blackie M, Baughman KR, Palmisano B, Sanders M, Sperling D, Scott E, Radwany S, Drost J, Thomas J. Acad Med. 2019 Oct;94(10):1483-1488. doi: 10.1097/ACM.0000000000002806.

PROBLEM:

A disconnect exists between caregivers and health care providers, resulting in fragmented communication, which increases caregiver stress and compromises patient care. Although providers have a responsibility to recognize caregiver burden, they receive scant training on issues important to caregivers.

APPROACH:

From 2014-2017, as part of the Building Caregiver Partnerships Through Interprofessional Education project—a collaborative effort between Northeast Ohio Medical University and Summa Health—the authors developed curricula to foster effective partnerships between health care providers and caregivers by exposing medical students and residents to highly personal caregiving narratives. The curricula center on a short film featuring four families representing diverse caregiving experiences. The authors crafted several discussion guides, case-based learning exercises, structured clinical encounters, team-based simulations, and clinical cases as companion educational tools for the film.

OUTCOMES:

Medical students reported the educational tools piloted to be valuable in broadening their understanding of caregivers' needs, while residents reported the educational tools piloted to also be valuable in improving their communication and building partnerships with caregivers. Undergraduate and graduate faculty reported finding the pilots valuable.

NEXT STEPS:

Future goals include conducting an outcome evaluation, based on ACGME milestones, to identify and examine the clinical outcomes to determine if communication increases and quality of care improves as a result of the project. The authors would also like to include caregivers in the evaluation. Finally, because caregiving is best addressed from a team approach, the authors would like to pilot the project at other health professions programs.

Discharge Summary Training Curriculum: A Novel Approach to Training Medical Students How to Write Effective Discharge Summaries

Ming D, Zietlow K, Song Y, Lee HJ, Clay A. Clin Teach. 2019 Oct;16(5):507-512. doi: 10.1111/tct.12960. Epub 2018 Oct 30.

BACKGROUND:

Resident physicians at teaching hospitals write many discharge summaries (DCSs), but receive little formal training or feedback. Poor DCS quality poses a potential patient safety risk.

METHODS:

We developed a curriculum to train fourth-year medical students (MS4s) how to write DCSs and integrated this curriculum into a transition-to-residency course. An inpatient attending physician (IPA) and non-inpatient physician (coach) used structured tools to assess for the presence of key elements within the DCS, evaluate the overall quality of the DCS, and judge the student's progression towards entrustable professional activities and transitional year milestones. We identified overall areas of weakness and correlated scores between IPAs and coaches.

Improvements in student knowledge and DCS writing confidence were determined using pre- and post-curriculum surveys.

RESULTS:

Of 102 eligible students, 78 completed the assignment, 61 wrote a new DCS and 17 reviewed previously written DCSs. Patient condition at discharge was missing in more than 20.0% of DCSs. Coaches were less likely than IPAs to assess students as entrustable (58.3% versus 95.8%; $p = 0.0027$). IPAs assigned higher overall quality ratings than coaches (8.0 versus 6.0 out of 10.0, $p < 0.0001$). Post-intervention, 82.2% of students reported they learned how to write high-quality DCSs and 93.3% of students reported they would change the way they write DCSs.

CONCLUSIONS:

Graduating medical students have limited skill and comfort in writing DCSs. Structured training on how to write DCSs before postgraduate residency training is a key step towards ultimately improving transitions of care. Training should teach learners to write high-quality DCSs that serve the needs of both inpatient and outpatient providers. Resident physicians at teaching hospitals are expected to independently author [discharge summaries] DCSs, yet few receive formal training.

Core Competencies for Pediatric Consultation-Liaison Psychiatry in Child and Adolescent Psychiatry Fellowship Training

Shaw RJ, Rackley S, Walker A, Fuchs DC, Meadows A, Dalope K, Pao M; Special Interest Study Group for Pediatric Consultation Liaison Psychiatry Core Competencies, Physically Ill Child Committee, American Academy of Child and Adolescent Psychiatry. *Psychosomatics*. 2019 Sep - Oct;60(5):444-448. doi: 10.1016/j.psych.2019.04.006. Epub 2019 May 3

BACKGROUND:

Learners developing competency-based skills, attitudes, and knowledge through the achievement of defined milestones is a core feature of competency-based medical education. In 2017, a special interest study group of the American Academy of Child and Adolescent Psychiatry convened a panel of specialists to describe pediatric consultation-liaison psychiatry (CLP) best educational practices during child and adolescent psychiatry fellowship.

OBJECTIVE:

The objective of this project was to develop a national consensus on pediatric CLP competencies to help guide training in this specialty.

METHODS:

An expert working group developed a list of candidate competences based on previously established educational outcomes for CLP (formerly Psychosomatic Medicine), child and adolescent psychiatry, and general psychiatry. A survey was distributed to members of the American Academy of Child and Adolescent Psychiatry Physically Ill Child Committee to determine child and adolescent psychiatry fellowship educational needs on pediatric CLP services and generate consensus regarding pediatric CLP competencies.

RESULTS:

Most survey respondents were supportive of the need for a national consensus on core competencies for pediatric CLP. Consensus from a panel of experts in the field of pediatric CLP generated a list of proposed core competencies that track the Accreditation Council for Graduate Medical Education's six core competencies.

CONCLUSIONS:

Consistent learning outcomes provide the foundation for further development of tools to support training in pediatric CLP. There is a need to develop further tools including outcome assessment instruments and self-directed learning materials that can be used to support lifelong learning.

Milestones on the Plastic Surgery In-Service Training Examination

Ganesh Kumar N, Marwaha J, Drolet BC. J Surg Educ. 2019 Sep - Oct;76(5):1370-1375. doi: 10.1016/j.jsurg.2019.03.014. Epub 2019 Apr 5.

BACKGROUND:

The Plastic Surgery Milestones Project was implemented in 2014 to establish standards for competency based resident education. In restructuring educational activities under the Milestones, various pedagogical tools have been revised. However, these standards have not yet been applied to the Plastic Surgery In-Service Training Examination. The purpose of this study was to determine the representation of the various components of the Plastic Surgery Milestones Project, on the In-Service Training Examination.

METHODS:

All questions from the 2014 - 2018 In-Service Examinations were evaluated within the framework of the current Plastic Surgery Milestones. Using content analysis, each Examination question was mapped to a single Milestone. Descriptive analysis of Milestone subject area and Core Competency breakdown, as well as year to year trends, were performed.

RESULTS:

Of the 1,150 questions analyzed, there was an unequal representation of individual Milestones (0-7.4%). Of the 36 Plastic Surgery Milestones, 10 represented more than 50% of the PSITEs while 8 Milestones had less than 1% representation. The most common subject area was Head and Neck (12.7%) and least common was Reconstruction of the Trunk and Perineum. Among Core Competencies, more than half (50.4%) tested Patient Care while Interpersonal and Communication Skills was the lowest represented, 0.2%.

CONCLUSIONS:

The Plastic Surgery In-Service Examination tests a variable proportion of Milestones. Currently, the PSITE is not well integrated with competency based education in spite of a shift towards such a training model. Going forward, the PSITE may include an associated Milestone with each question in order to better incorporate Competencies into this important annual evaluation metric.

Focused Teaching Improves Medical Student Professionalism and Data Gathering Skills in the Emergency Department

Smith C, Likourezos A, Schiller J. *Cureus*. 2019 Sep 25;11(9):e5765. doi: 10.7759/cureus.5765.

INTRODUCTION:

Leaders in medical education have developed milestones and core competencies in an attempt to ensure that relational skills, such as communication and professionalism, are emphasized in addition to the usual skills of medical knowledge, data gathering, and emergency stabilization during students' emergency medicine (EM) medical education. Providers facile in each of these areas have better patient outcomes, patient experiences, and decreased incidence of malpractice cases. The authors attempted to demonstrate that by deliberate teaching of these skills during an EM medical student clerkship, students could significantly improve their clinical performance.

METHODS:

This prospective, randomized, single-blinded cohort study was performed at an academic, tertiary, urban ED to investigate the effects of a one-on-one preceptor shift on the clinical performance of fourth-year medical students. Students were randomized into two groups and assessed by pre- and post-intervention objective structured clinical encounters (OSCEs) with standardized patients (SPs) at weeks one and three. A crossover design was employed so that students in the control group participated in a preceptor shift after their second OSCE. Measurements were based on a five-point Likert scale assessment linked to early EM milestones as defined by the Accreditation Council on Graduate Medical Education (ACGME).

RESULTS:

The mean improvement in total overall score was significantly greater in the intervention group: 4.31 versus 2.57 (Cohen's $d = 0.57$, $p = 0.029$). When each milestone was assessed individually, students in the intervention group improved significantly in data gathering (Cohen's $d = 0.47$, $p = 0.048$) and professionalism (Cohen's $d = 0.66$, $p = 0.011$). There was a nonstatistically significant improvement for the intervention compared to control group in emergency management and communication skills. There was no improvement for either group in medical knowledge.

CONCLUSION:

A one-on-one preceptor shift can result in a statistically significant improvement in data gathering and professionalism skills as measured by OSCEs.

A Milestone-Based Pediatric Intern Boot Camp: An Educational Intervention to Minimize the July Effect

Novosel A, van de Ridder M, Smith-King C, McLeod M, Triemstra J. *Academic Pediatrics*. 2019 Aug; (6). doi:10.1016/j.acap.2019.05.083.

INTRODUCTION:

The transition from student to intern is difficult and highlighted by performance missteps often referred to as the July Effect. Some pediatric institutions have implemented intern boot camps (IBC) to better prepare interns at the start of residency. Such pediatric boot camps described in the literature have not specifically targeted the ACGME/ABP Pediatric Milestones. We implemented an IBC that utilized these milestones to improve the interns' confidence, knowledge, and skills. Methods 19 new interns participated in the IBC at the HDVCH/MSU Pediatric Residency Program. We used Kerns Six-Step Approach as a conceptual framework and targeted 3 levels of Kirkpatrick's level of evaluation (reaction, learning, and behavior). A needs assessment from residents and faculty was used to identify specific milestones. We designed our IBC to include lectures, workshops and clinical experiences to target these milestones. A questionnaire containing 15-confidence (Likert Scale 1-5) and 10 knowledge-based questions was given before and after the IBC. The paired t-test was used to assess total confidence scores and pre/post knowledge measures. The sign test was used to compare individual confidence questions. Block 1 milestone evaluations were analyzed for pre-IBC (2016, 2017) and post-IBC interns (2018). Significance was assessed at $p < 0.05$.

RESULTS:

Interns demonstrated a significant improvement in their overall confidence score (Pre: 47.7 ± 4.1 , Post: 58.6 ± 5.3 ; $p < 0.001$). All individual confidence questions showed increases. Interns demonstrated a significant improvement in perceived pediatric knowledge on the post-IBC test (Pre: 5.2 ± 1.5 , Post: 6.8 ± 1.3 ; $p = 0.004$). Block 1 evaluations from 7/2018 did not show improved evaluations when compared to pre-IBC cohorts.

Conclusions

Incoming interns demonstrated a significant improvement in confidence and perceived knowledge of the targeted pediatric milestones after participating in the IBC. Our innovative approach of targeting pediatric milestones in an IBC suggests that such a targeted curriculum helps the difficult transition for interns.

Rising to the Challenge: Residency Programs' Experience With Implementing Milestones-Based Assessment

Dzara K, Huth K, Kesselheim JC, Schumacher DJ. J Grad Med Educ. 2019 Aug;11(4):439-446. doi: 10.4300/JGME-D-18-00717.1.

BACKGROUND:

Changes to assessment efforts following the shift to milestones-based assessment in the ACGME Next Accreditation System have not been fully characterized.

OBJECTIVE:

This study describes themes in initial milestones-based assessment practices with the goal of informing continued implementation and optimization of milestones-based assessment.

METHODS:

Semistructured interviews were conducted with 15 residency program leaders in 6 specialties at 8 academic medical centers between August and December 2016. We explored what was retained, what was added, and what was changed from pre-milestones assessment efforts. We also examined the perceived impact of the shift to milestones-based assessment on the programs. Thematic analysis began after the first 5 interviews and ended once thematic sufficiency was reached. Two additional authors reviewed the codes, offered critical input, and informed the formation and naming of the final themes.

RESULTS:

Three themes were identified: (1) program leaders faced challenges to effective implementation; (2) program leaders focused on adaptability and making milestones work in what felt like a less than ideal situation for them; and (3) despite challenges, program leaders see value and utility in their efforts to move to milestones-based assessment. We describe a number of strategies that worked for programs during the transition, with perceived benefits acknowledged.

CONCLUSIONS:

While adaptation to milestones has occurred and benefits are noted, negative impacts and challenges (eg, perceived lack of implementation guidance and faculty development resources) persist. There are important lessons learned (eg, utilizing implementation experiences formatively to improve curricula and assessment) in the transition to milestones-based assessment.

Annotated Bibliography for Supervising Psychiatry Residents in Psychodynamic Psychotherapy

Miller CWT, Hodzic V, Ross DR, Ehrenreich MJ. *Acad Psychiatry*. 2019 Aug;43(4):417-424. doi: 10.1007/s40596-019-01056-4. Epub 2019 Apr 17.

OBJECTIVE:

This paper sought to compile an annotated bibliography for the outpatient year of adult psychiatry residents, providing resources for a foundation in psychodynamic theory which can be utilized in supervision to aid in ongoing psychotherapeutic work.

METHODS:

In selecting the readings, the ACGME Milestones sub-competencies considered were (i) empathy and process, (ii) boundaries, (iii) alliance and provision of psychotherapies, (iv) seeking and providing supervision, and (v) knowledge of psychotherapy (theories, practice, and evidence base). Once the readings were selected, two authors independently reviewed the articles to determine which key sub-competencies each article addressed. Chance corrected agreement between the reviewers was assessed using the Cohen kappa statistic. The kappa for interrater agreement was 0.83.

RESULTS:

A list of 32 readings was compiled sequentially, allowing for theoretical concepts to be progressively built upon. The content of the papers aligned well with multiple sub-competencies in the medical knowledge (MK) and patient care (PC) domains. The bibliography allows for close examination of therapeutic frame; active listening and reflecting on the meaning of the therapist's interventions; transference and the use of countertransference as a diagnostic/therapeutic tool; defense mechanisms; patient pressures towards reenactment; theoretical viewpoints on therapeutic action (e.g., ego psychology, self-psychology, relational therapy, object relations, classical/modern Kleinian); and meaning of lateness, treatment breaks, and termination.

CONCLUSIONS:

This list serves as an ancillary resource which can augment discussions in therapy supervision, while also aiding in standardizing the minimal knowledge base achieved in psychodynamic theory.

Effects of a Primary Palliative Care Educational System for Teaching Learners at Different Levels of Training

El-Sourady M, Chen H, Martin SF, Ritchie J Ellis K, Richeson A Moore D, Karlekar M, Misra S. *Am J Hosp Palliat Care*. 2019 Aug;36(8):675-681. doi: 10.1177/1049909119834854. Epub 2019 Mar 7.

ABSTRACT

Interest and appreciation for palliative care (PC) has resulted in increased demand for both PC services and education. The PC rotation has been shown to improve PC knowledge in medical students (MS) and internal medicine (IM) residents, and PC specialists stand poised to direct the primary PC education of learners at different levels of training. To concurrently teach learners of different levels of training on a busy PC service, we created an educational system that emphasizes management of learner schedules, organization of teaching activities, faculty development to improve teaching skills, and learner self-evaluation. Both MS and IM residents showed an improvement in self-assessed competence as well as increased comfort level with seriously ill patients after PC rotation.

Careful adjustment of learner schedules has accommodated an increasing number of learners, while maintaining a low learner to faculty ratio. The PC educators face an exciting and daunting challenge as the number of patients with PC needs and the number of learners requesting PC experience grow. We continue to improve milestone-based PC assessment tools, to invest in faculty development, and to explore innovative ways to support PC educators as they strive to provide consistent PC education that is both useful for learners and can be incorporated into busy PC clinical practice.

Program Director Minimum Milestone Expectations of Pediatric Residents before Ready to Supervise Others and Before Graduation

Li S-TT. 56. Academic Pediatrics. Aug 2019;19(6):e26. doi:10.1016/j.acap.2019.05.070.

BACKGROUND:

In 2013, the Accreditation Council for Graduate Medical Education (ACGME) began requiring program directors (PDs) to report Milestone levels for every resident semiannually. Our prior 2015 survey found that few PDs had minimum Milestone level expectations before residents are ready to supervise (20%) or ready to graduate (20%).

OBJECTIVE:

Characterize present day model for pediatric PD minimum Milestone expectations for residents before being ready to supervise and graduate.

METHODS:

Cross-sectional survey in Spring 2018 of pediatric PDs on their program Milestone expectations before residents are ready to supervise and graduate. At programs with no established Milestone expectations, PDs indicated expectations they considered for use in their program. Descriptive analyses were used to explore PD minimum expectations by level of training.

RESULTS:

Response rate was 46.2% (93/201). Few programs have minimum Milestone levels before residents are ready to supervise (22.6%; 21/93) or graduate (36.6%; 34/93). Minimum expectations before a resident was ready to supervise were highest for trustworthiness (Prof5), professional conduct (Prof3), professionalization (Prof2), transfer of care (PC3), organize and prioritize (PC2), humanism (Prof1), and help-seeking (Prof4), where most PDs felt that Level 2.5 was the minimum expectation. PD expectations for supervising residents were lowest for learning activities (PBLI2) and advocacy (SBP2), where the majority of PDs felt that there was no minimum or that Level 1 was sufficient. Minimum expectations for graduates were highest for diagnostic/therapeutic decisions (PC4), develop management plans (PC5), gather information (PC1), organize and prioritize (PC2), professionalization (Prof2), and trustworthiness (Prof5), where >70% of PDs felt that Level 3.0 was the minimum (Figure). PD expectations for graduating residents were lowest for quality improvement (PBLI3), advocacy, learning activities, and evidence-based medicine (MK), where >40% of PDs felt that Level 2.5 was the minimum.

CONCLUSIONS:

Five years after the ACGME required Milestone reporting, only a minority of PDs have established minimum Milestones before residents are ready to supervise or ready to graduate. However, more PDs have minimum Milestone levels before residents are ready to graduate than in 2015 (36.6% vs 20%) and PDs recognize the relative importance of different competencies in establishing readiness to supervise and readiness to graduate.

An Examination of Advocacy Education in Residency Training

Black CC, Motta A. Arch Pathol Lab Med. 2019 Jul 17. doi: 10.5858/arpa.2019-0116-EP.

CONTEXT:

Pathology-related advocacy is best when performed directly by pathologists. Practicing advocacy is included in the Milestones 2.0 and should be introduced during residency training.

OBJECTIVE:

To understand advocacy education in residency training we surveyed pathologists to ask what training they had in residency, what resources were available, and what experiences were most impressionable.

DESIGN:

Two types of inquiry were performed. First, a survey to program graduates asking about leadership and advocacy activities during training and about leadership and advocacy activities since graduation. Secondly, focused email and telephone inquiries were made to 12 pathologists-4 in practice for more than 20 years, 4 within the first 10 years of practice, and to 4 PGY4 (postgraduate year 4) residents-asking what training and experiences were available to them, and how they became motivated to become active in practice.

RESULTS:

Our results showed that resources available outside of the home program have changed through the years and more national resident groups are available that were not available in the past. These groups may educate trainees in leadership and advocacy. Internally, opportunities to shadow faculty at interdepartmental leadership meetings, as well as selection of the Chief Resident, are enduring tools for honing these skills.

CONCLUSIONS:

Teaching advocacy in training is important and part of the Accreditation Council for Graduate Medical Education core requirements as well as a level 5 Milestone. Education may require a balance of internal and external resources, since different programs may offer different opportunities. Shadowing during real advocacy events was the most impressionable experience.

Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Education Milestones for Resident Education

Sharma D, Easdown LJ, Zolyomi A, Ayrian E, Wheeler PJ, Edelman G, Mahla ME; Society for Neuroscience in Anesthesiology & Critical Care (SNACC) Neuroanesthesiology Milestones Task Force. *J Neurosurg Anesthesiol.* 2019 Jul;31(3):337-341. doi: 10.1097/ANA.0000000000000586.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) has introduced competency-based assessments (milestones) for resident education. However, the existing milestones for Anesthesiology are not specific to Neuroanesthesiology. The Society for Neuroscience in Anesthesiology & Critical Care (SNACC) commissioned a task force to adapt the ACGME anesthesiology milestones for use in Neuroanesthesiology training, and to provide recommendations for implementing milestones.

METHODS:

A 7-member expert task force supported by an advisory committee developed the initial milestones by consensus. Written permission was given by the ACGME. The milestones were refined following 3-month pilot use in 14 departments across the United States and inputs from SNACC members. Final milestones were approved by the SNACC Board of Directors.

RESULTS:

Twelve Neuroanesthesiology-specific milestones in 5 major ACGME domains are recommended; these were identified as most pertinent to this subspecialty rotation. These pertain to patient care (7 milestones), medical knowledge (2 milestones), practice-based learning and improvement (1 milestone), and interpersonal and communication skills (2 milestones). Each milestone was described in detail, with clear outline of expectations at various levels of training.

CONCLUSIONS:

The SNACC Neuroanesthesiology milestones provide a framework for reviewing resident performance and are expected to facilitate improved use of ACGME milestones during Neuroanesthesiology subspecialty training. The task force recommends that the target should be to accomplish level 4 or higher milestones by the end of residency training. Individual programs should decide the implications of a resident not meeting the expected milestones.

Some Assembly Required: Tracing the Interpretative Work of Clinical Competency Committees

Pack R, Lingard L, Watling CJ, Chahine S, Cristancho SM. *Med Educ.* 2019 Jul;53(7):723-734. doi: 10.1111/medu.13884. Epub 2019 Apr 30.

OBJECTIVES:

This qualitative study describes the social processes of evidence interpretation employed by Clinical Competency Committees (CCCs), explicating how they interpret, grapple with and weigh assessment data.

METHODS:

Over 8 months, two researchers observed 10 CCC meetings across four postgraduate programmes at a Canadian medical school, spanning over 25 hours and 100 individual decisions. After each CCC meeting, a semi-structured interview was conducted with one member. Following constructivist grounded theory methodology, data collection and inductive analysis were conducted iteratively.

RESULTS:

Members of the CCCs held an assumption that they would be presented with high-quality assessment data that would enable them to make systematic and transparent decisions. This assumption was frequently challenged by the discovery of what we have termed 'problematic evidence' (evidence that CCC members struggled to meaningfully interpret) within the catalogue of learner data. When CCCs were confronted with 'problematic evidence', they engaged in lengthy, effortful discussions aided by contextual data in order to make meaning of the evidence in question. This process of effortful discussion enabled CCCs to arrive at progression decisions that were informed by, rather than ignored, problematic evidence.

CONCLUSIONS:

Small groups involved in the review of trainee assessment data should be prepared to encounter evidence that is uncertain, absent, incomplete, or otherwise difficult to interpret, and should openly discuss strategies for addressing these challenges. The answer to the problem of effortful processes of data interpretation and problematic evidence is not as simple as generating more data with strong psychometric properties. Rather, it involves grappling with the discrepancies between our interpretive frameworks and the inescapably subjective nature of assessment data and judgement.

Who Moved my Fellow: Changes to Accreditation Council for Graduate Medical Education Fellowships in Pediatric Surgery and What May Be Yet to Come

Alaish SM, Garcia AV. *Curr Opin Pediatr*. 2019 Jun;31(3):409-413. doi: 10.1097/MOP.0000000000000762.

PURPOSE OF REVIEW:

Over the past 15 years, the Accreditation Council for Graduate Medical Education (ACGME) has significantly altered the regulatory framework governing fellowship training in pediatric surgery. The daily experiences of pediatric surgical trainees have been impacted by these changes, but training program directors and faculty have not developed a consistent approach to managing this shift. This review highlights the changes, which have occurred, analyzes the current state of fellowship training, and proposes potential strategies for management.

RECENT FINDINGS:

The implementation of work hour restrictions, increased supervision requirements, the milestone evaluation program and most recently, enforcement of required critical care experience, have caused significant changes in the curriculum. Pediatric surgical trainees record more total cases, and more minimally invasive surgical (MIS) cases, in particular, than ever before. A subset of this increase may result from trainees performing cases previously assigned to general surgery residents. Teaching cases performed by fellows have decreased. Although the relationship between these shifts in training experience and the didactic curriculum is not clear, we also note that the Pediatric Surgery Certifying Examination failure rate has increased, approaching 20% in recent years.

SUMMARY:

It is unclear whether the changes in Pediatric Surgery training programs have been effective, or (conversely) have led to unintended consequences. Paradigm shifts in our training model may be required to address the changes in surgical education and skill acquisition, so that well tolerated, competent and skillful pediatric surgeons continue to enter the workforce.

Feedback with Performance Metric Scorecards Improves Resident Satisfaction but Does Not Impact Clinical Performance

Mamtani M, Shofer FS, Sackeim A, Conlon L, Scott K, Mills AM. *AEM Educ Train*. 2019 May 20;3(4):323-330. doi: 10.1002/aet2.10348. eCollection 2019 Oct.

OBJECTIVES:

The Emergency Medicine Milestone Project, a framework for assessing competencies, has been used as a method of providing focused resident feedback. However, the emergency medicine milestones do not include specific objective data about resident clinical efficiency and productivity, and studies have shown that milestone-based feedback does not improve resident satisfaction with the feedback process. We examined whether providing performance metric reports to resident physicians improves their satisfaction with the feedback process and their clinical performance.

METHODS:

We conducted a three-phase stepped-wedge randomized pilot study of emergency medicine residents at a single, urban academic site. In phase 1, all residents received traditional feedback; in phase 2, residents were randomized to receive traditional feedback (control group) or traditional feedback with performance metric reports (intervention group); and in phase 3, all residents received monthly performance metric reports and traditional feedback. To assess resident satisfaction with the feedback process, surveys using 6-point Likert scales were administered at each study phase and analyzed using two-sample t-tests. Analysis of variance in repeated measures was performed to compare impact of feedback on resident clinical performance, specifically patient treatment time (PTT) and patient visits per hour.

RESULTS:

Forty-one residents participated in the trial of which 21 were randomized to the intervention group and 20 in the control group. Ninety percent of residents liked receiving the report and 74% believed that it better prepared them for expectations of becoming an attending physician. Additionally, residents randomized to the intervention group reported higher satisfaction ($p = 0.01$) with the quality of the feedback compared to residents in the control group. However, receiving performance metric reports, regardless of study phase or postgraduate year status, did not affect clinical performance, specifically PTT (183 minutes vs. 177 minutes, $p = 0.34$) or patients visits per hour (0.99 vs. 1.04, $p = 0.46$).

CONCLUSIONS:

While feedback with performance metric reports did not improve resident clinical performance, resident physicians were more satisfied with the feedback process, and a majority of residents expressed liking the reports and felt that it better prepared them to become attending physicians. Residency training programs could consider augmenting feedback with performance metric reports to aide in the transition from resident to attending physician.

The Implementation of an Introductory Surgical Pathology Didactic Series to Transition First Year Residents and Facilitate Upper Level Resident Teaching

Mehr CR, Montone KT, Schwartz LE. *Adv Anat Pathol*. 2019 May;26(3):210-214. doi: 10.1097/PAP.000000000000229.

ABSTRACT:

The increasing complexity of the practice of pathology and health care in general requires that pathology residents acquire a vast number of skills during their training. This has been reflected by the broad range of skills addressed in the Accreditation Council for Graduate Medical Education (ACGME) milestones. In order to address some of these milestones, our residency program instituted an introductory didactic series in surgical pathology that focused on 2 objectives. First, the didactics provided basic grossing and histology training to first year residents transitioning from medical school.

Second, the sessions allowed upper level residents to refine their teaching and communication skills at the microscope and therefore served as an important career development tool. Surveys of both first year residents and the upper level residents that led these sessions confirm the utility of these didactics and the use of upper level residents to teach junior trainees. In addition, these sessions led to a dramatic increase in RISE scores among first year trainees. An introductory series with upper level residents leading slide sessions could easily be replicated at other institutions and provide similar benefits.

Factors that Contribute to Resident Teaching Effectiveness

Rutz M, Turner J, Pettit K, Palmer MM, Perkins A, Cooper DD. *Cureus*. 2019 Mar 21;11(3):e4290. doi: 10.7759/cureus.4290.

BACKGROUND

One of the key components of residency training is to become an educator. Resident physicians teach students, advanced practice providers, nurses, and even faculty on a daily basis.

OBJECTIVE

The goal of this study was to identify the objective characteristics of residents, which correlate with perceived overall teaching effectiveness.

METHODS

We conducted a one-year, retrospective study to identify factors that were associated with higher resident teaching evaluations. Senior emergency medicine (EM) teaching residents are evaluated by medical students following clinical teaching shifts. Eighteen factors pertaining to resident teaching effectiveness were chosen. Two items from the medical students' evaluations were analyzed against each factor: teaching effectiveness was measured on a five-point Likert scale and an overall teaching score (1-75).

RESULTS

A total of 46 EM residents and 843 medical student evaluations were analyzed. The ACGME milestones for systems-based practice ($p = 0.02$) and accountability ($p = 0.05$) showed a statistically significant association with a rating of "five" on the Likert scale for teaching effectiveness. Three other ACGME milestones, systems-based practice ($p = 0.01$), task switching ($p = 0.04$), and team management ($p = 0.03$) also showed a statically significant association of receiving a score of 70 or greater on the overall teaching score.

CONCLUSION

Residents with higher performance associated with system management and accountability were perceived as highly effective teachers. USMLE and in-service exams were not predictive of higher teaching evaluations. Our data also suggest that effective teachers are working in both academic and community settings, providing a potential resource to academic departments and institutions.

Identification of Gender Differences in Ultrasound Milestone Assessments during Emergency Medicine Residency Training: A Pilot Study

Acuña J, Situ-LaCasse EH, Patanwala AE, Stolz LA, Amini R, Friedman L, Adhikari S. *Adv Med Educ Pract.* 2019 Mar 27;10:141-145. doi: 10.2147/AMEP.S196140. eCollection 2019.

OBJECTIVES:

Prior literature suggests that incongruities between male and female resident's procedural competency may be explained by gender bias during the evaluation process. There are no known studies investigating gender differences in the assessment of ultrasound-based procedural skills among emergency medicine (EM) residents. The purpose of this study was to evaluate for gender differences in ultrasound milestone assessments among EM residents.

METHODS:

This is a retrospective study including EM residents. Milestone assessment data were collected from a total of 3 Accreditation Council for Graduate Medical Education (ACGME) EM residency programs representing a 3-year period. The outcome measures included mean milestone levels, milestone levels at baseline and graduation and differences in milestone achievement between female and male EM residents. An unpaired Student's t-test was used to compare milestone scores between female and male residents.

RESULTS:

A total of 456 ultrasound milestone evaluations were collected from 91 EM residents (34 females [37%] and 57 males [63%]). No significant differences were noted in the overall mean milestone level between females (2.3 ± 0.6) and males (2.2 ± 0.6) ($P=0.387$). There were no significant differences noted in the ultrasound milestone level between females (0.8 ± 0.6) and males (0.7 ± 0.7) at baseline ($P=0.754$). Although it did not reach statistical significance ($P=0.197$), the increase in the mean ultrasound milestone level from baseline to graduation was greater in males (3.4 ± 0.7) compared to females (3.1 ± 0.7).

CONCLUSION:

Overall, there were no statistically significant differences in the mean ultrasound milestone levels between females and males. The rate of ultrasound milestone level achievement during EM residency training at our institution had a slight tendency to be higher for males than females in the observed residency programs; however, this also did not reach statistical significance. Possible gender bias while evaluating ultrasound milestone levels needs to be further studied on a larger scale.

Surgical Simulation: Markers of Proficiency

Binkley J, Bukoski AD, Doty J, Crane M, Barnes SL, Quick JA. J Surg Educ. 2019 Jan - Feb;76 (1): 234-241. doi: 10.1016/j.jsurg.2018.05.018. Epub 2018 Jul 6.

OBJECTIVE:

Surgical simulation has become an integral component of surgical training. Simulation proficiency determination has been traditionally based upon time to completion of various simulated tasks. We aimed to determine objective markers of proficiency in surgical simulation by comparing novel assessments with conventional evaluations of technical skill.

DESIGN:

Categorical general surgery residents completed 10 laparoscopic cholecystectomy modules using a high-fidelity simulator. We recorded and analyzed simulation task times, as well as number of hand movements, instrument path length, instrument acceleration, and participant affective engagement during each simulation. Comparisons were made to Objective Structured Assessment of Technical Skill (OSATS) and Accreditation Council for Graduate Medical Education Milestones, as well as previous laparoscopic experience, duration of laparoscopic cholecystectomies performed by participants, and postgraduate year. Comparisons were also made to Fundamentals of Laparoscopic Surgery task times. Spearman's rho was utilized for comparisons, significance set at >0.50 .

SETTING:

University of Missouri, Columbia, Missouri, an academic tertiary care facility.

PARTICIPANTS:

Fourteen categorical general surgery residents (postgraduate year 1-5) were prospectively enrolled.

RESULTS:

One hundred forty simulations were included. The number of hand movements and instrument path lengths strongly correlated with simulation task times (ρ 0.62-0.87, $p < 0.0001$), FLS task completion times (ρ 0.50-0.53, $p < 0.0001$), and prior real-world laparoscopic cholecystectomy experience (ρ -0.51 to -0.53, $p < 0.0001$). No significant correlations were identified between any of the studied markers with Accreditation Council for Graduate Medical Education Milestones, Objective Structured Assessment of Technical Skill evaluations, total previous laparoscopic experience, or postgraduate year level. Neither instrument acceleration nor participant engagement showed significant correlation with any of the conventional markers of real-world or simulation skill proficiency.

CONCLUSIONS:

Simulation proficiency, measured by instrument and hand motion, is more representative of simulation skill than simulation task time, instrument acceleration, or participant engagement.

Evaluation of a Modified Objective Structured Assessment of Technical Skills Tool for the Assessment of Pediatric Laceration Repair Performance

Uspal NG, Thomas AA, Burns R, Jones M, Gross IT, Kearney RD, Whitney RE, Uspal JE, Gove N, Reid J. *Cureus*. 2019 Feb 12;11(2):e4056. doi: 10.7759/cureus.4056.

INTRODUCTION:

The Accreditation Council for Graduate Medical Education (ACGME) has developed milestones including procedural skills under the core competency of patient care. Progress in training is expected to be monitored by residency programs. To our knowledge, there exists no tool to evaluate pediatric resident laceration repair performance.

METHODS:

The Objective Structured Assessment of Technical Skills was adapted to evaluate resident laceration repair performance using two components: a global rating scale (GRS) and a checklist. Pediatric and family medicine residents at a tertiary care children's hospital were filmed performing a simulated laceration repair. Videos were evaluated by at least five physicians trained in laceration repair. Concordance correlation coefficients (CCC) were calculated for the GRS and checklist scores. Scores for each resident were compared across levels of training and procedural experience. Spearman's rank order correlations were calculated to compare the checklist and GRS. Results Thirty residents were filmed performing laceration repair procedures. The CCC showed fair concordance across reviewers for the checklist (0.55, 95% CI: 0.38-0.69) and the GRS (0.53, 95% CI: 0.36-0.67). There was no significant difference in scores by self-reported experience or training level. There was correlation between the median GRS and checklist scores (Spearman $\rho = 0.730$, $p < .001$).

CONCLUSIONS:

A novel tool to evaluate resident laceration repair performance in a pediatric emergency department showed fair agreement across reviewers. The study tool is not precise enough for summative evaluation; however, it can be used to distinguish between trainees who have and have not attained competence in laceration repair for formative feedback.

Transforming Resident Assessment: An Analysis Using Deming's System of Profound Knowledge

Warm EJ, Kinnear B, Kelleher M, Sall D, Holmboe E. *Acad Med.* 2019 Feb;94(2):195-201. doi: 10.1097/ACM.0000000000002499.

ABSTRACT:

W. Edwards Deming, in his System of Profound Knowledge, asserts that leaders who wish to transform a system should understand four essential elements: appreciation for a system, theory of knowledge, knowledge about variation, and psychology. The Accreditation Council for Graduate Medical Education (ACGME) introduced the milestones program as a part of the Next Accreditation System to create developmental language for the six core competencies and facilitate programmatic assessment within graduate medical education systems. Viewed through Deming's lens, the ACGME can be seen as the steward of a large system, with everyone who provides assessment data as workers in that system. The authors use Deming's framework to illustrate the working components of the assessment system of the University of Cincinnati College of Medicine's internal medicine residency program and draw parallels to the macrocosm of graduate medical education. Successes and failures in transforming resident assessment can be understood and predicted by identifying the system and its aims, turning information into knowledge, developing an understanding of variation, and appreciating the psychology of motivation of participants. The authors offer insights from their experience for educational leaders who wish to apply Deming's elements to their own assessment systems, with questions to explore, pitfalls to avoid, and practical approaches in doing this type of work.

What Do Quantitative Ratings and Qualitative Comments Tell Us about General Surgery Residents' Progress toward Independent Practice? Evidence from a 5-Year Longitudinal Cohort

Tekian A, Borhani M, Tilton S, Abasolo E, Park YS. *Am J Surg*. 2019 Feb;217(2):288-295. doi: 10.1016/j.amjsurg.2018.09.031. Epub 2018 Sep 29.

BACKGROUND:

This study examines the alignment of quantitative and qualitative assessment data in end-of-rotation evaluations using longitudinal cohorts of residents progressing throughout the five-year general surgery residency.

METHODS:

Rotation evaluation data were extracted for 171 residents who trained between July 2011 and July 2016. Data included 6069 rotation evaluations forms completed by 38 faculty members and 164 peer-residents. Qualitative comments mapped to general surgery milestones were coded for positive/negative feedback and relevance.

RESULTS:

Quantitative evaluation scores were significantly correlated with positive/negative feedback, $r = 0.52$ and relevance, $r = -0.20$, $p < .001$. Themes included feedback on leadership, teaching contribution, medical knowledge, work ethic, patient-care, and ability to work in a team-based setting. Faculty comments focused on technical and clinical abilities; comments from peers focused on professionalism and interpersonal relationships.

CONCLUSIONS:

We found differences in themes emphasized as residents progressed. These findings underscore improving our understanding of how faculty synthesize assessment data.

Choosing Our Own Pathway to Competency-Based Undergraduate Medical Education.

Veale P, Busche K, Touchie C, Coderre S, McLaughlin K. Acad Med. 2019 Jan;94(1):25-30. doi: 10.1097/ACM.0000000000002410.

ABSTRACT:

After many years in the making, an increasing number of postgraduate medical education (PGME) training programs in North America are now adopting a competency-based medical education (CBME) framework based on entrustable professional activities (EPAs) that, in turn, encompass a larger number of competencies and training milestones. Following the lead of PGME, CBME is now being incorporated into undergraduate medical education (UME) in an attempt to improve integration across the medical education continuum and to facilitate a smooth transition from clerkship to residency by ensuring that all graduates are ready for indirect supervision of required EPAs on day one of residency training. The Association of Faculties of Medicine of Canada recently finalized its list of 12 EPAs, which closely parallels the list of 13 EPAs published earlier by the Association of American Medical Colleges, and defines the "core" EPAs that are an expectation of all medical school graduates. In this article, the authors focus on important, practical considerations for the transition to CBME that they feel have not been adequately addressed in the existing literature. They suggest that the transition to CBME should not threaten diversity in UME or require a major curricular upheaval. However, each UME program must make important decisions that will define its version of CBME, including which terminology to use when describing the construct being evaluated, which rating tools and raters to include in the assessment program, and how to make promotion decisions based on all of the available data on EPAs.

Does Orthopaedic Resident Efficiency Improve with Respect to Decreased Fluoroscopic Times in Tibial Intramedullary Nailing? A Measure of an ACGME Milestone

Bradburn K, Patel JH, Cannada LK. *Current Orthopaedic Practice*. 2019;(2):129. doi:10.1097/BCO.0000000000000733.

BACKGROUND:

Intramedullary nailing of tibial fractures is a surgical milestone from the Accreditation Council for Graduate Medical Education (ACGME). Our purpose was to evaluate if fluoroscopic time decreased with increasing resident experience and could be used as a measure of this milestone.

METHODS:

Current Procedural Terminology (CPT) codes were used to identify patients who underwent intramedullary nailing of tibial shaft fractures under the direction of fellowship-trained trauma attending staff. The data collected included patient demographics, fracture classification, fluoroscopic imaging total time, and the post-graduate years (PGY) of orthopaedic residency of the operating resident.

Exclusions of patients included concomitant fluoroscopic procedures, inadequate records, or surgeries involving primary assisting residents with less than PGY-2 experience. We compared overall groups between half years and looked at individual resident years for each of the continuous variables.

RESULTS:

When residents were grouped as senior (PGY-4 and PGY-5) or junior (PGY-2 and PGY-3), seniors used significantly less fluoroscopy than juniors (207.39asec vs. 258.30asec, $P=0.018$). In the first half of the academic year, PGY-2 residents completed tibial nailing slowest in terms of fluoroscopic usage ($P=0.003$). PGY-4 residents completed tibial nailing faster in terms of fluoroscopic usage than other years ($P=0.031$). In the second half of the academic year, PGY-5 residents used significantly less fluoroscopy than PGY-2 residents ($P=0.035$).

CONCLUSIONS:

As the ACGME currently has no measurement for resident progress and efficiency regarding tibial shaft intramedullary nailing, our data indicate that fluoroscopic measurements may be useful in assessing resident proficiency.

Training, Education for Robotic Performance with Simulation (Terps): A Valuable Tool For Gynecologic Surgeons In Training

Helou C, Seal P, Sanses T, Morozov V, Roque D. Journal of Minimally Invasive Gynecology. 2019;26:S159.

To evaluate the role of robotic simulation in training OBGYN residents by determining an optimal number of exercise repetitions prior to clinical debut; To assess whether clinical exposure accelerates proficiency by correlating laparoscopic/robotic experience with simulator skills acquisition

Prospective cohort study Urban academic center with active COEMIG designation 2017-2018 Gynecology residents (PGY1-4) Voluntary participants were instructed to complete 10 repetitions of 5 exercises (pegboard-1, energy dissection-1, energy switching-1, ring&rail-2, tubes) on the dV-Trainer® robotic simulator. After a 4-month hiatus, residents were asked to repeat the protocol. Residents were surveyed regarding prior surgical experience and perceptions regarding simulation utility. 25 of 28 (89%) residents participated. Performance was captured using M-scores® (aggregate quality, efficiency, risk, and safety measure). With all exercises, M-scores® increased with repetitions among all levels (mean±SD 58.9±19.1 repetition 1 versus 82.0±13.6 repetition 10, $p<0.001$); however, after one round, many trainees failed to attain the pre-determined passing score of 80%. Across all participants, mean scores by exercise were 82.5±15.6, 78.0±15.8, 72.6±17.9, 62.7±19.4, 60.1±22.1 ($p<0.001$). Neither PGY level nor prior surgical experience correlated with higher scores: repetition-1 scores were 61±12.8, 54.0±11.2, 59.4 ±19.7, and 59.8±10.6 for PGY-1 through -4 participants, $p=0.51$; repetition-10 scores were 80±3.9, 82±9.3, 86.5±9.3, and 84.9±9.0, $p=0.79$, respectively. Self-reported prior surgical experience reflected graduated responsibility: only PGY-4 participants reported console exposure, with most describing 1-5 cases performed. Retention of skills at 4 months negatively correlated with difficulty, suggesting challenging skills require more repetitions to master. Poor compliance hindered data interpretation. The majority of trainees believed simulation is valuable. Robotic simulation may be useful for development/maintenance of robotic skills in Gynecology trainees. M-score® may be insufficiently sensitive; additional metrics should be explored. Robotic simulation is valued by trainees, however, not a milestone established by the ACGME. Protected time with incorporation into curricula would be needed to maximize utility.

Information within Residency Monthly Evaluation Forms at Two Institutions

Cooper CJ, Wehner P, Dailey C, O'Connor N, Kleshinski J, Shapiro JI. *Medical Education Online*. 2019;24(1):1635844. doi:10.1080/10872981.2019.1635844.

ABSTRACT:

Periodic review of resident performance is an important aspect of residency training. Amongst allopathic residency programs, it is expected that the performance of resident physicians which can be grouped based on the ACGME core competencies, be assessed so as to allow for effective feedback and continuous improvement. Review of monthly evaluation forms for residents in the core ACGME programs at Marshall University and the University of Toledo demonstrated a wide spread in the number of Likert questions that faculty were asked to complete. This number ranged from a low of 7 in Surgery to a high of 65 in Psychiatry (both Marshall Programs). Correlation and network analysis were performed on these data. High degrees of correlations were noted between answers to questions (controlled for each resident) on these forms at both institutions. In other words, although evaluation scores varied tremendously amongst the different residents in all the programs studied, scores addressing different competencies tended to be very similar for the same resident, especially in some of the programs which were studied. Network analysis suggested that there were clusters of questions that produced essentially the same answer for a given resident, and these clusters were bigger in some of the different residency program assessment forms. This seemed to be more the rule in the residency programs with large numbers of Likert questions. The authors suggest that reducing the number of monthly questions used to address the core competencies in some programs may be possible without substantial loss of information.

Intern Self-Reported Preparedness for Residency: An ACGME Milestone-Based Study

McLean ME, Huls TA, Park JC, Anana MC, Chen AS, Chien GK, Cygan L, Gupta SJ, Husain A, Mishra DN, Ng KM, Russell JT, Surlles RT, Kulkami ML. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*. 2019;20:S10.

OBJECTIVE

Transitioning from medical school to internship is challenging. While several curricula for medical students and interns have been proposed during this transition period, there has not been a large-scale self assessment of incoming emergency medicine (EM) interns' preparedness for EM milestones. While many medical schools and EM residencies host "boot camps" or other intensive orientation programs for EM-bound students, having knowledge of incoming EM residents' self-perceived strengths and weaknesses will help clerkship directors and EM residency leadership better serve this group of learners. Milestones in EM are used in the United States to measure residents' progress and determine competence at residency completion.⁴ Incoming interns are expected to have achieved level 1 milestones by the time they enter residency, to have achieved level 2 milestones between the first and second year, and to have achieved level 4 milestones before completion of residency. We reached out to 151 newly-matched interns at 11 different sites to ask about their self-perceived "preparedness" for levels 1, 2, and 3 of our eight selected EM milestones (numbers 1, 3, 4, 5, 7, 9, 10, and 12).

DESIGN AND METHOD:

This was a prospective, cross-sectional study of 151 newly-matched pre-interns at 11 EM residency programs. We included all newly-matched interns at each program. Interns were invited via email from their programs to complete a voluntary, anonymous survey prior to the start of residency. The survey used a Likert scale (1 = very unprepared to 5 = extremely prepared) to assess self-reported preparedness to perform levels 1 and 2 of milestones 1, 3, 4, 5, 7, 9, 10, and 12. Milestones were chosen based on ease of teaching in an EM case curriculum that was later implemented.

RESULTS:

A total of 126 pre-interns completed the survey (response rate 83.4%).

CONCLUSION:

Subjects reported highest level of preparedness for emergency stabilization (PC1), and lowest levels of preparedness for airway management (PC10) and pharmacological management (PC5). The data suggest that teachers of fourth-year medical students and new EM interns may want to emphasize milestones 5 and 10 early in internship or late in medical school.

Effectiveness of the Adolescent Medicine Rotation in Improving Pediatric Residents Self-Assessed Skill and Confidence Caring for Youth

Ruedinger E, Carlin K, Inwards-Breland D, McCarty CA. J Adolesc Health. 2018 Dec 6. pii: S1054-139X(18)30468-3. doi: 10.1016/j.jadohealth.2018.10.007.

PURPOSE:

Practicing and resident pediatricians report inadequate skill in caring for adolescents, despite adolescents comprising roughly one-quarter of most general and subspecialty practices. This study examined the effectiveness of participation in an adolescent medicine rotation at improving pediatric residents' self-perceived skills and confidence across nine key adolescent health domains. We also evaluated the impact of didactic instruction during the rotation.

METHODS:

Resident and recent-graduate participants (n = 34) completed milestone-based self-assessment of their skill and confidence caring for adolescent patients in nine key adolescent health-related domains. This study employed a post-test then retrospective pretest, an educational study design used to minimize response-shift bias whereby participants rate their skill and confidence at the end of the intervention (post-test), and then reflect back to retrospectively rate their preintervention skill (retrospective pretest). Additionally, differences in gains between those who did and did not participate in didactic instruction were evaluated. Didactic instruction was delivered during the adolescent medicine rotation utilizing a flipped-classroom model; participants received standardized preparatory materials and participated in active-learning workshops.

RESULTS:

Participants demonstrated a significant ($p \leq .0001$) increase in self-perceived skill levels for all assessed domains after the rotation as compared to before the rotation, whether or not they received didactic instruction. Participation in didactic instruction did not yield significant ($p \leq .05$) additional benefit for any of the assessed domains.

CONCLUSIONS:

Participation in an adolescent medicine rotation is of value to pediatric resident trainees and leads to increased self-assessed skill and confidence in caring for youth.

Program Director Perceptions of Usefulness of the Accreditation Council for Graduate Medical Education Milestones System for Urology Resident Evaluation

Sebesta EM, Cooper KL, Badalato GM. *Urology*. 2018 Nov 8. pii: S0090-4295(18)31132-4. doi: 10.1016/j.urology.2018.10.042.

OBJECTIVES:

To assess the application and perceived usefulness of the Accreditation Council for Graduation Medical Education (ACGME) Milestones system for resident evaluation among urology program directors (PDs).

METHOD:

We conducted an online survey of 133 urology PDs. The survey addressed several domains: (1) demographic information, (2) logistics and implementation of the faculty Clinical Competency Committee (CCC) meetings, and (3) perceived overall effectiveness and usefulness of the Milestones assessments.

RESULTS:

Eighty-eight responses were obtained (66% response rate). A total of 42/88 programs (48%) described the Milestones as very or somewhat unhelpful in resident evaluation, with a comparable proportion (44%) responding Milestones assessments never or almost never accurately distinguished between residents. Respondents felt higher scores on all domains of the Milestones were completely or somewhat uncorrelated to higher inservice exam scores (58%), with a smaller fraction (49%) deeming they were not predictive of board passage rates. Overall, 30% of respondents answered neutrally as to whether they felt the Milestones format has led to better resident formative feedback, and 35% were neutral as to the implications of this system toward promoting professional development.

CONCLUSIONS:

The ACGME Milestones system for resident evaluation was initiated to create a uniform competency-based assessment system; however, a sizable proportion of urology PDs in our cohort did not find the Milestones system helpful or accurate in assessing residents or predicting future successes. Given the Milestones system is still in its infancy, the utility of this system within urology has yet to be fully assessed.

Standardized Patients to Assess Resident Interpersonal Communication Skills and Professional Values Milestones

Vora S, Lineberry M, Dobiesz VA. West J Emerg Med. 2018 Nov;19(6):1019-1023. doi: 10.5811/westjem.2018.8.37204. Epub 2018 Oct 18.

ABSTRACT:

It has been a challenge to assess communication and professional values Milestones in emergency medicine (EM) residents using standardized methods, as mandated by the Accreditation Council for Graduate Medical Education (ACGME). This paper outlines an innovative method of assessing these Milestones using an established instructional method. EM faculty mapped the communication and professional values Milestones to an existing communication and interpersonal skills scale. We identified six communication-focused scenarios: death notification; informed consent; medical non-compliance; medical error; treatment refusal; and advanced directives. In a pilot, 18 EM residents completed these six standardized patient (SP) encounters. Our experience suggests SP encounters can support standardized direct observation of residents' achievement of ACGME Milestones. Further effort can be made to create a tailored, behaviorally-anchored tool that uses the Milestones as the conceptual framework.

Multilevel Quality Improvement Teams: An Alternative Approach for Surgical Academic Training Programs to Meet ACGME Core Competency Milestones

Hajjar-Nejad MJ, Kubicki N, Morales D, Kavic SM. J Surg Educ. 2018 Nov 21. pii: S1931-7204(18) 30440-9. doi: 10.1016/j.jsurg.2018.10.006.

BACKGROUND:

Quality improvement (QI) activities are an integral part of residency training. We started the process to implement team-based, multilevel QI project streams within our academic surgical residency by studying resident perceptions.

OBJECTIVE:

Our residency carried out 6 QI projects in line with the American Council for Graduate Medical Education competencies. A resident survey was completed in 2016 to measure resident perceptions of an individual versus team-based QI project approach.

METHODS:

This was a descriptive study looking at resident's preference for team projects and ongoing projects within the training program. We started in 2014 utilizing Wait's Team Action Projects in surgery paradigm to conduct 6 QI projects. After initiation of projects, we allotted 2 full years to pass prior to assessing resident perceptions via a 12-item survey.

RESULTS:

Notably, this was a descriptive study aiming to capture resident perceptions on team-based QI and the foundational elements necessary to create and sustain such projects by integrating into our curriculum from the intern year. In 2016, 40 residents completed surveys (72.7% response rate), all (100%) opined that they preferred team-based approaches over individual ones, and 75% were on board to move forward with only a team-based approach in the future.

CONCLUSIONS:

This was a pivotal start to adopting a team-based QI project strategy in the future and laid a solid foundation to build upon. We found residents in our program desire to work within teams early on to develop effective solutions to clinical problems. Residents perceived that the team-based model resulted in an improved resident experience with the QI process and improved patient care. We hope to publish a series of articles updating our progress as we move forward in this endeavor.

Electronic Health Records as an Educational Tool: Viewpoint

Habboush Y, Hoyt R, Beidas S. JMIR Med Educ. 2018 Nov 12;4(2):e10306. doi: 10.2196/10306.

BACKGROUND:

Electronic health records (EHRs) have been adopted by most hospitals and medical offices in the United States. Because of the rapidity of implementation, health care providers have not been able to leverage the full potential of the EHR for enhancing clinical care, learning, and teaching. Physicians are spending an average of 49% of their working hours on EHR documentation, chart review, and other indirect tasks related to patient care, which translates into less face time with patients.

OBJECTIVE:

The purpose of this article is to provide a preliminary framework to guide the use of EHRs in teaching and evaluation of residents.

METHODS:

First we discuss EHR educational capabilities that have not been reviewed in sufficient detail in the literature and expand our discussion for each educational activity with examples. We emphasize quality improvement of clinical notes as a basic foundational skill using a spreadsheet-based application as an assessment tool. Next, we integrate the six Accreditation Council for Graduate Medical Education (ACGME) Core Competencies and Milestones (CCMs) framework with the Reporter-Interpreter-Manager-Educator (RIME) model to expand our assessments of other areas of resident performance related to EHR use. Finally, we discuss how clinical utility, clinical outcome, and clinical reasoning skills can be assessed in the EHR.

RESULTS:

We describe a pilot conceptual framework-CCM framework-to guide and demonstrate the use of the EHR for education in a clinical setting.

CONCLUSIONS:

As EHRs and other supporting technologies evolve, medical educators should continue to look for new opportunities within the EHR for education. Our framework is flexible to allow adaptation and use in most training programs. Future research should assess the validity of such methods on trainees' education.

Does Incorporating a Measure of Clinical Workload Improve Workplace-Based Assessment Scores? Insights for Measurement Precision and Longitudinal Score Growth from Ten Pediatrics Residency Programs

Park YS, Hicks PJ, Carraccio C, Margolis M, Schwartz A; PMAC Module 2 Study Group. Acad Med. 2018 Nov;93(11S Association of American Medical Colleges Learn Serve Lead: Proceedings of the 57th Annual Research in Medical Education Sessions):S21-S29. doi: 10.1097/ACM.0000000000002381.

PURPOSE:

This study investigates the impact of incorporating observer-reported workload into workplace-based assessment (WBA) scores on (1) psychometric characteristics of WBA scores and (2) measuring changes in performance over time using workload-unadjusted versus workload-adjusted scores.

METHOD:

Structured clinical observations and multisource feedback instruments were used to collect WBA data from first-year pediatrics residents at 10 residency programs between July 2016 and June 2017. Observers completed items in 8 subcompetencies associated with Pediatrics Milestones. Faculty and resident observers assessed workload using a sliding scale ranging from low to high; all item scores were rescaled to a 1-5 scale to facilitate analysis and interpretation. Workload-adjusted WBA scores were calculated at the item level using three different approaches, and aggregated for analysis at the competency level. Mixed-effects regression models were used to estimate variance components. Longitudinal growth curve analyses examined patterns of developmental score change over time.

RESULTS:

On average, participating residents (n = 252) were assessed 5.32 times (standard deviation = 3.79) by different raters during the data collection period. Adjusting for workload yielded better discrimination of learner performance, and higher reliability, reducing measurement error by 28%. Projections in reliability indicated needing up to twice the number of raters when workload-unadjusted scores were used. Longitudinal analysis showed an increase in scores over time, with significant interaction between workload and time; workload also increased significantly over time.

CONCLUSIONS:

Incorporating a measure of observer-reported workload could improve the measurement properties and the ability to interpret WBA scores.

2017 Program Director Survey: Feedback from your Adult Neurology Residency Leadership

London ZN, Khan J, Cahill C, Schuyler E, Wold J, Southerland AM. *Neurology*. 2018 Oct 9;91 (15): e1448-e1454. doi: 10.1212/WNL.0000000000006315. Epub 2018 Sep 7.

OBJECTIVE:

To survey adult neurology program directors (PDs) and inform the future development of neurology training programs.

METHODS:

All US adult neurology PDs were invited to complete the survey. The goals were to determine the demographic makeup of residency programs, characterize curricula, understand PD and program needs, and compare results to those of a similar survey in 2007.

RESULTS:

The response rate was 70.6%. PD demographics for age, faculty track status, and academic rank remain unchanged over the last decade. The proportion of female PDs and assistant PDs has increased significantly. The mean number of residents per training program has also increased significantly. Female PDs are more likely to have a junior academic rank than their male colleagues. Disparities remain between the PDs' time spent on teaching/program administration and salary support. Most PDs support moving fellowship applications later in the training cycle. The majority of PDs find the Clinical Competency Committee process useful in assessing resident competence. A minority of PDs feel that the Accreditation Council for Graduate Medical Education Milestones meet their intended purpose. Half of programs include a curriculum to supplement the clinical experience on child neurology rotations. A third of programs include a supplemental curriculum for psychiatry rotations. The majority of programs offer a general fund for residents to use to support their education.

CONCLUSION:

Deficiencies exist in compensation for PDs' teaching and administrative time and for academic promotion for female PDs. These results serve as a benchmark for comparison across programs and the basis to advocate for further improvements and support for neurology residency training.

Predictability of Clinical Knowledge Through Mobile App-based Simulation for the Treatment of Pediatric Septic Arthritis: A Pilot Study

Shore BJ, Miller PE, Noonan KJ, Bae DS. J Pediatr Orthop. 2018 Oct;38(9):e541-e545. doi: 10.1097/BPO.0000000000001228.

BACKGROUND:

Recently the American Board of Orthopaedic Surgery and the Accreditation Council of Graduate Medical Education have identified the treatment of septic arthritis of the hip in children as a milestone skill for all US orthopaedic residents. The purpose of this study was to test correlation between clinical knowledge and examination score on a mobile app-based training module for the treatment of pediatric septic hip arthritis.

METHODS:

A 4-part simulation model on surgical decision-making associated with the treatment of pediatric septic arthritis was developed through expert consensus. Orthopaedic trainees participating in the "Top Gun" program of the 2015 and 2016 International Pediatric Orthopaedic Symposiums were recruited to participate in this pilot study. Trainees completed a presimulation quiz on their knowledge of diagnosis, arthrocentesis, and surgical irrigation and debridement on a pediatric patient presenting with septic arthritis of the hip. Trainees then completed the 4-part simulation on the mobile app. Pearson correlation analysis was used to assess the relationship between the quiz and the simulation.

RESULTS:

A total of 53 orthopaedic residents and fellows participated in the simulation. Median quiz score was 87 points [interquartile range (IQR), 81 to 94] before the intervention and 100 points (IQR, 94 to 100) postintervention. The median simulation test score was 89 (IQR, 81 to 92) which demonstrated a positive correlation with the postintervention quiz ($r=0.44$, $P<0.001$). The preintervention metrics demonstrated a positive correlation with postintervention metrics ($r=0.53$, $P<0.001$).

CONCLUSIONS:

This study revealed a statistically significant positive correlation between the mobile app simulation and the clinical knowledge of the participants, as well as the ability to improve knowledge about a procedure during the testing period. These findings support the ability for the mobile app to test clinical knowledge. In the current environment of decreased work hours and patient exposure for orthopaedic trainees, mobile app-based simulation has the potential to safely aid in assessment of orthopaedic residents and fellows.

Timing of Milestone Competency Acquisition in Neurology Residency: What by When?

Jones LK Jr, Eggers SDZ, Capobianco DJ, Boes CJ. Neurology. 2018 Oct 16;91(16):748-754. doi: 10.1212/WNL.0000000000006361. Epub 2018 Sep 14.

OBJECTIVE:

To determine the stage of training at which neurology residents should achieve individual elements of the Accreditation Council for Graduate Medical Education neurology Milestones and to examine the relationship between perceived importance of Milestones and the stage by which they should be achieved.

METHODS:

A modified Delphi technique was used to establish consensus postgraduate year (PGY) expectations for neurology Milestone competencies across 3 geographically and administratively distinct Mayo Clinic neurology residency programs. Timing expectations were examined for relationships to perceived importance of the individual Milestones and effects of participant characteristics.

RESULTS:

PGY expectations for neurology Milestone elements ranged from PGY 1.3 to PGY 4.1. Extent of rater educational seniority had no effect on PGY competency expectations. There was a moderate inverse relationship between perceived importance of the Milestone element and the PGY by which it should be achieved ($r_s = -0.74$, $p < 0.0001$).

CONCLUSIONS AND RELEVANCE:

Expectations for neurology Milestone competency acquisition can be measured and may help inform individual program design, educational expectations, and future Milestone design.

Radiology Education in Medical School and Residency: The Views and Needs of Program Directors

Schiller PT, Phillips AW, Straus CM. Acad Radiol. 2018 Oct;25(10):1333-1343. doi: 10.1016/j.acra.2018.04.004. Epub 2018 May 7.

RATIONALE AND OBJECTIVES:

The authors of this study used the perspectives of residency program directors (PDs) nationally to explore whether trainees are adequately prepared to utilize and interpret medical imaging as interns, to identify the types of imaging skills most important for residency, and to begin to address current shortcomings in radiology education.

MATERIALS AND METHODS:

The authors created a survey using a modified version of Accreditation Council for Graduate Medical Education radiology milestones and sent it to 100 randomly selected PDs each in pediatrics, internal medicine, obstetrics and gynecology, and general surgery. The survey asked PDs to assess the actual and desired imaging skills of their incoming interns, the incoming interns' variability of skill level upon matriculation, and which imaging skills were most important from the PDs' perspective.

RESULTS:

PDs from all specialties identified a significant shortcoming relative to their expectations for both image interpretation and utilization skills. Additionally, PDs identified a significant variability in imaging skills, and described that variability as a hindrance to their programs. All of the potential imaging skills were rated as highly important with little clinically relevant difference between them.

DISCUSSION:

This multidisciplinary national survey found a deficiency in imaging education among interns across specialties and substantiates calls for formalized and improved radiology education in undergraduate medical education. Additionally, PDs had difficulty distinguishing which skills were most important, suggesting an unclear understanding of imaging ability needs for interns in respective specialties. More specific needs assessments are warranted on a national level.

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Communication Skills Training for Surgical Residents: Learning to Relate to the Needs of Older Adults

Roberts L, Cornell C, Bostrom M, Goldsmith S, Ologhobo T, Roberts T, Robbins L. J Surg Educ. 2018 Sep - Oct;75(5):1180-1187. doi: 10.1016/j.jsurg.2018.02.005. Epub 2018 Mar 31.

BACKGROUND:

It is vital for physicians and surgeons to communicate successfully with older adults, who will constitute one-fifth of the US population by 2030. Older adults often perceive themselves as stigmatized and powerless in healthcare settings. Effective communication leads to better patient compliance and satisfaction, which is now a component of Medicare hospital reimbursement and physician and surgeon compensation from hospitals and networks.

OBJECTIVE:

To increase orthopaedic surgery resident understanding of the unique needs of older adults in order to maintain effective and sensitive communication with this vulnerable population.

DESIGN:

A two-part training program (ongoing for 8 years) comprised of: 1) small-group interactive didactic sessions on aging issues; and 2) workshop demonstrations given by the residents to a group of older adults, followed by a Question & Answer session. Residents were assessed using a 22-item pre-post questionnaire covering medical knowledge of aging, attitudes toward older adults, and personal anxiety about aging. Older adult participants were surveyed for perceptions of residents' sensitivity toward them.

SETTING:

Hospital for Special Surgery in New York City, a specialized urban academic center, with a 5- year Orthopedic Surgery Residency program.

PARTICIPANTS:

70 PGY3 residents, for whom the program is a requirement, and 711 older adult participants recruited from a community convenience sample.

RESULTS:

Older adult participants: Of 711 participants, 672 (95%) responded; 96% strongly agreed/agreed that the residents had demonstrated sensitivity toward them. Residents: Of 70 residents, 35 (50%) were assessed. Mean knowledge scores increased significantly ($p \leq 0.001$); five of nine attitude items ($p \leq 0.05$) and one of four anxiety items improved significantly ($p \leq 0.001$).

CONCLUSIONS:

Significant change was seen in residents' attitudes and anxiety levels toward older adults, attributes that are usually deep seated and hard to change. Residents moved along the Accreditation Council for Graduate Medical Education Milestones continuum for three core competencies.

Radiology Resident Assessment and Feedback Dashboard

Durojaiye AB, Snyder E, Cohen M, Nagy P, Hong K, Johnson PT. Radiographics. 2018 Sep-Oct;38 (5): 1443-1453. doi: 10.1148/rg.2018170117. Epub 2018 Aug 10.

ABSTRACT:

Assessment of residents is optimally performed through processes and platforms that provide daily feedback, which can be immediately acted on. Given the documentation required by the Accreditation Council for Graduate Medical Education (ACGME), effective data management, integration, and presentation are crucial to ease the burden of manual documentation and increase the timeliness of actionable information. To this end, the authors modeled the learning activities of residents using the Experience Application Programming Interface (xAPI) framework, which is a standard framework for the learning community. On the basis of the xAPI framework and using open-source software to extend their existing infrastructure, the authors developed a Web-based dashboard that provides residents with a more holistic view of their educational experience. The dashboard was designed around the ACGME radiology milestones and provides real-time feedback to residents using various assessment metrics derived from multiple data sources. The purpose of this article is to describe the dashboard's architecture and components, the design and technical considerations, and the lessons learned in implementing the dashboard.

Pediatric Program Director Minimum Milestone Expectations before Allowing Supervision of Others and Unsupervised Practice

Li ST, Tancredi DJ, Schwartz A, Guillot A, Burke AE, Trimm RF, Guralnick S, Mahan JD, Gifford K. *Acad Pediatr*. 2018 Sep - Oct;18(7):828-836. doi: 10.1016/j.acap.2018.04.010. Epub 2018 Apr 25.

BACKGROUND:

The Accreditation Council for Graduate Medical Education requires semiannual Milestone reporting on all residents. Milestone expectations of performance are unknown.

OBJECTIVE:

Determine pediatric program director (PD) minimum Milestone expectations for residents prior to being ready to supervise and prior to being ready to graduate.

METHODS:

Mixed methods survey of pediatric PDs on their programs' Milestone expectations before residents are ready to supervise and before they are ready to graduate, and in what ways PDs use Milestones to make supervision and graduation decisions. If programs had no established Milestone expectations, PDs indicated expectations they considered for use in their program. Mean minimum Milestone level expectations adjusted for program size, region, and clustering of Milestone expectations by program were calculated for prior to supervise and prior to graduate. Free-text questions were analyzed using thematic analysis.

RESULTS:

The response rate was 56.8% (113/199). Most programs had no required minimum Milestone level before residents are ready to supervise (80%; 76/95) or ready to graduate (84%; 80/95). For readiness to supervise, minimum Milestone expectations PDs considered establishing for their program were highest for humanism (2.46, 95% CI: 2.21-2.71) and professionalization (2.37, 2.15-2.60). Minimum Milestone expectations for graduates were highest for help-seeking (3.14, 2.83-3.46). Main themes included the use of Milestones in combination with other information to assess learner performance and Milestones are not equally weighted when making advancement decisions.

CONCLUSIONS:

Most PDs have not established program minimum Milestones, but would vary such expectations by competency.

What Do Quantitative Ratings and Qualitative Comments Tell Us about General Surgery Residents' Progress toward Independent Practice? Evidence from a 5-Year Longitudinal Cohort

Tekian A, Borhani M, Tilton S, Abasolo E, Park YS. Am J Surg. 2018 Sep 29. pii: S0002-9610 (18) 30530-0. doi: 10.1016/j.amjsurg.2018.09.031.

BACKGROUND:

This study examines the alignment of quantitative and qualitative assessment data in end-of-rotation evaluations using longitudinal cohorts of residents progressing throughout the five-year general surgery residency.

METHODS:

Rotation evaluation data were extracted for 171 residents who trained between July 2011 and July 2016. Data included 6069 rotation evaluation forms completed by 38 faculty members and 164 peer-residents. Qualitative comments mapped to general surgery milestones were coded for positive/negative feedback and relevance.

RESULTS:

Quantitative evaluation scores were significantly correlated with positive/negative feedback, $r = 0.52$ and relevance, $r = -0.20$, $p < .001$. Themes included feedback on leadership, teaching contribution, medical knowledge, work ethic, patient-care, and ability to work in a team-based setting. Faculty comments focused on technical and clinical abilities; comments from peers focused on professionalism and interpersonal relationships.

CONCLUSIONS:

We found differences in themes emphasized as residents progressed. These findings underscore improving our understanding of how faculty synthesize assessment data.

Challenges in Measuring ACGME Competencies: Considerations for Milestones

Natesan P, Batley NJ, Bakhti R, El-Doueihi PZ. *Int J Emerg Med*. 2018 Sep 28;11(1):39. doi: 10.1186/s12245-018-0198-3.

BACKGROUND:

Measuring milestones, competencies, and sub-competencies as residents progress through a training program is an essential strategy in Accreditation Council for Graduate Medical Education (ACGME)'s attempts to ensure graduates meet expected professional standards.

Previous studies have found, however, that physicians make global ratings often by using a single criterion.

METHODS:

We use advanced statistical analysis to extend these studies by examining the validity of ACGME International competency measures for an international setting, across emergency medicine (EM) and neurology, and across evaluators. Confirmatory factor analysis (CFA) models were fitted to both EM and neurology data. A single-factor CFA was hypothesized to fit each dataset. This model was modified based on model fit indices. Differences in how different EM physicians perceived the core competencies were tested using a series of measurement invariance tests.

RESULTS:

Extremely high alpha reliability coefficients, factor coefficients ($> .93$), and item correlations indicated multicollinearity, that is, most items being evaluated could essentially replace the underlying construct itself. This was true for both EM and neurology data, as well as all six EM faculty.

CONCLUSIONS:

Evaluation forms measuring the six core ACGME competencies did not possess adequate validity. Severe multicollinearity exists for the six competencies in this study. ACGME is introducing milestones with 24 sub-competencies. Attempting to measure these as discrete elements, without recognizing the inherent weaknesses in the tools used will likely serve to exacerbate an already flawed strategy. Physicians likely use their "gut feelings" to judge a resident's overall performance. A better process could be conceived in which this subjectivity is acknowledged, contributing to more meaningful evaluation and feedback.

Meeting Milestones: Results of a Quality-Improvement Curriculum to Achieve Cost-Conscious Care

Chang O, Jordan J, Shah N, Mendiola M, Merport Modest A, Golen T. J Eur CME. 2018 Sep 25;7(1):1517572.

doi: 10.1080/21614083.2018.1517572. eCollection 2018.

ABSTRACT:

There is a lack of residency education in cost-conscious care. We implemented a costing and quality improvement (QI) curriculum to Obstetrics and Gynaecology trainees using "Time-Driven Activity-Based Costing (TDABC)," and assessed its educational impact. The curriculum included didactic and practical portions. Pre-and post-knowledge surveys were obtained from 24 residents on self-perceived knowledge of key QI principles. Self-perceived knowledge, before and after the curriculum, was scored on a Likert scale from 0 to 5 points (0 is the least knowledge and 5 is the most knowledge). The mean scores reported an increase in knowledge of clinical guideline development (pre = 1.19 vs. post = 3.07, $p = 0.0052$); confidence in participating in QI work (pre = 1.75 vs. post = 3.42 points, $p < 0.0001$); and knowledge in communicating QI principles (pre = 1.89, post = 3.17, $p < 0.0003$). Our educational programme uses the TDABC method and the residents' clinical experience effectively to teach residents cost-conscious care.

Advancing Simulation-Based Education in Pain Medicine

Singh N, Nielsen AA, Copenhaver DJ, Sheth SJ, Li CS, Fishman SM. Pain Med. 2018 Sep 1;19(9):1725-1736. doi: 10.1093/pm/pnx344.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) has recently implemented milestones and competencies as a framework for training fellows in Pain Medicine, but individual programs are left to create educational platforms and assessment tools that meet ACGME standards.

OBJECTIVES:

In this article, we discuss the concept of milestone-based competencies and the inherent challenges for implementation in pain medicine. We consider simulation-based education (SBE) as a potential tool for the field to meet ACGME goals through advancing novel learning opportunities, engaging in clinically relevant scenarios, and mastering technical and nontechnical skills.

RESULTS:

The sparse literature on SBE in pain medicine is highlighted, and we describe our pilot experience, which exemplifies a nascent effort that encountered early difficulties in implementing and refining an SBE program.

CONCLUSIONS:

The many complexities in offering a sophisticated simulated pain curriculum that is valid, reliable, feasible, and acceptable to learners and teachers may only be overcome with coordinated and collaborative efforts among pain medicine training programs and governing institutions.

Ten Commandments for Neonatal-Perinatal Medicine Fellows

Chabra S, Sawyer T. J Med Educ Curric Dev. 2018 Sep 19;5:2382120518798639. doi: 10.1177/2382120518798639. eCollection 2018 Jan-Dec.

ABSTRACT:

The transformation of a general pediatrician into a neonatologist requires rigorous training in a diverse range of core skills during neonatal-perinatal medicine fellowship. This training includes the care of high-risk newborn infants, as well as interdisciplinary communication with care team members and families in the neonatal intensive care unit. In addition, neonatal-perinatal medicine fellows need to acquire competency in key procedural skills, including neonatal resuscitation techniques, to be able to safely practice neonatology without direct supervision on graduation. Although there is much general advice available to help residents and fellows navigate training, there is little specific advice or guidance for neonatal fellows. In this *Perspective*, we present 10 commandments for neonatal fellows. The commandments include (1) cherish your patients and their families, (2) know your limits and seek help when needed, (3) understand competency-based medical education, (4) remember the 6 core competencies, (5) review your specialty milestones, (6) have an individualized learning plan, (7) seek out feedback, (8) honor your attendings and nurses, (9) appreciate the importance of teamwork, and (10) do not take thyself in vain. These commandments were developed based on the experience of the authors, working closely with neonatal fellows over several decades. The commandments are present not as unbreakable rules, but rather as words of advice from 2 neonatologists who, having completed their neonatal fellowship, want to help guide others do the same. We believe that this resource will be useful to fellowship programs and neonatal-perinatal fellows.

A Cross-Specialty Examination of Resident Error Disclosure and Communication Skills Using Simulation

Gardner AK, Lim G, Minard CG, Guffey D, Pillow MT. J Grad Med Educ. 2018 Aug;10(4):438- 441. doi: 10.4300/JGME-D-17-00603.1.

BACKGROUND:

Disclosure of medical errors is important to patients and physicians, but formal disclosure training during the graduate medical education curriculum is limited.

OBJECTIVE:

We examined resident competence related to error disclosure, using standardized patient (SP) ratings of resident communication skills.

METHODS:

All first-year residents from medicine, radiology, emergency medicine, orthopedic surgery, and neurological surgery completed a 20-minute simulated session in which they were provided background information on a medical error they had made and were asked to disclose the error to an SP acting as a family member. Residents were then debriefed and completed a post-scenario questionnaire. The SPs completed an 11-item communication assessment and 3 milestone rating tools on professionalism (PROF-1, PROF-3) and interpersonal and communication skills (ICS-1).

RESULTS:

Ninety-six residents from a single institution participated toward the end of the intern year. Communication assessment scores ranged from 23% to 100% (mean [SD], 80.6 [17.0]). Mean (SD) milestone ratings across specialties were 2.80 ± 0.92 for PROF-1, 2.48 ± 0.92 for PROF-3, and 2.45 ± 0.92 for ICS-1. One-way analysis of variance revealed no significant differences among specialties on milestone or communication ratings. Residents who accepted personal responsibility for the error (84.55 [14.06]) received significantly higher communication ratings from SPs compared with residents who did not (66.67 [19.52], $P < .001$).

CONCLUSIONS:

This SP assessment of error disclosure by first-year residents from multiple specialties was feasible and acceptable. It revealed areas of improvement as well as considerable variation in communication skills and professionalism among residents.

Analysis of Milestone-Based End-of-Rotation Evaluations for Ten Residents Completing a Three-Year Anesthesiology Residency

Chemtob CM, Tanaka P, Keil M, Macario A. *Cureus*. 2018 Aug 24;10(8):e3200. doi: 10.7759/cureus.3200.

INTRODUCTION:

Faculty are required to assess the development of residents using educational milestones. This descriptive study examined the end-of-rotation milestone-based evaluations of anesthesiology residents by rotation faculty directors. The goals were to measure: (1) how many of the 25 Accreditation Council for Graduate Medical Education (ACGME) anesthesiology subcompetency milestones were included in each of the residency's rotations evaluations, (2) the percentage of evaluations sent to the rotation director that were actually completed by the director, (3) the length of time between the end of the residents' rotations and completion of the evaluations, (4) the frequency of straight line scoring, defined as the resident receiving the same milestone level score for all subcompetencies on the evaluation, and (5) how often a resident received a score below a Level 4 in at least one subcompetency in the three months prior to graduating.

METHODS:

In 2013, the directors for each the 24 anesthesia rotations in the Stanford University School of Medicine Anesthesiology Residency Program created new milestone-based evaluations to be used at the end of rotations to evaluate residents. The directors selected the subcompetencies from the list released by the ACGME that were most appropriate for their rotation. End-of-rotation evaluations for the post graduate year (PGY)-2 to PGY-4 from July 1, 2014 to June 30, 2017 were retrospectively analyzed for a sample of 10 residents randomly selected from 22 residents in the graduating class.

RESULTS:

The mean number of subcompetencies evaluated by each of the 24 rotations in the residency equaled 17.88 (standard deviation (SD): 3.39, range 10-24, median 18.5) from the available possible total of 25 subcompetencies. Three subcompetencies (medical knowledge, communication with patients and families, and coordination of patient care within the healthcare system) were included in the evaluation instruments of all 24 rotations. The three least frequently listed subcompetencies were: "acute, chronic, and cancer-related pain consultation/management" (25% of rotations had this on the end-of-rotation evaluation), "triage and management of critically ill patient in non-operative setting" (33%), and "education of patient, families, students, residents, and others" (38%). Overall, 418 end of rotation evaluations were issued and 341 (82%) completed, with 63% completed within one month, 22% between month one and two, and 15% after two months. The frequency of straight line scoring varied, from never occurring (0%) in three rotations to always occurring (100%) in two rotations, with an overall average of 51% (SD: 33%). Sixty-one percent of straight line scoring corresponded to the residents' postgraduate year whereby, for example, a post-graduate year two resident received an ACGME Level 2 proficiency for all subcompetencies. Thirty-one percent of the straight line scoring was higher than the resident's year of training (e.g., a PGY-2 received Level 3 or higher for all the subcompetencies). The remaining 7% of straight line scoring was below the expected level for the year of training. Three of seven residents had at least one subcompetency rated as below a Level 4 on one of the evaluations during the three months prior to finishing residency.

CONCLUSION:

Formal analysis of a residency program's end-of-rotation milestone evaluations may uncover opportunities to improve competency-based evaluations.

A Survey on Recent Medical School Graduate Comfort with the Level 1 Milestones

Petravick ME, Marsh JL, Karam MD, Dirschl DR. J Surg Educ. 2018 Jul - Aug;75(4):911-917. doi: 10.1016/j.jsurg.2017.10.004. Epub 2017 Nov 7.

OBJECTIVE:

The Next Accreditation System implemented 5 levels of milestones for orthopedic surgery residents in 2013. The Level 1 milestones were noted as those "expected of an incoming resident." While the milestones were intended for assessing resident progression and readiness for independent practice, this designation can also be used to assess how well prepared graduating medical students are for beginning an orthopedic surgery residency. The primary objective of this paper is to measure recent medical school graduate comfort with the Level 1 milestones.

DESIGN, SETTING, AND PARTICIPANTS:

In June 2015, the program directors for the Midwest Orthopaedic Surgical Skills (MOSS) Consortium affiliated residency programs were sent an online survey for distribution to the recent medical school graduates who matched at their respective programs. The survey was about recent graduate comfort with the Level 1 milestone handles associated with 16 orthopedic milestones spanning multiple subspecialties. Responses were grouped based on comfort with individual milestone handles with orthopedic conditions (e.g., carpal tunnel) or with broader categories spanning orthopedic milestones (e.g., imaging).

RESULTS:

In all, 66 of 112 graduates (58.9%) responded. Of 60 milestone handles surveyed, respondents were "Comfortable" with an average of 31.6 ± 14.2 handles with some conditions performing much better than others. The median "Comfortable" response rate was 31 handles. The 8 broader categories had "Comfortable" response rates between 35% and 70%. All 8 orthopedic conditions had significantly higher "Comfortable" response rates for "Evaluation & Knowledge" handles than for "Decision Making & Treatment" handles.

CONCLUSIONS:

Most recent medical student graduates who matched into an orthopedic surgery residencies are only comfortable with about half of the Level 1 milestone handles even though they are expected to meet the Level 1 milestones upon beginning residency. This finding suggests the development of an assessment based on the Level 1 milestones would be appropriate to better inform both graduate and undergraduate medical education in orthopedic surgery.

Long-Term Retention of Musculoskeletal Ultrasound Training during Residency

Irwin RW, Smith J, Issenberg SB. Am J Phys Med Rehabil. 2018 Jul;97(7):523-530. doi: 10.1097/PHM.0000000000000924.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Physical Medicine and Rehabilitation (ABPMR) developed milestones for evaluation of resident physicians that include proper musculoskeletal ultrasound (MSUS) examination of major joints. To date, there have been no published data demonstrating acquisition and retention of these skills and correlation with the milestone evaluation. The investigators developed and implemented a curriculum in musculoskeletal ultrasound examination for Physical Medicine and Rehabilitation (PM&R) residents at a large academic medical center. The investigators chose six joints for training and evaluation: ankle, elbow, hip, knee, shoulder and wrist/hand. The program included: 1) didactic lectures on anatomy and ultrasound technique; 2) peer-led demonstrations of the procedure on a standardized patient (SP); 3) individual practice on SPs; 4) faculty observation and feedback; 5) review sessions and additional practice; and, 6) assessment of skills in an objective structured clinical examination (OSCE). From 2013-2017, 30 PM&R residents were trained and evaluated. The results, based on OSCE scores, showed that the majority of residents achieved the appropriate level of competency for their year. A blended, standardized curriculum in MSUS instruction with assessment by an OSCE, can be used to evaluate MSUS skills, and can help align this education with residency milestones.

Top Medical Education Studies of 2016: A Narrative Review

Fromme HB, Ryan MS, Darden A, D'Alessandro DM, Mogilner L, Paik S, Turner TL. Acad Pediatr. 2018 Jul; 18(5):485-492. doi: 10.1016/j.acap.2018.01.015. Epub 2018 Feb 6.

ABSTRACT:

Education, like clinical medicine, should be based on the most current evidence in the field. Unfortunately, medical educators can be overwhelmed by the sheer volume and range of resources for this literature. This article provides an overview of 15 articles from 2016 that the authors consider the top articles in the field of pediatric medical education. The 7 authors, all medical educators with combined leadership and expertise across the continuum of pediatric medical education, used an iterative 3-stage process to review more than 6339 abstracts published in 2016. This process was designed to identify a small subset of articles that were most relevant to educational practices and most applicable to pediatric medical education. In the first 2 stages, pairs of authors independently reviewed and scored abstracts in 13 medical education-related journals and reached consensus to identify the articles that best met these criteria. In the final stage, all articles were discussed using a group consensus model to select the final articles included in this review. This article presents summaries of the 15 articles that were selected. The results revealed a cluster of studies related to observed standardized clinical encounters, self-assessment, professionalism, clinical teaching, competencies/milestones, and graduate medical education management strategies. We provide suggestions on how medical educators can apply the findings to their own practice and educational settings. This narrative review offers a useful tool for educators interested in keeping informed about the most relevant and valuable information in the field.

Simple Frameworks for Daily Work: Innovative Strategies to Coach Residents Struggling with Time Management, Organization, and Efficiency

DeKosky AS, Sedrak MS, Goren E, Dine CJ, Warburton KM. J Grad Med Educ. 2018 Jun;10(3): 325-330. doi: 10.4300/JGME-D-17-00756.1.

BACKGROUND:

Organization and efficiency are central to success on busy inpatient services and may be relevant to demonstrating certain milestones. Most residents adopt these skills by observing supervisors and peers. For some, this method of emulation and adaptation does not occur, with the potential for a negative effect on patient care and team morale. Information on effective strategies for remediating organization and efficiency deficits is lacking.

OBJECTIVE:

We explored the major themes of organization and efficiency referred to the University of Pennsylvania Department of Medicine Early Intervention and Remediation Committee (EIRC), and developed tools for their remediation.

METHODS:

Assessments of residents and fellows referred to the EIRC between July 2014 and October 2016 were reviewed for organization and efficiency deficits. Common areas were identified, and an iterative process of learner observations and expert input was used to develop remediation tools.

RESULTS:

Over a 2-year period, the EIRC developed remediation plans for 4% of residents (13 of 342 total residents), and for 1 internal medicine subspecialty fellow. Organization and efficiency was the primary or secondary deficit in more than half of those assessed. Most common deficiencies involved admitting a patient efficiently, performing effective prerounding, and composing daily progress notes/presentations. Remediation tools that provided deconstruction of tasks to their most granular and reproducible components were effective in improving performance.

CONCLUSIONS:

Deficits in organization and efficiency can disproportionately affect resident performance and delay milestone achievement. Many residents would benefit from detailed frameworks and assistance with new approaches to basic elements of daily work.

An Analysis of Residents' Self-Evaluation and Faculty-Evaluation in Internal Medicine Standardized Residency Training Program Using Milestones Evaluation System

Zhang Y, Chu XT, Zeng XJ, Li H, Zhang FC, Zhang SY, Shen T. Zhonghua Nei Ke Za Zhi. 2018 Jun 1;57(6):440-445. doi: 10.3760/cma.j.issn.0578-1426.2018.06.009.

OBJECTIVE:

To assess the value of internal medicine residency training program at Peking Union Medical College Hospital (PUMCH), and the feasibility of applying revised Milestones evaluation system.

METHODS:

Postgraduate-year-one to four (PGY-1 to PGY-4) residents in PUMCH finished the revised Milestones evaluation scales in September 2017. Residents' self-evaluation and faculty- evaluation scores were calculated. Statistical analysis was conducted on the data.

RESULTS:

A total of 207 residents were enrolled in this cross-sectional study. Both self and faculty scores showed an increasing trend in senior residents. PGY-1 residents were assessed during their first month of residency with scores of 4 points or higher, suggesting that residents have a high starting level. More strikingly, the mean score in PGY-4 was 7 points or higher, proving the career development of residency training program. There was no statistically significant difference between total self- and faculty-evaluation scores. Evaluation scores of learning ability and communication ability were lower in faculty group ($t=-2.627, -4.279$, all $P<0.05$). The scores in graduate students were lower than those in standardized training residents.

CONCLUSIONS:

The goal of national standardized residency training is to improve the quality of healthcare and residents' career development. The evaluation results would guide curriculum design and emphasize the importance and necessity of multi-level teaching. Self-evaluation contributes to the understanding of training objectives and personal cognition.

Use of a Clinical Pathologic Conference to Demonstrate Residents' ACGME Emergency Medicine Milestones, Aid in Faculty Development, and Increase Academic Output

Kane K, Weaver K, Barr G, Quinn S, Goyke T, Smith A, Yenser D, Kane B. J Am Osteopath Assoc. 2018 Jun 1;118(6):410-415. doi: 10.7556/jaoa.2018.085.

ABSTRACT:

The Emergency Medicine Milestones Project, developed by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Emergency Medicine, includes competence targets for residents to attain and, ultimately, to exceed American Osteopathic Association and ACGME expectations for residents. The authors sought to use the clinical pathologic conference (CPC) format in their institutions' Emergency Medicine Milestones Project to provide measurable residency academic and faculty development outcomes. The CPC is an event in which a resident presents an unknown case to a discussant in advance of a didactic session to demonstrate an organized approach and decision-making rationale to a differential diagnosis. Feedback forms included the assessment of resident discussants from the perspective of level-5 Milestone achievements in particular. Developing an internal CPC competition with a dedicated core faculty coordinator who provides skill development for both resident and faculty presentation has proven successful. Such a competition can document the level-5 achievements for senior residents, be a source of faculty development, and increase peer-reviewed academic output.

Comprehensive Health Care Economics Curriculum and Training in Radiology Residency

Keiper M, Donovan T, DeVries M. J Am Coll Radiol. 2018 Jun;15(6):900-904. doi: 10.1016/j.jacr.2018.02.022. Epub 2018 May 2.

PURPOSE:

To investigate the ability to successfully develop and institute a comprehensive health care economics skills curriculum in radiology residency training utilizing didactic lectures, case scenario exercises, and residency mini retreats.

METHODS:

A comprehensive health care economics skills curriculum was developed to significantly expand upon the basic ACGME radiology residency milestone System-Based Practice, SBP2: Health Care Economics requirements and include additional education in business and contract negotiation, radiology sales and marketing, and governmental and private payers' influence in the practice of radiology.

RESULTS:

A health care economics curriculum for radiology residents incorporating three phases of education was developed and implemented. Phase 1 of the curriculum constituted basic education through didactic lectures covering System-Based Practice, SBP2: Health Care Economics requirements. Phase 2 constituted further, more advanced didactic lectures on radiology sales and marketing techniques as well as government and private insurers' role in the business of radiology. Phase 3 applied knowledge attained from the initial two phases to real-life case scenario exercises and radiology department business miniretreats with the remainder of the radiology department.

CONCLUSION:

A health care economics skills curriculum in radiology residency is attainable and essential in the education of future radiology residents in the ever-changing climate of health care economics. Institution of more comprehensive programs will likely maximize the long-term success of radiology as a specialty by identifying and educating future leaders in the field of radiology.

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What Every Graduating Resident Needs to Know About Quality Improvement and Patient Safety: A Content Analysis of 26 Sets of ACGME Milestones

Lane-Fall M, Davis JJ, Clapp J, Myers JS, Riesenber LA. Acad Med. 2018 Jun;93(6):904-910. doi: 10.1097/ACM.0000000000002039.

PURPOSE:

Quality improvement (QI) and patient safety (PS) are broadly relevant to the practice of medicine, but specialty-specific milestones demonstrate variable expectations for trainee competency in QI/PS. The purpose of this study was to develop a unifying portrait of QI/ PS expectations for graduating residents irrespective of specialty.

METHOD:

Milestones from 26 residency programs representing the 24 member boards of the American Board of Medical specialties were downloaded from the Accreditation Council for Graduate Medical Education (ACGME) website in 2015. A codebook was generated by in-depth reading of all milestone sets by two authors. Using a content analytic approach, milestones were then coded by a single author, with a 10% sample double-coded by another author. Descriptive statistics were used to characterize frequency counts.

RESULTS:

Of 612 total milestones, 249 (40.7%) made mention of QI/PS. A median 10 milestones per specialty (interquartile range, 5.25-11.75) mentioned QI/PS. There were 446 individual references to QI, 423 references to PS, and another 1,065 references to QI/PS-related concepts, including patient-centered care, cost-effective practice, documentation, equity, handoffs and care transitions, and teamwork. QI/PS references reflected expectations about both individual-level practice (531/869, 61.1%) and practice within a healthcare system (338/869, 38.9%). QI and PS references were linked to all six ACGME core competencies.

CONCLUSIONS:

Although there is variability in the emphasis placed on QI/PS across specialties, overall, QI/PS is reflected in more than 40% of residency milestones. Graduating residents in all specialties are expected to demonstrate competence in QI, PS, and multiple related concepts.

Evaluating Surgical Residents' Patient-Centered Communication Skills: Practical Alternatives to the "Apprenticeship Model"

Newcomb A, Trickey AW, Lita E, Dort J. *J Surg Educ*. 2018 May - Jun;75(3):613-621. doi: 10.1016/j.j Surg.2017.09.011. Epub 2017 Oct 7.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) requires residency programs to assess communication skills and provide feedback to residents. We aimed to develop a feasible data collection process that generates objective clinical performance information to guide training activities, inform ACGME milestone evaluations, and validate assessment instruments.

DESIGN:

Residents care for patients in the surgical clinic and in the hospital, and participate in a communication curriculum providing practice with standardized patients (SPs). We measured perception of resident communication using the 14-item Communication Assessment Tool (CAT), collecting data from patients at the surgery clinic and surgical wards in the hospital, and from SP encounters during simulated training scenarios. We developed a handout of CAT example behaviors to guide patients completing the communication assessment.

SETTING:

Independent academic medical center.

PARTICIPANTS:

General surgery residents.

RESULTS:

The primary outcome is the percentage of total items patients rated "excellent;" we collected data on 24 of 25 residents. Outpatient evaluations resulted in significantly higher scores (mean 84.5% vs. 68.6%, $p < 0.001$), and female patients provided nearly statistically significantly higher ratings (mean 85.2% vs. 76.7%, $p = 0.084$). In multivariate analysis, after controlling for patient gender, visit reason, and race, (1) residents' CAT scores from SPs in simulation were independently associated with communication assessments in their concurrent patient population ($p = 0.017$), and (2) receiving CAT example instructions was associated with a lower percentage of excellent ratings by 9.3% ($p = 0.047$).

CONCLUSIONS:

Our data collection process provides a model for obtaining meaningful information about resident communication proficiency. CAT evaluations of surgical residents by the inpatient population had not previously been described in the literature; our results provide important insight into relationships between the evaluations provided by inpatients, clinic patients, and SPs in simulation. Our example behaviors guide shows promise for addressing a common concern, minimizing ceiling effects when measuring physician-patient communication.

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The Accreditation Council for Graduate Medical Education (ACGME) requires residency programs to assess communication skills and provide feedback to residents. We aimed to develop a feasible data collection process that generates objective clinical performance information to guide training activities, inform ACGME milestone evaluations, and validate assessment instruments.

DESIGN:

Residents care for patients in the surgical clinic and in the hospital, and participate in a communication curriculum providing practice with standardized patients (SPs). We measured perception of resident communication using the 14-item Communication Assessment Tool (CAT), collecting data from patients at the surgery clinic and surgical wards in the hospital, and from SP encounters during simulated training scenarios. We developed a handout of CAT example behaviors to guide patients completing the communication assessment.

SETTING: Independent academic medical center.

PARTICIPANTS: General surgery residents.

RESULTS:

The primary outcome is the percentage of total items patients rated "excellent;" we collected data on 24 of 25 residents. Outpatient evaluations resulted in significantly higher scores (mean 84.5% vs. 68.6%, $p < 0.001$), and female patients provided nearly statistically significantly higher ratings (mean 85.2% vs. 76.7%, $p = 0.084$). In multivariate analysis, after controlling for patient gender, visit reason, and race, (1) residents' CAT scores from SPs in simulation were independently associated with communication assessments in their concurrent patient population ($p = 0.017$), and (2) receiving CAT example instructions was associated with a lower percentage of excellent ratings by 9.3% ($p = 0.047$).

CONCLUSIONS:

Our data collection process provides a model for obtaining meaningful information about resident communication proficiency. CAT evaluations of surgical residents by the inpatient population had not previously been described in the literature; our results provide important insight into relationships between the evaluations provided by inpatients, clinic patients, and SPs in simulation. Our example behaviors guide shows promise for addressing a common concern, minimizing ceiling effects when measuring physician-patient communication.

Teaching and Assessing Professionalism in Radiology: Resources and Scholarly Opportunities to Contribute to Required Expectations

Kelly AM, Mullan PB. *Acad Radiol.* 2018 May;25(5):599-609. doi: 10.1016/j.acra.2018.01.008. Epub 2018 Mar 1.

ABSTRACT:

Teaching and assessing trainees' professionalism now represents an explicit expectation for Accreditation Council Graduate Medical Education-accredited radiology programs. Challenges to meeting this expectation include variability in defining the construct of professionalism; limits of traditional teaching and assessment methods, used for competencies historically more prominent in medical education, for professionalism; and emerging expectations for credible and feasible professionalism teaching and assessment practices in the current context of health care training and practice. This article identifies promising teaching resources and methods that can be used strategically to augment traditional teaching of the cognitive basis for professionalism, including role modeling, case-based scenarios, debriefing, simulations, narrative medicine (storytelling), guided discussions, peer-assisted learning, and reflective practice. This article also summarizes assessment practices intended to promote learning, as well as to inform how and when to assess trainees as their professional identities develop over time, settings, and autonomous practice, particularly in terms of measurable behaviors. This includes assessment tools (including mini observations, critical incident reports, and appreciative inquiry) for authentic assessment in the workplace; engaging multiple sources (self-peer, other health professionals, and patients) in assessment; and intentional practices for trainees to take responsibility for seeking our actionable feedback and reflection. This article examines the emerging evidence of the feasibility and value added of assessment of medical competency milestones, including professionalism, coordinated by the Accreditation Council Graduate Medical Education in radiology and other medical specialties. Radiology has a strategic opportunity to contribute to scholarship and inform policies in professionalism teaching and assessment practices.

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Resident and Program Director's Perceptions of Milestone-Based Feedback in Obstetrics and Gynecology

Hariton E, Bortoletto P, Barnes KL, Kaimal AJ, Stagg AR. J Med Educ Curric Dev. 2018 May 20;5:2382120518774794. doi: 10.1177/2382120518774794. eCollection 2018 Jan-Dec.

INTRODUCTION:

In July 2014, US residency programs fully implemented the Next Accreditation System including the use of milestone evaluation and reporting. Currently, there has been little investigation into the result of implementation of this new system. Therefore, this study sought to evaluate perceptions of Obstetrics and Gynecology residents and program directors regarding the use of milestone-based feedback and identify areas of deficiency.

METHODS:

A Web-based survey was sent to US-based Obstetrics and Gynecology residents and program directors regarding milestone-based assessment implementation.

RESULTS:

Out of 245 program directors, 84 responded to our survey (34.3% response rate). Of responding program directors, most reported that milestone-based feedback was useful (74.7%), fair (83.0%), and accurate (76.5%); however, they found it administratively burdensome (78.1%). Residents felt that milestone-based feedback was useful (62.7%) and fair (70.0%). About 64.3% of residents and 74.7% of program directors stated that milestone-based feedback is an effective tool to track resident progression; however, a sizable minority of both groups believe that it does not capture surgical aptitude. Qualitative analysis of free response comments was largely negative and highlighted the administrative burden and lack of accuracy of milestone-based feedback.

CONCLUSION:

Overall, both Obstetrics and Gynecology program directors and residents report that milestone-based feedback is useful and fair. Issues of administrative burden, timeliness, evaluation of surgical aptitude, and ability to act on assigned milestone levels were identified. Although this study is limited to one specialty, such issues are likely important to all residents, faculty, and program directors who have implemented the Next Accreditation System requirements.

The American Society of Hematology and ASCO Curricular Milestones for Assessment of Fellows in Hematology/Oncology: Development, Reflection, and Next Steps

Collichio F, Muchmore EA. Am Soc Clin Oncol Educ Book. 2018 May 23;(38):887-893. doi: 10.1200/EDBK_201773.

ABSTRACT:

The American Society of Hematology (ASH)/ASCO Curricular Milestones is a tool for assessment and teaching for fellows in hematology/oncology. The expectations of the Next Accreditation System of the Accreditation Council of Graduate Medical Education (ACGME) was developed over years from the creation of the six core competencies in 1999 to the current data-driven outcomes-based system. The current internal medicine subspecialty milestones (ACGME reporting milestones) follow the general rubric of the general internal medicine milestones. The ASH/ASCO curricular milestones were developed from the foundational elements of the specialty, and they are interwoven with the ACGME reporting milestones. The 2017 ACGME Milestones Report shows that the milestones display progression in performance through clear anchors. Educational outcomes are available in many specialties. The internal medicine subspecialties have been given the opportunity to update the ACGME reporting milestones. The ACGME has acknowledged that these milestones may be different for each of the specialties. The program committees of ASH and ASCO agree that revision of the ACGME reporting milestones would decrease the overlap of domains, lack of clarity, and negative language that is present in version 1.0. ASH and ASCO are working with the ACGME and American Board of Internal Medicine (ABIM) to develop Curricular Milestones, version 2.0.

Introducing a Curriculum in Ethics and Professionalism for Dermatology Residencies

Stoff BK, Grant-Kels JM, Brodell RT, Paller AS, Perlis CS, Mostow E, Pariser D, Bercovitch L. J Am Acad Dermatol. 2018 May;78(5):1032-1034. doi: 10.1016/j.jaad.2017.04.1121.

ABSTRACT:

There is general agreement on what constitutes ethical reasoning and professional behavior, but standardized methods to teach these skills in dermatology residency are currently unavailable. We introduce a model curriculum designed to impart the knowledge and skills to meet the Accreditation Council for Graduate Medical Education Dermatology Milestones for Professionalism over a 3-year cycle.

Shadowing Emergency Medicine Residents by Medical Education Specialists to Provide Feedback on Non-Medical Knowledge-Based ACGME Sub-Competencies

Waterbrook AL, Spear Ellinwood KC, Pritchard TG, Bertels K, Johnson AC, Min A, Stoneking LR. *Adv Med Educ Pract.* 2018 May 4;9:307-315. doi: 10.2147/AMEP.S151216. eCollection 2018.

OBJECTIVE:

Non-medical knowledge-based sub-competencies (multitasking, professionalism, accountability, patient-centered communication, and team management) are challenging for a supervising emergency medicine (EM) physician to evaluate in real-time on shift while also managing a busy emergency department (ED). This study examines residents' perceptions of having a medical education specialist shadow and evaluate their nonmedical knowledge skills.

METHODS:

Medical education specialists shadowed postgraduate year 1 and postgraduate year 2 EM residents during an ED shift once per academic year. In an attempt to increase meaningful feedback to the residents, these specialists evaluated resident performance in selected non- medical knowledge-based Accreditation Council of Graduate Medical Education (ACGME) sub- competencies and provided residents with direct, real-time feedback, followed by a written evaluation sent via email. Evaluations provided specific references to examples of behaviors observed during the shift and connected these back to ACGME competencies and milestones.

RESULTS:

Twelve residents participated in this shadow experience (six post graduate year 1 and six postgraduate year 2). Two residents emailed the medical education specialists ahead of the scheduled shadow shift requesting specific feedback. When queried, five residents voluntarily requested their feedback to be included in their formal biannual review. Residents received milestone scores and narrative feedback on the non-medical knowledge-based ACGME sub- competencies and indicated the shadow experience and subsequent feedback were valuable.

CONCLUSION:

Medical education specialists who observe residents over the course of an entire shift and evaluate non-medical knowledge-based skills are perceived by EM residents to provide meaningful feedback and add valuable information for the biannual review process.

The American Society of Hematology and ASCO Curricular Milestones for Assessment of Fellows in Hematology/Oncology: Development, Reflection, and Next Steps

Collichio F, Muchmore EA. Am Soc Clin Oncol Educ Book. 2018 May 23;(38):887-893. doi: 10.1200/EDBK_201773.

ABSTRACT:

The American Society of Hematology (ASH)/ASCO Curricular Milestones is a tool for assessment and teaching for fellows in hematology/oncology. The expectations of the Next Accreditation System of the Accreditation Council of Graduate Medical Education (ACGME) was developed over years from the creation of the six core competencies in 1999 to the current data-driven outcomes-based system. The current internal medicine subspecialty milestones (ACGME reporting milestones) follow the general rubric of the general internal medicine milestones. The ASH/ASCO curricular milestones were developed from the foundational elements of the specialty, and they are interwoven with the ACGME reporting milestones. The 2017 ACGME Milestones Report shows that the milestones display progression in performance through clear anchors. Educational outcomes are available in many specialties. The internal medicine subspecialties have been given the opportunity to update the ACGME reporting milestones. The ACGME has acknowledged that these milestones may be different for each of the specialties. The program committees of ASH and ASCO agree that revision of the ACGME reporting milestones would decrease the overlap of domains, lack of clarity, and negative language that is present in version 1.0. ASH and ASCO are working with the ACGME and American Board of Internal Medicine (ABIM) to develop Curricular Milestones, version 2.0.

Results from the Field: Development and Evaluation of a Psychiatry Residency Training Rotation in Cognitive-Behavioral Therapies

Kamholz BW, Lawrence AE, Liverant GI, Black SK, Hill JM. *Acad Psychiatry*. 2018 Apr;42(2):228-232. doi: 10.1007/s40596-017-0720-6. Epub 2017 Jun 6.

OBJECTIVE:

The goal of this project was to develop and evaluate a new residency training rotation focused on cognitive-behavioral therapies (CBT) and to assess outcomes across multiple domains.

METHODS:

Data are presented from 30 psychiatry residents. Primary learning-related outcomes included content knowledge, self-efficacy, and attitudes and behavioral intentions towards evidence-based psychotherapies (e.g., CBT).

RESULTS:

Residents reported significant increases in CBT knowledge, CBT-specific self-efficacy, overall psychotherapy self-efficacy, belief in patient benefit from CBT, and behavioral intention to use CBT. However, there were almost no changes in attitudes towards evidence-based practice more broadly, with one significant finding showing an increase in skepticism towards such practices.

CONCLUSIONS:

This empirically based example of training program development, implementation, and evaluation appears largely successful and represents one approach for addressing the CBT competency goals outlined by the Accreditation Council for Graduate Medical Education (ACGME) and Milestone Project Guidelines. Despite these initial, positive findings, conclusions should be tempered by limitations of the project design (e.g., the lack of comparison group, absence of objective measures of resident behavioral change, or assessment of the effect of such changes on patient outcomes). Findings highlight the need for continued development and evaluation of training methods in CBT for residency programs.

Education Research: The Current State of Neurophysiology Education in Selected Neurology Residency Programs

Daniello KM, Weber DJ. *Neurology*. 2018 Apr 10;90(15):708-711. doi: 10.1212/WNL.0000000000005296.

OBJECTIVE:

Prior research has illustrated there is a knowledge gap in neurology residents' neurophysiology education (EEG and EMG), and we sought to understand whether this is still an issue and to recognize the barriers in order to create solutions and improve education.

METHODS:

Surveys were developed for adult neurology residents and one for program directors asking about confidence in neurophysiology knowledge, percent of graduates reaching level 4 ACGME (American Council of Graduate Medical Education) milestones in EEG and EMG, methods of learning used, interest in the subjects, and suggestions for improvements.

RESULTS:

Twenty-six program directors (19% responder rate) and 55 residents (from at least 16 different programs) completed the survey. Program directors thought that 85% of graduating residents met level 4 milestones in EEG and only 75% in EMG. Structured rotations and more time allocated to education of these topics were frequent barriers mentioned. Postgraduate year 4 residents were 60% and 67% confident in EEG and 64%, 59%, and 62.3% in EMG level 4 milestones. Learning to read EEGs was considered important throughout residents' training; however, this interest and value decreased over time with EMG.

CONCLUSION:

In our study, program directors suspect up to a quarter of residents may graduate not meeting level 4 ACGME milestones, and residents expressed lack of confidence in these areas. The educational methods used to instruct residents in EEG and EMG were similar as were the barriers they face across programs. This information hopefully will help fuel curriculum design and interest in these important neurology techniques.

Interim Analysis of a Prospective Multi-Institutional Study of Surgery Resident Experience with Flexibility in Surgical Training

Cullinan DR, Wise PE, Delman KA, Potts JR, Awad MM, Eberlein TJ, Klingensmith ME. J Am Coll Surg. 2018 Apr;226(4):425-431. doi: 10.1016/j.jamcollsurg.2017.12.024. Epub 2018 Jan 5.

BACKGROUND:

The Flexibility in Surgical Training (FIST) consortium project was designed to evaluate the feasibility and resident outcomes of optional subspecialty-focused training within general surgery residency training.

STUDY DESIGN:

After approval by the American Board of Surgery, R4 and R5 residents were permitted to customize up to 12 of the final 24 months of residency for early tracking into 1 of 9 subspecialty tracks. A prospective IRB-approved study was designed across 7 institutions to evaluate the impact of this option on operative experience, in-service exam (American Board of Surgery In-Training Examination [ABSITE]) and ACGME milestone performance, and resident and program director (PD) perceptions. The FIST residents were compared with chief residents before FIST initiation (controls) as well as residents during the study period who did not participate in FIST (no specialization track, NonS).

RESULTS:

From 2013 to 2017, 122 of 214 chief residents (57%) completed a FIST subspecialty track. There were no differences in median ABSITE scores between FIST, NonS residents, and controls. The ACGME milestones at the end of the R5 year favored the FIST residents in 13 of 16 milestones compared with NonS. Case logs demonstrated an increase in track-specific cases compared with NonS residents. Resident and PD surveys reported a generally favorable experience with FIST.

CONCLUSIONS:

In this prospective study, FIST is a feasible option in participating institutions. All FIST residents, regardless of track, met requirements for ABS Board eligibility, despite modifications to rotations and case experience. Future studies will assess the impact of FIST on ABS exam results and fellowship success.

General Surgery Education across Three Continents

McIlhenny C, Kurashima Y, Chan C, Hirano S, Domínguez-Rosado I, Stefanidis D. *Am J Surg.* 2018 Feb;215(2):209-213. doi: 10.1016/j.amjsurg.2017.12.002. Epub 2017 Dec 5.

ABSTRACT:

Surgical education has seen tremendous changes in the US over the past decade. The Halstedian training model of see one, do one, teach one that governed surgical training for almost 100 years has been replaced by the achievement of the ACGME competencies, milestones, entrustable professional activities (EPAs), and acquisition of surgical skill outside the operating room on simulators. Several of these changes in American medical education have been influenced by educators and training paradigms abroad. In this paper, we review the training paradigms for surgeons in the UK, Japan, and Mexico to allow comparisons with the US training paradigm and promote the exchange of ideas.

Mapping the Balint Groups to the Accreditation Council for Graduate Medical Education Family Medicine Competencies

Lichtenstein A, Antoun J, Rule C, Knowlton K, Sternlieb J. *Int J Psychiatry Med.* 2018 Jan- Mar;53(1-2):47-58. doi: 10.1177/0091217417745294. Epub 2017 Dec 13.

ABSTRACT:

Introduction Balint group discussions provide learning opportunities for many of the competencies and milestones put forward by the Accreditation Council for Graduate Medical Education. The current literature is mixed concerning the effect of Balint groups on communication skills and professionalism. Aim To map the content of the Balint discussion to the competencies and milestones put forward by the Accreditation Council for Graduate Medical Education.

METHODOLOGY:

A group who were both experts in Balint and members of the clinical competency committee of residency programs rated narratives that summarized Balint group discussions. Credentialed Leaders of the American Balint Society were invited via email to submit narratives (250 words) about Balint groups that they have led, or were leading, with residents.

RESULTS:

Only four narratives were submitted. Additional cases were recruited through literature review of published Balint discussion cases. A total of 25 cases were rated by the committee. There was agreement between three out of four raters on at least one core milestone in every case. The most frequent milestones were C1 (develops meaningful therapeutic relationships with patients and families), C2 (communicated effectively with patients, families, and public), Prof1 (completes a process of professionalization), and Prof3 (demonstrates humanism and cultural proficiency). Balint groups provided a learning opportunity for a subset of milestones in at least 36% of the cases.

CONCLUSION:

This pilot research suggests that Balint groups and the discussions of complex and challenging cases provide learning opportunities for multiple family medicine milestones, mainly communication skills and professionalism. Further research is needed to refine the methodology and the rating system.

Are Surgical Milestone Assessments Predictive of In-Training Examination Scores?

Kimbrough MK, Thrush CR, Barrett E, Bentley FR, Sexton KW. J Surg Educ. 2018 Jan - Feb;75(1):29-32. doi: 10.1016/j.jsurg.2017.06.021. Epub 2017 Jul 5.

OBJECTIVES:

With the recent utilization of Accreditation Council for Graduate Medical Education developmental milestones as part of resident evaluation, we sought to explore whether milestone-based ratings were associated with American Board of Surgery In-Training Examination (ABSITE) scores.

METHODS:

Mid-year milestone ratings were obtained from the Accreditation Council for Graduate Medical Education Accreditation Database System for years 2014, 2015, and 2016 for all postgraduate years 1-5 general surgery residents in our program and paired with ABSITE scores (n = 69) from January of the following year. Linear regression was used to assess predictor importance of milestones on both ABSITE percentage correct scores and ABSITE percentile scores.

RESULTS:

Minimal to small positive correlations were observed between milestones and ABSITE percentile scores ($r = 0.09-0.25$), while moderately large correlations were observed between milestones and percentage correct scores ($r = 0.65-0.76$). The Medical Knowledge 1 (MK1) milestone significantly predicted ABSITE percentage correct scores, and explained 60% of the variance (adjusted $R^2 = 0.603$). MK1 also significantly predicted ABSITE percentile scores, although weaker in magnitude, with MK1 explaining 20% of the variance (adjusted $R^2 = 0.197$). Postgraduate year level and other milestones were not influential predictors of ABSITE scores.

CONCLUSIONS:

The mid-year MK1 milestone rating was predictive of ABSITE scores and may serve as a useful marker for Clinical Competency Committees to identify residents who could benefit from additional support to prepare for the ABSITE, although given the small exploratory nature of this study, additional research is still needed.

The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs

Conforti LN, Yaghmour NA, Hamstra SJ, Holmboe ES, Kennedy B, Liu JJ, Waldo H, Selden NR. *J Surg Educ.*

2018 Jan - Feb;75(1):147-155. doi: 10.1016/j.jsurg.2017.06.001. Epub 2017 Jun 22.

OBJECTIVES:

The purpose of this study was to determine the effect of the Accreditation Council for Graduate Medical Education Milestones on the assessment of neurological surgery residents. The authors sought to determine the feasibility, acceptability, and utility of this new framework in making judgments of progressive competence, its implementation within programs, and the influence on curricula. Residents were also surveyed to elicit the effect of Milestones on their educational experience and professional development.

DESIGN, SETTING, AND PARTICIPANTS:

In 2015, program leadership and residents from 21 neurological surgery residency programs participated in an online survey and telephone interview in which they reflected on their experiences with the Milestones. Survey data were analyzed using descriptive statistics. Interview transcripts were analyzed using grounded theory.

RESULTS:

Response themes were categorized into 2 groups: outcomes of the Milestones implementation process, and facilitators and barriers. Because of Milestones implementation, participants reported changes to the quality of the assessment process, including the ability to identify struggling residents earlier and design individualized improvement plans. Some programs revised their curricula based on training gaps identified using the Milestones. Barriers to implementation included limitations to the adoption of a developmental progression model in the context of rotation block schedules and misalignment between progression targets and clinical experience. The shift from time-based to competency-based evaluation presented an ongoing adjustment for many programs. Organized preparation before clinical competency committee meetings and diverse clinical competency committee composition led to more productive meetings and perceived improvement in promotion decisions.

CONCLUSIONS:

The results of this study can be used by program leadership to help guide further implementation of the Milestones and program improvement. These results also help to guide the evolution of Milestones language and their implementation across specialties.

A Program Director Survey of the Clinical Base Year in Anesthesiology Residency Programs

Streiff A, Orlando B, Mahoney B. J Educ Perioper Med. 2018 Jan 1;20(1):E619. eCollection 2018 Jan-Mar.

BACKGROUND:

To maintain compliance with the current shift towards competency-based milestone assessment in graduate medical education, residency training programs must reflect this emphasis in their curricula starting with the intern year of training.¹ In working towards collaborative efforts in curricular development between Accreditation Council for Graduate Medical Education (ACGME) anesthesiology residency programs, understanding the structure and design of the clinical base year for anesthesiology residency programs nationwide will serve as a valuable initial step.

METHODS:

Anonymous online surveys were sent to anesthesiology residency program directors to collect data regarding their program's anesthesiology clinical base year (CBY) required, elective, and novel rotations. The survey was also designed to characterize the educational resources provided by the department, changes in the design of the clinical base year, and the feedback received from interns or other rotation department heads.

RESULTS:

Thirty-nine out of 130 US anesthesiology residency program directors responded (30%). The majority of respondents (87%) provide an in-house categorical intern CBY with a majority of those (94%) including a month dedicated to anesthesiology, during which some form of mentorship by anesthesiology faculty or senior house staff was provided. The majority of respondents with anesthesiology exposure stated that they provide educational resources such as textbook materials (82%) or simulation sessions (89%) to their residents.

CONCLUSIONS:

With the evolution of the role of the anesthesiologist, advancements in biotechnology, and newly created board examinations, it is imperative that the CBY prepares rising anesthesiology residents to meet these demands. Results from this survey study can serve as the initial step in improving the clinical base year structure for anesthesiology residents nationally. Collaborative efforts can be undertaken to better incorporate clinical competency, feedback mechanisms, and educational tools through the collection of experiential evidence of successful strategies as well as challenges faced by program directors nationwide.

Positive Change in Feedback Perceptions and Behavior: A 10-Year Follow-up Study

Balmer DF, Tenney-Soeiro R, Mejia E, Rezet B. *Pediatrics*. 2018 Jan;141(1). pii: e20172950. doi: 10.1542/peds.2017-2950. Epub 2017 Dec 7.

BACKGROUND:

Providing and learning from feedback are essential components of medical education, and typically described as resistant to change. But given a decade of change in the clinical context in which feedback occurs, the authors asked if, and how, perceptions of feedback and feedback behaviors might have changed in response to contextual affordances.

METHODS:

In 2017, the authors conducted a follow-up, ethnographic study on 2 general pediatric floors at the same children's hospital where another ethnographic study on a general pediatric floor was conducted in 2007. Data sources included (1) 21 and 34 hours of observation in 2007 and 2017, respectively, (2) 35 and 25 interviews with general pediatric attending physicians and residents in 2007 and 2017, respectively, and (3) a review of 120 program documents spanning 2007 to 2017. Data were coded and organized around 3 recommendations for feedback that were derived from 2007 data and served as standards for assessing change in 2017.

RESULTS:

Data revealed progress in achieving each recommendation. Compared with 2007, participants in 2017 more clearly distinguished between feedback and evaluation; residents were more aware of in-the-moment feedback, and they had shifted their orientation from evaluation and grades to feedback and learning. Explanations for progress in achieving recommendations, which were derived from the data, pointed to institutional and national influences, namely, the pediatric milestones.

CONCLUSIONS:

On the basis of follow-up, ethnographic data, changes in the clinical context of pediatric education may afford positive change in perceptions of feedback and feedback behavior and point to influences within and beyond the institution.

Bringing the Flipped Classroom to Day 1: A Novel Didactic Curriculum for Emergency Medicine Intern**Orientation**

Barrie MG, Amick C, Mitzman J, Way DP, King AM. West J Emerg Med. 2018 Jan;19(1):145- 147. doi: 10.5811/westjem.2017.11.35286. Epub 2017 Dec 18.

ABSTRACT:

Most emergency medicine (EM) residency programs provide an orientation program for their incoming interns, with the lecture being the most common education activity during this period. Our orientation program is designed to bridge the gap between undergraduate and graduate medical education by ensuring that all learners demonstrate competency on Level 1 Milestones, including medical knowledge (MK). To teach interns core medical knowledge in EM, we reformulated orientation using the flipped-classroom model by replacing lectures with small group, case-based discussions. Interns demonstrated improvement in medical knowledge through higher scores on a posttest. Evaluation survey results were also favorable for the flipped-classroom teaching format.

Educational Resources for Resident Training in Quality Improvement: A National Survey of Urology Residency Program Directors

Ziemba JB, Matlaga BR, Tessier CD. Urology practice. 2018;(5):398.

INTRODUCTION:

A key physician competency outlined in the Urology Milestone Project is engagement in quality improvement. Despite this mandate little is known about the attitudes of urology residency program directors regarding the relative importance of quality improvement education. Therefore, we performed a national survey of program directors.

METHODS:

A 25-item survey was developed to investigate program director knowledge and training in quality improvement methodology, participation in quality improvement related activities, curriculum support for resident quality improvement educational activities, and attitudes regarding the relative importance of quality improvement education. The survey was sent via e-mail (November 1, 2016) to all program directors affiliated with the Society of Academic Urologists (sample size 116 of 134, 87% of Accreditation Council for Graduate Medical Education programs).

RESULTS:

A total of 36 program directors returned a completed survey for a response rate of 31%. Only 22% (8) of program directors reported receiving formal education or training in quality improvement methodology. Overall 44% (16) of program directors reported that their program offers formal education or a curriculum in quality improvement methodology for their trainees. Program directors expressed a strong desire for residents to learn quality improvement methodology (positive response 32 of 36, 89%) and understand how to apply it to conduct a quality improvement project (positive response 30 of 35, 86%). Program directors strongly believe that a urology oriented quality improvement curriculum would be a valuable resource (positive response 31 of 36, 86%) with a need for support from our professional society (positive response 29 of 36, 81%).

CONCLUSIONS:

A minority of programs have quality improvement education available for residents. However, program directors agree that quality improvement is an integral part of residency training that should be promoted by our profession.

Consensus Statement by the Congenital Cardiac Anesthesia Society: Milestones for the Pediatric Cardiac Anesthesia Fellowship

Nasr VG, Guzzetta NA, Miller-Hance WC, et al. *Anesthesia and Analgesia*. 2018;126(1):198- 207. doi:10.1213/ANE.0000000000002482.

ABSTRACT:

Pediatric cardiac anesthesiology has evolved as a subspecialty of both pediatric and cardiac anesthesiology and is devoted to caring for individuals with congenital heart disease ranging in age from neonates to adults. Training in pediatric cardiac anesthesia is a second-year fellowship with variability in both training duration and content and is not accredited by the Accreditation Council on Graduate Medical Education. Consequently, in this article and based on the Accreditation Council on Graduate Medical Education Milestones Model, an expert panel of the Congenital Cardiac Anesthesia Society, a section of the Society of Pediatric Anesthesiology, defines 18 milestones as competency-based developmental outcomes for training in the pediatric cardiac anesthesia fellowship.

Thresholds and Interpretations: How Clinical Competency Committees Identify Pediatric Residents with Performance Concerns

Schumacher DJ, Michelson C, Poynter S, Barnes MM, Li ST, Burman N, Sklansky DJ, Thoreson L, Calaman S, King B, Schwartz A; APPD LEARN CCC Study Group, Elliott S, Sharma T, Gonzalez Del Rey J, Bartlett K, Scott-Vernaglia SE, Gibbs K, McGreevy JF, Garfunkel LC, Gellin C, Frohna JG. *Med Teach*. 2018 Jan;40(1):70-79. doi: 10.1080/0142159X.2017.1394576.

BACKGROUND:

Clinical competency committee (CCC) identification of residents with performance concerns is critical for early intervention.

METHODS:

Program directors and 94 CCC members at 14 pediatric residency programs responded to a written survey prompt asking them to describe how they identify residents with performance concerns. Data was analyzed using thematic analysis.

RESULTS:

Six themes emerged from analysis and were grouped into two domains. The first domain included four themes, each describing a path through which residents could meet or exceed a concern threshold: 1) written comments from rotation assessments are foundational in identifying residents with performance concerns, 2) concerning performance extremes stand out, 3) isolated data points may accumulate to raise concern, and 4) developmental trajectory matters. The second domain focused on how CCC members and program directors interpret data to make decisions about residents with concerns and contained 2 themes: 1) using norm- and/or criterion-referenced interpretation, and 2) assessing the quality of the data that is reviewed.

CONCLUSIONS:

Identifying residents with performance concerns is important for their education and the care they provide. This study delineates strategies used by CCC members across several programs for identifying these residents, which may be helpful for other CCCs to consider in their efforts.

Consensus Statement by the Congenital Cardiac Anesthesia Society: Milestones for the Pediatric Cardiac Anesthesia Fellowship

Nasr VG, Guzzetta NA, Miller-Hance WC, et al. *Anesthesia and Analgesia*. 2018;126(1):198- 207. doi:10.1213/ANE.0000000000002482.

ABSTRACT:

Pediatric cardiac anesthesiology has evolved as a subspecialty of both pediatric and cardiac anesthesiology and is devoted to caring for individuals with congenital heart disease ranging in age from neonates to adults. Training in pediatric cardiac anesthesia is a second-year fellowship with variability in both training duration and content and is not accredited by the Accreditation Council on Graduate Medical Education. Consequently, in this article and based on the Accreditation Council on Graduate Medical Education Milestones Model, an expert panel of the Congenital Cardiac Anesthesia Society, a section of the Society of Pediatric Anesthesiology, defines 18 milestones as competency-based developmental outcomes for training in the pediatric cardiac anesthesia fellowship.

Trapped as a Group, Escape as a Team: Applying Gamification to Incorporate Teambuilding Skills through an 'Escape Room' Experience

Zhang XC, Lee H, Rodriguez C, Rudner J, Chan TM, Papanagnou D. *Cureus*. 2018;10(3):e2256. doi:10.7759/cureus.2256. DOI 10.7759/cureus.2256

ABSTRACT:

Teamwork, a skill critical for quality patient care, is recognized as a core competency by the Accreditation Council for Graduate Medical Education (ACGME). To date, there is no consensus on how to effectively teach these skills in a forum that engages learners, immerses members in life-like activities, and builds both trust and rapport. Recreational 'Escape Rooms' have gained popularity in creating a life-like environment that rewards players for working together, solving puzzles, and completing successions of mindbending tasks in order to effectively 'escape the room' in the time allotted. In this regard, escape rooms share many parallels with the multitasking and teamwork that is essential for a successful emergency department (ED) shift. A pilot group of nine emergency medicine (EM) residents and one senior EM faculty member underwent a commercial escape room as part of a teambuilding exercise in January 2018. The escape room required participants to practice teamwork, communication, task delegation, and critical thinking to tackle waves of increasingly complex puzzles, ranging from hidden objects, physical object assembly (i.e., jigsaw puzzles), and symbol matching. Activities required members to recognize and utilize the collective experiences, skills, knowledge base, and physical abilities of the group. After the game, players underwent a structured 'game-master' debriefing facilitated by an employee of the commercial escape room; this was followed by a postevent survey facilitated by a faculty member, which focused on participants' feelings, experiences, and problem-solving techniques. Escape rooms afford learners the opportunity to engage in an activity that rewards teamwork and effective leadership through experiences that directly link to specific ACGME milestones and educational learning theories. EM participants were engaged in the activity and felt that the escape room reproduced an environment analogous to the ED. The debriefing that followed the activity provided a satisfactory conclusion to the experience; but learners preferred a more organized debriefing format that provided them with constructive and specific feedback on their performance.

Examination to Assess the Clinical Examination and Documentation of Spine Pathology among Orthopedic Residents

Haglin JM, Zeller JL, Egol KA, Phillips DP. Spine J. 2017 Dec;17(12):1830-1836. doi: 10.1016/j.spinee.2017.06.009. Epub 2017 Jun 13.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) guidelines requires residency programs to teach and evaluate residents in six overarching "core competencies" and document progress through educational milestones. To assess the progress of orthopedic interns' skills in performing a history, physical examination, and documentation of the encounter for a standardized patient with spinal stenosis, an objective structured clinical examination (OSCE) was conducted for 13 orthopedic intern residents, following a 1-month boot camp that included communications skills and curriculum in history and physical examination. Interns were objectively scored based on their performance of the physical examination, communication skills, completeness and accuracy of their electronic medical record (EMR), and their diagnostic conclusions gleaned from the patient encounter.

PURPOSE:

The purpose of this study was to meaningfully assess the clinical skills of orthopedic post-graduate year (PGY)-1 interns. The findings can be used to develop a standardized curriculum for documenting patient encounters and highlight common areas of weakness among orthopedic interns with regard to the spine history and physical examination and conducting complete and accurate clinical documentation.

STUDY SETTING:

A major orthopedic specialty hospital and academic medical center.

METHODS:

Thirteen PGY-1 orthopedic residents participated in the OSCE with the same standardized patient presenting with symptoms and radiographs consistent with spinal stenosis. Videos of the encounters were independently viewed and objectively evaluated by one investigator in the study. This evaluation focused on the completeness of the history and the performance and completion of the physical examination. The standardized patient evaluated the communication skills of each intern with a separate objective evaluation. Interns completed these same scoring guides to evaluate their own performance in history, physical examination, and communications skills. The interns' documentation in the EMR was then scored for completeness, internal consistency, and inaccuracies.

RESULTS:

The independent review revealed objective deficits in both the orthopedic interns' history and the physical examination, as well as highlighted trends of inaccurate and incomplete documentation in the corresponding medical record. Communication skills with the patient did not meet expectations. Further, interns tended to overscore themselves, especially with regard to their performance on the physical examination ($p < .0005$). Inconsistencies, omissions, and inaccuracies were common in the corresponding medical notes when compared with the events of the patient encounter. Nine of the 13 interns (69.2%) documented at least one finding that was not assessed or tested in the clinical encounter, and four of the 13 interns (30.8%) included inaccuracies in the medical record, which contradicted the information collected at the time of the encounter.

CONCLUSIONS:

The results of this study highlighted significant shortcomings in the completeness of the interns' spine history and physical examination, and the accuracy and completeness of their EMR note. The study

Point-of-Care Ultrasound in General Surgery Residency Training: A Proposal for Milestones in Graduate Medical Education Ultrasound

Beal EW, Sigmond BR, Sage-Silski L, Lahey S, Nguyen V, Bahner DP. J Ultrasound Med. 2017 Dec;36(12):2577-2584. doi: 10.1002/jum.14298. Epub 2017 Jun 26.

ABSTRACT:

The use of point-of-care ultrasound (US) in the clinical setting has undergone massive growth, although its incorporation into training and practice is variable. Surgeons are interested in using point-of-care US and can incorporate it effectively into clinical practice. However, the current state of point-of-care US training in general surgery is inadequate. The Accreditation Council for Graduate Medical Education introduced the Milestones Project to evaluate resident and fellow performance. Emergency medicine is the only specialty with a point-of-care US milestone. We have successfully implemented a US training program into our general surgery residency curriculum and now propose milestones in point-of-care US for all general surgery residents.

Two-Year Experience Implementing a Curriculum to Improve Residents' Patient-Centered Communication Skills

Trickey AW, Newcomb AB, Porrey M, Piscitani F, Wright J, Graling P, Dort J. *J Surg Educ.* 2017 Nov - Dec;74(6):e124-e132. doi: 10.1016/j.jsurg.2017.07.014. Epub 2017 Jul 26.

OBJECTIVES:

Surgery milestones from The Accreditation Council for Graduate Medical Education have encouraged a focus on training and assessment of residents' nontechnical skills, including communication. We describe our 2-year experience implementing a simulation-based curriculum, results of annual communication performance assessments, and resident evaluations.

DESIGN:

Eight quarterly modules were conducted on various communication topics. Former patient volunteers served as simulation participants (SP) who completed annual assessments using the Communication Assessment Tool (CAT). During these 2 modules, communication skills were assessed in the following standardized scenarios: (1) delivering bad news to a caregiver of a patient with postoperative intracerebral hemorrhage and (2) primary care gallstone referral with contraindications for cholecystectomy. SP-CAT ratings were evaluated for correlations by individual and associations with trainee and SP characteristics. Surgical patient experience surveys are evaluated during the curriculum.

SETTING:

Independent academic medical center surgical simulation center.

PARTICIPANTS:

Twenty-five surgery residents per year in 2015 to 2017.

RESULTS:

Residents have practiced skills in a variety of scenarios including bad news delivery, medical error disclosure, empathic communication, and end-of-life conversations. Residents report positive learning experiences from the curriculum (90% graded all modules A/A+). Confidence ratings rose following each module ($p < 0.001$) and in the second year ($p < 0.001$). Annual assessments yielded insights into skills level, and relationships to resident confidence levels and traits. Communication scores were not associated with resident gender or postgraduate year. Over the course of the curriculum implementation, surgical patients have reported that doctors provided explanations with improved clarity ($p = 0.042$).

CONCLUSIONS:

The simulation-based SP-CAT has shown initial evidence of usability, content validity, relationships to observed communication behaviors and residents' skills confidence. Evaluations of different scenarios may not be correlated for individuals over time. The communication curriculum paralleled improvements in patient experience concerning surgeons' clear explanations. An ongoing surgery resident communication curriculum has numerous educational, assessment, and institutional benefits.

Appraising Medical Literature: The Effect of a Structured Journal Club Curriculum Using the Lancet Handbook of Essential Concepts in Clinical Research on Resident Self-Assessment and Knowledge in Milestone-Based Competencies

Lentscher JA, Batig AL. *Mil Med.* 2017 Nov;182(11):e1803-e1808. doi: 10.7205/MILMED-D-17-00059.

BACKGROUND:

Training in literature appraisal and statistical interpretation is one of the residency training requirements outlined by the Accreditation Council for Graduate Medical Education. Frequently, a journal club format is used to teach this competency although this teaching modality is not standardized or well studied in regard to its efficacy.

METHODS:

This study sought to determine the effect of a structured journal club curriculum that incorporated The Lancet Handbook of Essential Concepts in Clinical Research on objective and self-assessed knowledge pertaining to study design and interpretation. The study was a retrospective observational study evaluating the effect of a structured journal club curriculum using the Lancet text with pre- and postimplementation assessment using a resident self-assessment survey. The study examined a monthly journal club curriculum that covered 1 topic/chapter from the assigned text, paired with a contemporary article to highlight the chapter topic. Resident self-assessed and objective knowledge was evaluated and compared using a survey taken before and after the curriculum change. The study was completed during 1 academic year at Madigan Army Medical Center in Tacoma, Washington, an academic military medical training and tertiary care center. Study surveys were distributed to all 17 obstetrics and gynecology residents throughout the 4 residency training years. Of the 17 potential participants, 13 (76%) participated in the precurriculum assessment and 14 (82%) participated after its completion.

FINDINGS:

There was no significant improvement in resident self-assessed knowledge following curriculum implementation. There was a trend toward improved objective knowledge pertaining to study design and interpretation after curriculum completion, but this was not statistically significant.

DISCUSSION:

There is a lack of standardized and well-studied methods to teach residents how to evaluate and appraise medical literature and research. The Lancet Handbook of Essential Concepts in Clinical Research may be a useful tool to teach some of these tenets in the residency training environment, but this limited study did not prove this assertion.

IMPACT:

There is a dearth of proven and well-studied means to teach the tenets of study design, statistical interpretation, and critical literature appraisal to trainees with any consistency or validity. This study demonstrated a trend toward better objective knowledge related to study design, interpretation, and understanding after a change in our training curriculum that implemented The Lancet Handbook of Essential Concepts in Clinical Research into the monthly journal club curriculum. Resident self-rated knowledge and proficiency in their abilities to understand research and study design were not significantly changed with the curriculum.

RECOMMENDATIONS:

Better evidence is needed to guide future educational curricula directed toward teaching the

competency of medical literature review and appraisal.

Impact of an Event Reporting System on Resident Complication Reporting in Plastic Surgery Training: Addressing an ACGME and Plastic Surgery Milestone Project Core Competency

Parikh RP, Snyder-Warwick A, Naidoo S, Skolnick GB, Patel KB. *Plast Reconstr Surg*. 2017 Nov;140(5):736e-745e. doi: 10.1097/PRS.0000000000003771.

BACKGROUND:

The Accreditation Council for Graduate Medical Education and Plastic Surgery Milestone Project has identified practice-based learning and improvement, which involves systematically analyzing current practices and implementing changes, as a core competency in residency education. In surgical care, complication reporting is an essential component of practice-based learning and improvement as complications are analyzed in morbidity and mortality conference for quality improvement. Unfortunately, current methods for capturing a comprehensive profile of complications may significantly underestimate the true occurrence of complications. Therefore, the objectives of this study are to evaluate an intervention for complication reporting and compare this to current practice, in a plastic surgery training program.

METHODS:

This is a preintervention and postintervention study evaluating resident reporting of complications on a plastic surgery service. The intervention was an online event reporting system developed by department leadership and patient safety experts. The cohorts consisted of all patients undergoing surgery during two separate 3-month blocks bridged by an implementation period. A trained reviewer recorded complications, and this served as the reference standard. Fisher's exact test was used for binary comparisons.

RESULTS:

There were 32 complications detected in 219 patients from June to August of 2015 and 35 complications in 202 patients from October to December of 2015. The proportion of complications reported in the preintervention group was nine of 32 (28.1 percent). After the intervention, this significantly increased to 32 of 35 (91.4 percent) ($p < 0.001$).

CONCLUSION:

An intervention using an event reporting system, supported by departmental leadership, led to significant improvements in complication reporting by plastic surgery residents.

Graduate Medical Education Competencies for International Health Electives: A Qualitative Study

Nordhues, Hannah C. Bashir, M. Usmaan, Merry, Stephen P., Sawatsky, Adam P. Medical Teacher; Nov2017, Vol. 39 Issue 11, p1128-1137, 10p

BACKGROUND:

Background: Residency programs offer international health electives (IHEs), providing multiple educational benefits. This study aimed to identify how IHEs fulfill the Accreditation Council for Graduate Medical Education (ACGME) core competencies.

METHODS:

We conducted a thematic analysis of post-rotation reflective reports from residents who participated in IHEs through the Mayo International Health Program. We coded reports using a codebook created from the ACGME competencies. Using a constant comparative method, we identified significant themes within each competency.

RESULTS:

Residents from 40 specialties participated in 377 IHEs in 56 countries from 2001 to 2014. Multiple themes were identified within each of the six ACGME core competencies: Patient Care and Procedural Skills (4), Medical Knowledge (5), Practice-Based Learning and Improvement (3), Interpersonal and Communication Skills (5), Professionalism (4), and Systems-Based Practice and Improvement (3). Themes included improving physical exam and procedural skills, providing care in resource-limited setting, gaining knowledge of tropical and non-tropical diseases, identifying socioeconomic determinants of health, engaging in the education of others, and increasing communication across cultures and multidisciplinary teams.

CONCLUSIONS:

Through IHEs, residents advanced their knowledge, skills, and attitudes in each of the six ACGME competencies. These data can be used for development of IHE competencies and milestones for resident assessment.

A Competency-Based Simulation Curriculum for Surgical Resident Trauma Resuscitation Skills

Moorman ML, Capizzani TR, Feliciano MA, French JC. *Int J Crit Illn Inj Sci*. 2017 Oct- Dec;7(4):241-247. doi: 10.4103/IJCIIS.IJCIIS_12_17.

BACKGROUND:

Evidence-based curricula for nonprocedural simulation training in general surgery are lacking. Residency programs are required to implement simulation training despite this shortcoming. The goal of this project was the development of a simulation curriculum that measurably improves milestone performance and replaces traditional experienced-based training with a competency-based model.

MATERIALS AND METHODS:

SimMan 3G[®] (Laerdal Medical, Wappingers Falls, NY, USA) was utilized for simulation. Needs assessment targeted trauma and shock resuscitation. Scenario design applied deliberate practice methodology. Learner performance data included items such as identification of shock physiology, resuscitation products used, volume delivered, use of resuscitation end-points, and knowledge of massive transfusion. Characteristics essential for a successful program were tabulated.

RESULTS:

Forty-eight residents in postgraduate year (PGY) 2-5 participated representing 100% of the 48 eligible for the training. Senior residents (PGY 4 and 5) demonstrated near universal improvement. Junior residents (PGY 2 and 3) improved in some areas but showed more skill decay between sessions. Overall, milestone performance improved with each training session, and resident feedback was universally positive.

CONCLUSIONS:

This prototype curriculum improved surgical resident competency in shock resuscitation in a simulated patient care environment. It can be modified to accommodate centers with fewer resources and can be implemented by clinical faculty. The essential characteristics of a successful program are identified.

Using the Teaching Perspectives Inventory as an Introduction to a Residents-as-Teachers Curriculum

Robertson AC, Fowler LC, Juve AM. J Educ Perioper Med. 2017 Oct 1;19(4):E614. eCollection 2017 Oct-Dec.

OBJECTIVE:

The Anesthesiology Milestone Project includes a milestone for assessing the teaching attributes of residents within the competency of Practice-based Learning and Improvement. We intend to develop a Residents-as-Teachers educational curriculum to assist our residents in successfully achieving this milestone. The goal of this study is to identify the specific teaching perspectives and intentions of our residents and to promote residents' comprehension of their own teaching philosophy.

METHODS:

We invited our residents to complete the Teaching Perspective Inventory (TPI) and a follow-up survey to gather information regarding dominant and recessive teaching perspectives, their intended career pathway, and their view of the importance of understanding teaching perspectives.

RESULTS:

The two most common dominant teaching perspectives are apprenticeship and nurturing for residents who are planning a career in both academic medicine and private practice. A greater percentage of residents planning an academic career agree that identifying their teaching perspective is beneficial to their role as a clinical educator, compared to those anticipating a career in private practice.

CONCLUSIONS:

Based on this pilot data, our Residents-as-Teachers curriculum will include instruction of educational strategies specifically designed towards the apprenticeship and nurturing perspectives.

Creation and Evaluation of a Laboratory Administration Curriculum for Pathology Residents

Guarner J; Hill C; Amukele, T. American Journal of Clinical Pathology. Oct 2017, Vol. 148 Issue 4, p368-373. 6p.

OBJECTIVES:

A clinical laboratory management (CLM) curriculum that can objectively assess the Accreditation Council for Graduate Medical Education pathology systems-based practice milestones and can provide consistent resident training across institutions is needed.

METHODS:

Faculty at Emory University created a curriculum that consists of assay verification exercises and interactive, case-based online modules. Beta testing was done at Emory University and Johns Hopkins. Residents were required to obtain a score of more than 80% in the online modules to achieve levels 3 to 4 in the milestones. In addition, residents shadowed a laboratory director, performed an inspection of a laboratory section, and completed training in human subjects research and test utilization.

RESULTS:

Fourteen residents took and evaluated the laboratory administration curriculum. The printed certificates from the modules were used for objective faculty evaluation of mastery of concepts. Of all the activities the residents performed during the rotation, the online modules were ranked most helpful by all residents. A 25-question knowledge assessment was performed before and after the rotation and showed an average increase of 8 points ($P = .0001$).

CONCLUSIONS:

The multimodal CLM training described here is an easily adoptable, objective system for teaching CLM. It was well liked by residents and provided an objective measurement of mastery of concepts for faculty.

Towards Consensus: Training in Procedural Skills for Diagnostic Radiology Residents – Current Opinions of Residents and Faculty at a Large Academic Center

Prater A, Rostad BS, Ebert EL, Mullins ME, Ho CP. *Curr Probl Diagn Radiol*. 2017 Oct 31. pii: S0363-0188(17)30162-7. doi: 10.1067/j.cpradiol.2017.09.012.

RATIONALE AND OBJECTIVES:

The Diagnostic Radiology Milestones Project provides a framework for measuring resident competence in radiologic procedures, but there are limited data available to assist in developing these guidelines. We performed a survey of current radiology residents and faculty at our institution as a first step toward obtaining data for this purpose. The survey addressed attitudes toward procedural standardization and procedures that trainees should be competent by the end of residency.

MATERIALS AND METHODS:

Current residents and faculty members were surveyed about whether or not there should be standardization of procedural training, in which procedures residents should achieve competency, and the number of times a procedure needs to be performed to achieve competency.

RESULTS:

Survey data were received from 60 study participants with an overall response rate of 32%. Sixty-five percent of respondents thought that procedural training should be standardized. Standardization of procedural training would include both the list of procedures that trainees should be competent in at the end of residency and the standard minimum number of procedures to achieve competency. Procedures that both residents and faculty agreed are important in which to achieve competency included central line/port procedures; CT-guided abdominal, thoracic, and musculoskeletal procedures; minor fluoroscopic-guided procedures; general fluoroscopy; peripheral line placements; and US-guided abdominal procedures. For most of these categories, most respondents believed that these procedures needed to be performed 6-20 times to achieve competency.

CONCLUSION:

Both resident and faculty respondents agreed that procedural training should be standardized during residency, and competence in specific procedures should be achieved at the completion of residency. Although this study is limited to a single institution, our data may provide assistance in developing future guidelines for standardizing image-guided procedure training. Future studies could be expanded to create a national consensus regarding the implementation of the Diagnostic Radiology Milestones Project.

Development of a Global Health Milestones Tool for Learners in Emergency Medicine: A Pilot Project

Douglass KA, Jacquet GA, Hayward AS, Dreifuss BA, Tupesis JP, Acerra J, Bloem C, Brenner J, DeVos E, Douglass K, Dreifuss B, Hayward AS, Hilbert SL, Jacquet GA, Lin J, Muck A, Nasser S, Oteng R, Powell NN, Rybarczyk MM, Schmidt J, Svenson J, Tupesis JP, Yoder K. *AEM Educ Train.* 2017 Sep 11;1(4):269-279. doi: 10.1002/aet2.10046. eCollection 2017 Oct.

OBJECTIVES:

In medical education and training, increasing numbers of institutions and learners are participating in global health experiences. Within the context of competency-based education and assessment methodologies, a standardized assessment tool may prove valuable to all of the aforementioned stakeholders. Milestones are now used as the standard for trainee assessment in graduate medical education. Thus, the development of a similar, milestone-based tool was undertaken, with learners in emergency medicine (EM) and global health in mind.

METHODS:

The Global Emergency Medicine Think Tank Education Working Group convened at the 2016 Society for Academic Medicine Annual Meeting in New Orleans, Louisiana. Using the Interprofessional Global Health Competencies published by the Consortium of Universities for Global Health's Education Committee as a foundation, the working group developed individual milestones based on the 11 stated domains. An iterative review process was implemented by teams focused on each domain to develop a final product.

RESULTS:

Milestones were developed in each of the 11 domains, with five competency levels for each domain. Specific learning resources were identified for each competency level and assessment methodologies were aligned with the milestones framework. The Global Health Milestones Tool for learners in EM is designed for continuous usage by learners and mentors across a career.

CONCLUSIONS:

This Global Health Milestones Tool for learners in EM may prove valuable to numerous stakeholders. The next steps include a formalized pilot program for testing the tool's validity and usability across training programs, as well as an assessment of perceived utility and applicability by collaborating colleagues working in training sites abroad.

Ways to Write a Milestone: Approaches to Operationalizing the Development of Competence in Graduate Medical Education

Leep Hunderfund AN, Reed DA, Starr SR, Havyer RD, Lang TR, Norby SM. Acad Med. 2017 Sep;92(9): 1328-1334. doi: 10.1097/ACM.0000000000001660.

PURPOSE:

To identify approaches to operationalizing the development of competence in Accreditation Council for Graduate Medical Education (ACGME) milestones.

METHOD:

The authors reviewed all 25 "Milestone Project" documents available on the ACGME Web site on September 11, 2013, using an iterative process to identify approaches to operationalizing the development of competence in the milestones associated with each of 601 subcompetencies.

RESULTS:

Fifteen approaches were identified. Ten focused on attributes and activities of the learner, such as their ability to perform different, increasingly difficult tasks (304/601; 51%), perform a task better and faster (171/601; 45%), or perform a task more consistently (123/601; 20%). Two approaches focused on context, inferring competence from performing a task in increasingly difficult situations (236/601; 29%) or an expanding scope of engagement (169/601; 28%). Two used socially defined indicators of competence such as progression from "learning" to "teaching," "leading," or "role modeling" (271/601; 45%). One approach focused on the supervisor's role, inferring competence from a decreasing need for supervision or assistance (151/601; 25%). Multiple approaches were often combined within a single set of milestones (mean 3.9, SD 1.6).

CONCLUSIONS:

Initial ACGME milestones operationalize the development of competence in many ways. These findings offer insights into how physicians understand and assess the developmental progression of competence and an opportunity to consider how different approaches may affect the validity of milestone-based assessments. The results of this analysis can inform the work of educators developing or revising milestones, interpreting milestone data, or creating assessment tools to inform milestone-based performance measures.

Mindfulness, Burnout, and Effects on Performance Evaluations in Internal Medicine Residents

Braun SE, Auerbach SM, Rybarczyk B, Lee B, Call S. *Adv Med Educ Pract*. 2017 Aug 16;8:591- 597. doi: 10.2147/AMEP.S140554. eCollection 2017.

PURPOSE:

Burnout has been documented at high levels in medical residents with negative effects on performance. Some dispositional qualities, like mindfulness, may protect against burnout. The purpose of the present study was to assess burnout prevalence among internal medicine residents at a single institution, examine the relationship between mindfulness and burnout, and provide preliminary findings on the relation between burnout and performance evaluations in internal medicine residents.

METHODS:

Residents (n = 38) completed validated measures of burnout at three time points separated by 2 months and a validated measure of dispositional mindfulness at baseline. Program director end-of-year performance evaluations were also obtained on 22 milestones used to evaluate internal medicine resident performance; notably, these milestones have not yet been validated for research purposes; therefore, the investigation here is exploratory.

RESULTS:

Overall, 71.1% (n = 27) of the residents met criteria for burnout during the study. Lower scores on the "acting with awareness" facet of dispositional mindfulness significantly predicted meeting burnout criteria $\chi^2(5) = 11.88, p = 0.04$. Lastly, meeting burnout criteria significantly predicted performance on three of the performance milestones, with positive effects on milestones from the "system-based practices" and "professionalism" domains and negative effects on a milestone from the "patient care" domain.

CONCLUSION:

Burnout rates were high in this sample of internal medicine residents and rates were consistent with other reports of burnout during medical residency. Dispositional mindfulness was supported as a protective factor against burnout. Importantly, results from the exploratory investigation of the relationship between burnout and resident evaluations suggested that burnout may improve performance on some domains of resident evaluations while compromising performance on other domains. Implications and directions for future research are discussed.

Competency-Based Medical Education and the Ghost of Kuhn: Reflections on the Messy and Meaningful Work of Transformation

Holmboe ES. Acad Med. 2018 Mar;93(3):350-353. doi: 10.1097/ACM.0000000000001866.

ABSTRACT

The transition, if not transformation, to outcomes-based medical education likely represents a paradigm shift struggling to be realized. Paradigm shifts are messy and difficult but ultimately meaningful if done successfully. This struggle has engendered tension and disagreements, with many of these disagreements cast as either-or polarities. There is little disagreement, however, that the health care system is not effectively achieving the triple aim for all patients. Much of the tension and polarity revolve around how more effectively to prepare students and residents to work in and help change a complex health care system. Competencies were an initial attempt to facilitate this shift by creating frameworks of essential abilities needed by physicians. However, implementation of competencies has proven to be difficult. Entrustable professional activities (EPAs) in undergraduate and graduate medical education and Milestones in graduate medical education are recent concepts being tried and studied as approaches to guide the shift to outcomes. Their primary purpose is to help facilitate implementation of an outcomes-based approach by creating shared mental models of the competencies, which in turn can help to improve curricula and assessment. Understanding whether and how EPAs and Milestones effectively facilitate the shift to outcomes has been and will continue to be an iterative and ongoing reflective process across the entire medical education community using lessons from implementation and complexity science. In this Invited Commentary, the author reflects on what got the community to this point and some sources of tension involved in the struggle to move to outcomes-based education.

Science of Health Care Delivery Milestones for Undergraduate Medical Education

Havyer RD, Norby SM, Leep Hunderfund AN, Starr SR, Lang TR, Wolanskyj AP, Reed DA. BMC Med Educ. 2017 Aug 25;17(1):145. doi: 10.1186/s12909-017-0986-0.

BACKGROUND:

The changing healthcare landscape requires physicians to develop new knowledge and skills such as high-value care, systems improvement, population health, and team-based care, which together may be referred to as the Science of Health Care Delivery (SHCD). To engender public trust and confidence, educators must be able to meaningfully assess physicians' abilities in SHCD. We aimed to develop a novel set of SHCD milestones based on published Accreditation Council for Graduate Medical Education (ACGME) milestones that can be used by medical schools to assess medical students' competence in SHCD.

METHODS:

We reviewed all ACGME milestones for 25 specialties available in September 2013. We used an iterative, qualitative process to group the ACGME milestones into SHCD content domains, from which SHCD milestones were derived. The SHCD milestones were categorized within the current ACGME core competencies and were also mapped to Association of American Medical Colleges' Entrustable Professional Activities (AAMC EPAs).

RESULTS:

Fifteen SHCD sub-competencies and corresponding milestones are provided, grouped within ACGME core competencies and mapped to multiple AAMC EPAs.

CONCLUSIONS:

This novel set of milestones, grounded within the existing ACGME competencies, defines fundamental expectations within SHCD that can be used and adapted by medical schools in the assessment of medical students in this emerging curricular area. These milestones provide a blueprint for SHCD content and assessment as ongoing revisions to milestones and curricula occur.

Procedural Skills of the Entrustable Professional Activities: Are Graduating US Medical Students Prepared to Perform Procedures in Residency?

Bruce AN, Kumar A, Malekzadeh S. J Surg Educ. 2017 Jul - Aug;74(4):589-595. doi: 10.1016/j.jsurg.2017.01.002. Epub 2017 Jan 23.

PURPOSE:

Competency-based medical education has been successfully instituted in graduate medical education through the development of Milestones. Consequently, the Association of American Medical Colleges implemented the core entrustable professional activities initiative to complement this framework in undergraduate medical education. We sought to determine its efficacy by examining the experiences and confidence of recent medical school graduates with general procedural skills (entrustable professional activities 12).

METHOD:

We administered an electronic survey to the MedStar Georgetown University Hospital intern class assessing their experiences with learning and evaluation as well as their confidence with procedural skills training during medical school. Simple linear regression was used to compare respondent confidence and the presence of formal evaluation in medical school.

RESULTS:

We received 28 complete responses, resulting in a 33% response rate, whereas most respondents indicated that basic cardiopulmonary resuscitation, bag/mask ventilation, and universal precautions were important to and evaluated by their medical school, this emphasis was not present for venipuncture, intravenous catheter placement, and arterial puncture. Mean summed scores of confidence for each skill indicated a statistically significant effect between confidence and evaluation of universal precaution skills.

CONCLUSIONS:

More advanced procedural skills are not considered as important for graduating medical students and are less likely to be taught and formally evaluated before graduation. Formal evaluation of some procedural skills is associated with increased confidence of the learner.

Simulation Training in Neurosurgery: Advances in Education and Practice

Konakondla S, Fong R, Schirmer CM. *Adv Med Educ Pract.* 2017 Jul 14;8:465-473. doi: 10.2147/AMEP.S113565. eCollection 2017.

ABSTRACT:

The current simulation technology used for neurosurgical training leaves much to be desired. Significant efforts are thoroughly exhausted in hopes of developing simulations that translate to give learners the "real-life" feel. Though a respectable goal, this may not be necessary as the application for simulation in neurosurgical training may be most useful in early learners. The ultimate uniformly agreeable endpoint of improved outcome and patient safety drives these investments. We explore the development, availability, educational taskforces, cost burdens and the simulation advancements in neurosurgical training. The technologies can be directed at achieving early resident milestones placed by the Accreditation Council for Graduate Medical Education. We discuss various aspects of neurosurgery disciplines with specific technologic advances of simulation software. An overview of the scholarly landscape of the recent publications in the realm of medical simulation and virtual reality pertaining to neurologic surgery is provided. We analyze concurrent concept overlap between PubMed headings and provide a graphical overview of the associations between these terms.

Miles Away Milestones: A Framework for Assessment of Pediatric Residents during Global Health Rotations

Arora G, Condurache T, Batra M, Butteris SM, Downs T, Garfunkel L, Newcomer CA, Perkins KL, Schubert C, St Clair NE. *Acad Pediatr*. 2017 Jul;17(5):577-579. doi: 10.1016/j.acap.2016.12.018. Epub 2017 Jan 12.

BACKGROUND:

Participation in global health (GH) rotations offers trainees the opportunity to strengthen physical examination skills, medical knowledge, resource utilization, interpersonal and communication skills, humanism, and personal and professional development. The Association of Pediatric Program Directors (APPD) has recognized GH as an educational priority.

Approximately 58% of pediatric training programs offer GH rotations, and 25% have GH tracks. Despite the growth of resident participation in GH experiences, no standardized assessment tools have been adapted for use during GH rotations. The robust milestone framework used to evaluate pediatric trainees on stateside rotations may be cumbersome for those unfamiliar with the milestones framework; may provide culturally inaccurate descriptors of behaviors; and, if not applied during GH rotations, may result in a missed opportunity to capture the knowledge, skills, and attitudes acquired during GH rotations. To address these issues, a collaborative group developed a milestone-based framework for assessing trainees engaged in GH rotations.

Entrustable Professional Activities for Pathology: Recommendations from the College of American Pathologists Graduate Medical Education Committee

McCloskey CB, Domen RE, Conran RM, Hoffman RD, Post MD, Brissette MD, Gratzinger DA, Raciti PM, Cohen DA, Roberts CA, Rojiani AM, Kong CS, Peterson JEG, Johnson K, Plath S, Powell SZ. *Acad Pathol.* 2017 Jun 27;4:2374289517714283. doi: 10.1177/2374289517714283. eCollection 2017 Jan-Dec.

ABSTRACT:

Competency-based medical education has evolved over the past decades to include the Accreditation Council for Graduate Medical Education Accreditation System of resident evaluation based on the Milestones project. Entrustable professional activities represent another means to determine learner proficiency and evaluate educational outcomes in the workplace and training environment. The objective of this project was to develop entrustable professional activities for pathology graduate medical education encompassing primary anatomic and clinical pathology residency training. The Graduate Medical Education Committee of the College of American Pathologists met over the course of 2 years to identify and define entrustable professional activities for pathology graduate medical education. Nineteen entrustable professional activities were developed, including 7 for anatomic pathology, 4 for clinical pathology, and 8 that apply to both disciplines with 5 of these concerning laboratory management. The content defined for each entrustable professional activity includes the entrustable professional activity title, a description of the knowledge and skills required for competent performance, mapping to relevant Accreditation Council for Graduate Medical Education Milestone subcompetencies, and general assessment methods. Many critical activities that define the practice of pathology fit well within the entrustable professional activity model. The entrustable professional activities outlined by the Graduate Medical Education Committee are meant to provide an initial framework for the development of entrustable professional activity-related assessment and curricular tools for pathology residency training.

Academic Remediation: Why Early Identification and Intervention Matters

Rumack CM, Guerrasio J, Christensen A, Aagaard EM. Acad Radiol. 2017 Jun;24(6):730-733. doi: 10.1016/j.acra.2016.12.022. Epub 2017 Mar 23.

ABSTRACT:

At our institution, we have developed a remediation team of strong, focused experts who help us with struggling learners in making the diagnosis and then coaching on their milestone deficits. It is key for all program directors to recognize struggling residents because early recognition and intervention gives the resident the best chance of success.

Practice Patterns of Sleep Otolaryngologists at Training Institutions in the United States

Lam AS, Wise SK, Dedhia RC. Otolaryngol Head Neck Surg. 2017 Jun;156(6):1025-1031. doi: 10.1177/0194599816671699. Epub 2016 Sep 27.

OBJECTIVE:

To assess the practice characteristics of adult sleep otolaryngologists within US otolaryngology residency training programs. Study Design Cross-sectional online survey.

SETTING:

Otolaryngology residency training programs.

SUBJECTS AND METHODS:

Program directors from 106 otolaryngology training programs in the United States were contacted. Program directors were instructed to forward a survey to otolaryngologists within the institution who provided Accreditation Council for Graduate Medical Education (ACGME) Otolaryngology Milestone Project feedback in "sleep-disordered breathing." The survey assessed demographics, nonsurgical practices, and surgical/ procedural practices of adult sleep otolaryngologists. Data were collected and analyzed.

RESULTS:

Forty-six surveys met inclusion criteria, representing 40 of 106 (38%) programs. Ninety-three percent of respondents reported that residents gained a significant portion of their sleep medicine training from themselves (ie, the respondents), yet only 36% of respondents spent $\geq 50\%$ of their time on sleep medicine/surgery. Forty-one percent reported being board certified in sleep, with 18% having completed an ACGME fellowship in sleep medicine. Respondents with board certification were more likely to spend greater portions of their practice on sleep medicine/ surgery, $\chi^2(3, n = 44) = 23.161$ ($P < .001$), treat non-obstructive sleep apnea sleep disorders (13 of 18 vs 1 of 26, $P < .001$), interpret polysomnograms (13 of 17 vs 1 of 15, $P < .001$), and perform drug-induced sleep endoscopy, $\chi^2(1, n = 43) = 5.43$, ($P = .02$). A similar pattern was seen with stratification by ACGME sleep medicine fellowship.

CONCLUSION:

This study highlights the variance in practice patterns among sleep otolaryngologists who instruct residents. Board certification and fellowship training in sleep medicine significantly influence breadth of trainee exposure to this field. The highly disparate trainee experiences to sleep otolaryngology across US programs require attention.

Accrediting Graduate Medical Education in Psychiatry: Past, Present, and Future

Johnson T, Nadyah JJ, Lang M, Shelton PG. Psychiatr Q. 2017 Jun;88(2):235-247. doi: 10.1007/s11126-016-9475-6.

ABSTRACT:

The current terminology, goals, and general competency framework systematically utilized in the education of residents regardless of specialty is almost unrecognizable and quite foreign to those who trained before 2010. For example, the clinical and professional expectations for physicians-in-training have been placed onto a developmental framework of milestones. The expectations required during training have been expanded to include leadership and team participation skills, proficiency in the use of information technology, systemsbased knowledge including respect of resources and cost of care, patient safety, quality improvement, population health and sensitivity to diversity for both individual and populations of patients. With these additions to physician training, the Accreditation Council for Graduate Medical Education (ACGME) hopes to remain accountable to the social contract between medicine and the public. With a focus on psychiatric practice, this article provides a general background and overview of the major overhaul of the accreditation process and educational goals for graduate medical education and briefly highlights possibilities for the future.

Toward a Research Agenda for Competency-Based Medical Education

Gruppen L, Frank JR, Lockyer J, Ross S, Bould MD, Harris P, Bhanji F, Hodges BD, Snell L, Ten Cate O; ICBME Collaborators. *Med Teach*. 2017 Jun;39(6):623-630. doi: 10.1080/0142159X.2017.1315065.

ABSTRACT:

Competency-based medical education (CBME) is both an educational philosophy and an approach to educational design. CBME has already had a broad impact on medical schools, residency programs, and continuing professional development in health professions around the world. As the CBME movement evolves and CBME programs are implemented, a wide range of emerging research questions will warrant scholarly examination. In this paper, we describe a proposed CBME research agenda developed by the International CBME Collaborators. The resulting framework includes questions about the meaning of key concepts of CBME and their implications for learners, faculty members, and institutional structures. Other research questions relate to the learning process, the meaning of entrustment decisions, fundamental measurement issues, and the nature and definition of standards. The exploration of these questions will help to solidify the theoretical foundation of CBME, but many issues related to implementation also need to be addressed. These pertain to, among other things, nurturing independent learning, assembling and using assessment results to make decisions about competence, structuring feedback, supporting remediation, and how best to evaluate the longer-term outcomes of CBME. High-quality research on these questions will require rigorous outcome measures with strong validity evidence. The complexity of CBME necessitates theoretical and methodological diversity. It also requires multi-institutional studies that examine effects at multiple levels, from the learner to the team, the institution, and the health care system. Such a framework of research questions can guide and facilitate scholarly discourse on the theoretical and practical body of knowledge related to competency-based health professions education.

"The Actualized Neurosurgeon": A Proposed Model of Surgical Resident Development

Lipsman N, Khan O, Kulkarni AV. *World Neurosurg.* 2017 Mar; 99:381-386. doi: 10.1016/j.wneu.2016.12.039. Epub 2016 Dec 21.

BACKGROUND:

Modern neurosurgical training is both physically and emotionally demanding, posing significant challenges, new and old, to residents as well as programs attempting to train safe, competent surgeons. Models to describe resident development, such as the Accreditation Council for Graduate Medical Education competencies and milestones, address the acquisition of specific skills but largely ignore the stresses and pressures unique to each stage of resident training.

METHODS:

We propose an alternative model of resident development adapted from the developmental psychology literature.

RESULTS:

Our model identifies the challenges that must be met at each stage of junior, intermediate, and senior and chief residency, leading ultimately to an "actualized" neurosurgeon (i.e., one who has maximized his or her potential). Failure to overcome any 1 of these challenges can lead to specific long-lasting consequences, including regret, identity crisis, incompetence, and bitterness. In contrast, the actualized surgeon is one who has successfully acquired the virtues of hope, will, purpose, fidelity, productivity, leadership, competence, and wisdom. The actualized surgeon not only functions safely, confidently, and professionally, but also successfully navigates the challenges of residency and emerges from them having fulfilled his or her maximal potential.

CONCLUSIONS:

This developmental perspective provides an individualized description of healthy surgical development. Our model allows programs to identify the basis for residents who fail to progress, counsel residents during their training, and perhaps help identify resident candidates who are better prepared to meet the developmental challenges of residency training.

Using the ACGME Milestones as a Handover Tool from Medical School to Surgery Residency

Wancata LM, Morgan H, Sandhu G, Santen S, Hughes DT. J Surg Educ. 2017 May - Jun;74(3):519-529.doi: 10.1016/j.jsurg.2016.10.016. Epub 2016 Nov 28.

OBJECTIVE:

To map current medical school assessments for graduating students to the Accreditation Council for Graduate Medical Education (ACGME) milestones in general surgery, and to pass forward individual performance metrics on level 1 milestones to receiving residency programs.

DESIGN:

The study included 20 senior medical students who were accepted into surgery internship positions. Data from medical school performance assessments from the third-year surgery clerkship, fourth-year surgery rotations, fourth-year surgery boot camp, Clinical Competency Assessment Examination, and United States Medical Licensing Examination (USMLE) Step 1 and 2 examinations were used to map each student's competency assessments to the General Surgery Milestones based on a scoring system created and validated by independent assessors. This Milestones Assessment was then provided to each student's receiving program director.

SETTING:

The study was conducted at the University of Michigan Medical School, in Ann Arbor, Michigan.

PARTICIPANTS:

Fourth-year medical students entering into surgical internship.

RESULTS:

Of 16 Accreditation Council for Graduate Medical Education (ACGME) General Surgery Milestones subcompetencies, 12 were able to be evaluated with current medical school assessments. Of the 20 students, 11 met criteria for all the level 1 milestones and 9 needed improvement in at least 1 domain.

Corrigendum to: Using the ACMGE Milestones as a Handover Tool from Medical School to Surgery

Wancata LM, Morgan H, Sandhu G, Santen S, Hughes DT. J Surg Educ. 2018 Sep 11. pii: S1931-7204(18)30378-7. doi: 10.1016/j.jsurg.2018.05.012.

No abstract available

Competency Milestones for Medical Students: Design, Implementation, and Analysis at One Medical School

Lomis KD, Russell RG, Davidson MA, Fleming AE, Pettepher CC, Cutrer WB, Fleming GM, Miller BM. *Med Teach*. 2017 May;39(5):494-504. doi: 10.1080/0142159X.2017.1299924. Epub 2017 Mar 10.

ABSTRACT:

Competency-based assessment seeks to align measures of performance directly with desired learning outcomes based upon the needs of patients and the healthcare system. Recognizing that assessment methods profoundly influence student motivation and effort, it is critical to measure all desired aspects of performance throughout an individual's medical training. The Accreditation Council for Graduate Medical Education (ACGME) defined domains of competency for residency; the subsequent Milestones Project seeks to describe each learner's progress toward competence within each domain. Because the various clinical disciplines defined unique competencies and milestones within each domain, it is difficult for undergraduate medical education to adopt existing GME milestones language. This paper outlines the process undertaken by one medical school to design, implement and improve competency milestones for medical students. A team of assessment experts developed milestones for a set of focus competencies; these have now been monitored in medical students over two years. A unique digital dashboard enables individual, aggregate and longitudinal views of student progress by domain. Validation and continuous quality improvement cycles are based upon expert review, user feedback, and analysis of variation between students and between assessors. Experience to date indicates that milestone-based assessment has significant potential to guide the development of medical students.

Using the Objective Structured Clinical Examination to Assess ACGME Competencies in Pediatric Gastroenterology Fellows

Solomon AB, Reed R, Benkov K, Kingsbery J, Lusman SS, Malter LB, Levine J, Rabinowitz SS, Wolff M, Zabar S, Weinschel E. *J Pediatr Gastroenterol Nutr.* 2017 Apr;64(4):e92-e95. doi: 10.1097/MPG.0000000000001450.

BACKGROUND:

The Accreditation Council for Graduate Medical Education has described 6 core competencies with which trainees should demonstrate proficiency. Using the Objective Structured Clinical Examination (OSCE), we aimed to assess 4 of these competencies among Pediatric Gastrointestinal (GI) fellows (PGs).

METHODS:

Eight first-year PGs from 6 medical centers in the New York area participated in a 4-station OSCE with trained standardized patient (SP) actors. The cases included an emergency department (ED) consult, or "ED Consult" for lower gastrointestinal bleeding; "Breaking Bad News" focusing on CF nutritional complications; "Second Opinion" for abdominal pain; "Transition of Care" for inflammatory bowel disease. At each station, attending faculty observed the encounters behind a 1-way mirror. SPs and faculties provided immediate feedback to the examined fellows. Previously validated OSCE checklists were used to assess performance. On completion, fellows attended debriefing sessions and completed surveys about the educational value.

RESULTS:

Median overall milestone competency scores were 6.9 (PC1), 4.8 (PC2), 5.9 (MK1), 5.7 (MK2), 6.4 (ICS1), 6.9 (Prof1), and 6.7 (Prof3). Overall, fellows score highest (7/9) on the inflammatory bowel disease "Transition of Care" case, found the "Breaking Bad News" Cystic Fibrosis OSCE to be the most challenging, and were most comfortable with the "ED Consult" OSCE, as a commonly encountered scenario. Overall, the fellows rated the educational value of the program highly.

CONCLUSIONS:

To our knowledge, although the OSCE has been validated in other medical fields, this is the first OSCE program developed for PGs fellows. These OSCEs have included Accreditation Council for Graduate Medical Education competencies, serving to assess fellows' skills in these areas while exposing them to challenging medical and psychosocial cases that they may not frequently encounter.

Talk the Talk: Implementing a Communication Curriculum for Surgical Residents

Newcomb AB, Trickey AW, Porrey M, Wright J, Piscitani F, Graling P, Dort J. J Surg Educ. 2017 Mar - Apr; 74(2):319-328. doi: 10.1016/j.jsurg.2016.09.009. Epub 2016 Nov 4.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education milestones provide a framework of specific interpersonal and communication skills that surgical trainees should aim to master.

However, training and assessment of resident nontechnical skills remains challenging. We aimed to develop and implement a curriculum incorporating interactive learning principles such as group discussion and simulation-based scenarios to formalize instruction in patient-centered communication skills, and to identify best practices when building such a program.

DESIGN:

The curriculum is presented in quarterly modules over a 2-year cycle. Using our surgical simulation center for the training, we focused on proven strategies for interacting with patients and other providers. We trained and used former patients as standardized participants (SPs) in communication scenarios.

SETTING:

Surgical simulation center in a 900-bed tertiary care hospital.

PARTICIPANTS:

Program learners were general surgery residents (postgraduate year 1-5). Trauma Survivors Network volunteers served as SPs in simulation scenarios.

RESULTS:

We identified several important lessons: (1) designing and implementing a new curriculum is a challenging process with multiple barriers and complexities; (2) several readily available facilitators can ease the implementation process; (3) with the right approach, learners, faculty, and colleagues are enthusiastic and engaged participants; (4) learners increasingly agree that communication skills can be improved with practice and appreciate the curriculum value; (5) patient SPs can be valuable members of the team; and importantly (6) the culture of patient-physician communication appears to shift with the implementation of such a curriculum.

CONCLUSIONS:

Our approach using Trauma Survivors Network volunteers as SPs could be reproduced in other institutions with similar programs. Faculty enthusiasm and support is strong, and learner participation is active. Continued focus on patient and family communication skills would enhance patient care for institutions providing such education as well as for institutions where residents continue on in fellowships or begin their surgical practice.

Program Director Perceptions of the General Surgery Milestones Project

Drolet BC, Marwaha JS, Wasey A, Pallant A. J Surg Educ. 2017 Mar 23. pii: S1931-7204(16)30373-7. doi: 10.1016/j.jsurg.2017.02.012.

OBJECTIVE:

As a result of the Milestones Project, all Accreditation Council for Graduate Medical Education accredited training programs now use an evaluation framework based on outcomes in 6 core competencies. Despite their widespread use, the Milestones have not been broadly evaluated. This study sought to examine program director (PD) perceptions of the Milestones Project.

DESIGN, SETTING, AND PARTICIPANTS:

A national survey of general surgery PDs distributed between January and March of 2016.

RESULTS:

A total of 132 surgical PDs responded to the survey (60% response rate). Positive perceptions included value for education (55%) and evaluation of resident performance (58%), as well as ability of Milestones to provide unbiased feedback (55%) and to identify areas of resident deficiency (58%). Meanwhile, time input and the ability of Milestones to discriminate underperforming programs were less likely to be rated positively (25% and 21%, respectively). Half of PDs felt that the Milestones were an improvement over their previous evaluation system (55%).

CONCLUSIONS:

Using the Milestones as competency-based, developmental outcomes measures, surgical PDs reported perceived benefits for education and objectivity in the evaluation of resident performance. The overall response to the Milestones was generally favorable, and most PDs would not return to their previous evaluation systems. To improve future iterations of the Milestones, many PDs expressed a desire for customization of the Milestones' content and structure to allow for programmatic differences.

Building a Framework of Entrustable Professional Activities, Supported by Competencies and Milestones, to Bridge the Educational Continuum

Carraccio C, Englander R, Gilhooly J, Mink R, Hofkosh D, Barone MA, Holmboe ES. *Acad Med.* 2017 Mar;92(3):324-330. doi: 10.1097/ACM.0000000000001141.

ABSTRACT:

The transition to competency-based medical education (CBME) and adoption of the foundational domains of competence by the Accreditation Council for Graduate Medical Education, Association of American Medical Colleges (AAMC), and American Board of Medical Specialties' certification and maintenance of certification (MOC) programs provided an unprecedented opportunity for the pediatrics community to create a model of learning and assessment across the continuum. Two frameworks for assessment in CBME have been promoted: (1) entrustable professional activities (EPAs) and (2) milestones that define a developmental trajectory for individual competencies. EPAs are observable and measurable units of work that can be mapped to competencies and milestones critical to performing them safely and effectively. The pediatrics community integrated the two frameworks to create a potential pathway of learning and assessment across the continuum from undergraduate medical education (UME) to graduate medical education (GME) and from GME to practice. The authors briefly describe the evolution of the Pediatrics Milestone Project and the process for identifying EPAs for the specialty and subspecialties of pediatrics. The method of integrating EPAs with competencies and milestones through a mapping process is discussed, and an example is provided. The authors illustrate the alignment of the AAMC's Core EPAs for Entering Residency with the general pediatrics EPAs and, in turn, the alignment of the latter with the subspecialty EPAs, thus helping build the bridge between UME and GME. The authors propose how assessment in GME, based on EPAs and milestones, can guide MOC to complete the bridge across the education continuum.

Number of Weeks Rotating in the Emergency Department Has a Greater Effect on Ultrasound Milestone Competency than a Dedicated Ultrasound Rotation

Smalley CM, Thiessen M, Bynny R, Dorey A, McNair B, Kendall JL. J Ultrasound Med. 2017 Feb;36(2):335-343. doi: 10.7863/ultra.15.12044. Epub 2016 Dec 10.

OBJECTIVES:

Ultrasound (US) is vital to modern emergency medicine (EM). Across residencies, there is marked variability in US training. The "goal-directed focused US" part of the Milestones Project states that trainees must correctly acquire and interpret images to achieve a level 3 milestone. Standardized methods by which programs teach these skills have not been established. Our goal was to determine whether residents could achieve level 3 with or without a dedicated US rotation.

METHODS:

Thirty-three first- and second-year residents were assigned to control (no rotation) and intervention (US rotation) groups. The intervention group underwent a 2-week curriculum in vascular access, the aorta, echocardiography, focused assessment with sonography for trauma, and pregnancy. To test acquisition, US-trained emergency medicine physicians administered an objective structured clinical examination. To test interpretation, residents had to identify normal versus abnormal findings. Mixed-model logistic regression tested the association of a US rotation while controlling for confounders: weeks in the emergency department (ED) as a resident, medical school US rotation, and postgraduate years.

RESULTS:

For image acquisition, medical school US rotation and weeks in the ED as a resident were significant ($P = .03$; $P = .04$) whereas completion of a US rotation and postgraduate years were not significant. For image interpretation, weeks in the ED as a resident was the only significant predictor of performance ($P = .002$) whereas completion of a US rotation and medical school US rotation were not significant.

CONCLUSIONS:

To achieve a level 3 milestone, weeks in the ED as a resident were significant for mastering image acquisition and interpretation. A dedicated US rotation did not have a significant effect. A medical school US rotation had a significant effect on image acquisition but not interpretation. Further studies are needed to best assess methods to meet US milestones.

Integrating Quality Improvement Education into the Nephrology Curricular Milestones Framework and the Clinical Learning Environment Review

Prince LK, Little DJ, Schexneider KI, Yuan CM. Clin J Am Soc Nephrol. 2017 Feb 7;12(2):349- 356. doi: 10.2215/CJN.04740416. Epub 2016 Nov 10.

ABSTRACT:

The Accreditation Council for Graduate Medical Education requires that trainees show progressive milestone attainment in the practice-based learning and systems-based practice competencies. As part of the Clinical Learning Environment Review, sponsoring hospitals must educate trainees in health care quality improvement, provide them with specialty-specific quality data, and ensure trainee participation in quality improvement activities and committees.

Subspecialty-specific quality improvement curricula in nephrology training programs have not been reported, although considerable curricular and assessment material exists for specialty residencies, including tools for assessing trainee and faculty competence. Nephrology-specific didactic material exists to assist nephrology fellows and faculty mentors in designing and implementing quality improvement projects. Nephrology is notable among internal medicine subspecialties for the emphasis placed on adherence to quality thresholds—specifically for chronic RRT shown by the Centers for Medicare and Medicaid Services Quality Incentive Program. We have developed a nephrology-specific curriculum that meets Accreditation Council for Graduate Medical Education and Clinical Learning Environment Review requirements, acknowledges regulatory quality improvement requirements, integrates with ongoing divisional quality improvement activities, and has improved clinical care and the training program. In addition to didactic training in quality improvement, we track trainee compliance with Kidney Disease Improving Global Outcomes CKD and ESRD quality indicators (emphasizing Quality Improvement Program indicators), and fellows collaborate on a yearly multidisciplinary quality improvement project. Over the past 6 years, each fellowship class has, on the basis of a successful quality improvement project, shown milestone achievement in Systems-Based Practice and Practice-Based Learning. Fellow quality improvement projects have improved nephrology clinical care within the institution and introduced new educational and assessment tools to the training program. All have been opportunities for quality improvement scholarship.

The curriculum prepares fellows to apply quality improvement principals in independent clinical practice—while showing milestone advancement and divisional compliance with Clinical Learning Environment Review requirements.

Milestones and Millennials: A Perfect Pairing-Competency-Based Medical Education and the Learning Preferences of Generation Y

Desy JR, Reed DA, Wolanskyj AP. Mayo Clin Proc. 2017 Feb;92(2):243-250. doi: 10.1016/j.mayocp.2016.10.026.

ABSTRACT:

Millennials are quickly becoming the most prevalent generation of medical learners. These individuals have a unique outlook on education and have different preferences and expectations than their predecessors. As evidenced by its implementation by the Accreditation Council for Graduate Medical Education in the United States and the Royal College of Physicians and Surgeons in Canada, competency based medical education is rapidly gaining international acceptance. Characteristics of competency based medical education can be perfectly paired with Millennial educational needs in several dimensions including educational expectations, the educational process, attention to emotional quotient and professionalism, assessment, feedback, and intended outcomes. We propose that with its attention to transparency, personalized learning, and frequent formative assessment, competency based medical education is an ideal fit for the Millennial generation as it realigns education and assessment with the needs of these 21st century learners.

Piloting the Mobile Medical Milestones Application (M3App®): A Multi-Institution Evaluation

Page C, Reid A, Coe CL, Beste J, Fagan B, Steinbacher E, Newton WP. Fam Med. 2017 Jan;49(1):35-41.

BACKGROUND AND OBJECTIVES:

Competency-based evaluation of the Accreditation Council for Graduate Medical Education (ACGME) Milestones requires the development of new evaluation tools that can better capture learners' behavior. This study describes the implementation and initial assessment of an innovative point-of-care mobile application, the M3App®, linked to the Family Medicine Milestones.

METHODS:

Seven family medicine residency programs in North Carolina implemented the M3App.® Program faculty and residents were surveyed prior to implementation regarding current evaluation methods and their quality and use and acceptability of electronic evaluation tools. Surveys were repeated after implementation for comparison.

RESULTS:

All seven programs successfully implemented the M3App. Most faculty members found the tool well designed, easy to use, beneficial to the quality and efficiency of feedback they provide, and to their knowledge of Milestones. Residents reported significant increases in the volume and quality of written feedback they receive.

CONCLUSIONS:

The M3App provides an efficient, convenient tool for assessing Milestones that can improve the quantity and quality of feedback residents receive from faculty. Improved faculty perception of knowledge of Milestones after M3App implementation suggests that the tool is also effective for faculty development.

Practical Implications for an Effective Radiology Residency Quality Improvement Program for Milestone Assessment

Leddy R, Lewis M, Ackerman S, Hill J, Thacker P, Matheus M, Tipnis S, Gordon L. Acad Radiol. 2017 Jan;24(1):95-104. doi: 10.1016/j.acra.2016.08.018. Epub 2016 Oct 18.

ABSTRACT:

Utilization of a radiology resident-specific quality improvement (QI) program and curriculum based on the Accreditation Council for Graduate Medical Education (ACGME) milestones can enable a program's assessment of the systems-based practice component and prepare residents for QI implementation post graduation. This article outlines the development process, curriculum, QI committee formation, and resident QI project requirements of one institution's designated radiology resident QI program. A method of mapping the curriculum to the ACGME milestones and assessment of resident competence by postgraduate year level is provided. Sample projects, challenges to success, and lessons learned are also described. Survey data of current trainees and alumni about the program reveal that the majority of residents and alumni responders valued the QI curriculum and felt comfortable with principles and understanding of QI. The most highly valued aspect of the program was the utilization of a resident education committee. The majority of alumni responders felt the residency quality curriculum improved understanding of QI, assisted with preparation for the American Board of Radiology examination, and prepared them for QI in their careers. In addition to the survey results, outcomes of resident project completion and resident scholarly activity in QI are evidence of the success of this program. It is hoped that this description of our experiences with a radiology resident QI program, in accordance with the ACGME milestones, may facilitate the development of successful QI programs in other diagnostic radiology residencies.

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Simulation Based Medical Education in Graduate Medical Education Training and Assessment Programs

Kothari LG, Shah K, Barach P. *Progress in Pediatric cardiology*. 2017:33.
doi:10.1016/j.ppedcard.2017.02.001.

ABSTRACT:

The healthcare system has an inconsistent record of ensuring reliable and safe patient outcomes. One of the main factors contributing to this poor record is inadequate and unreliable interdisciplinary team behavior. Learning how to function within an interdisciplinary team must begin early in medical training. Simulation based medical education (SBME) is an essential part of graduate medical education (GME) training, the acquisition of core competencies and their assessment. In this paper, we describe SBME as it relates to learning and professional maturation. We describe the use of simulation in GME training, link simulation to the ACGME professional core competencies, present examples of simulation assessment methods, and explore simulation as part of board certification and professional life long learning. We discuss the important benefits of simulation for hospitals and patient safety. We summarize the literature on cost effectiveness of simulation in education and the growing evidence that SBME translates to improvements in communication, teamwork and clinical care and the overall improvement of healthcare. We discuss the challenges and costs required to develop a successful simulation and training center, lab or in-situ program. We discuss the return on investment of SBME as it relates to patient safety, cost savings, and improved patient care. Hospitals should embrace simulation based medical education and support the development of simulation centers so that SBME becomes an integral part of the hospitals' mission to provide patients with the best care possible.

Domains, Competencies, EPAs, and Training Guidelines: A Primer on Developments in Pediatric Cardiology Education

Frank LH. Progress in Pediatric cardiology. 2017. doi:10.1016/j.ppedcard.2017.01.002.

ABSTRACT:

Competency-based medical education has been a part of graduate medical education for over 15 years. The Pediatric Milestone Project and Entrustable Professional Activities have created new concepts to understand and apply. Parallel to these developments, pediatric cardiologists have collaborated to refine fellowship training guidelines.

Emergency Medicine Resident Assessment of the Emergency Ultrasound Milestones and Current Training Recommendations

Stolz LA, Stolz U, Fields JM, et al. Emergency Medicine Resident Assessment of the Emergency Ultrasound Milestones and Current Training Recommendations. *Academic Emergency Medicine*. 2017;(3):353. doi:10.1111/acem.13113.

OBJECTIVES:

Emergency ultrasound (EUS) has been recognized as integral to the training and practice of emergency medicine (EM). The Council of Emergency Medicine Residency-Academy of Emergency Ultrasound (CORD-AEUS) consensus document provides guidelines for resident assessment and progression. The Accredited Council for Graduate Medical Education (ACGME) has adopted the EM Milestones for assessment of residents' progress during their residency training, which includes demonstration of procedural competency in bedside ultrasound. The objective of this study was to assess EM residents' use of ultrasound and perceptions of the proposed ultrasound milestones and guidelines for assessment.

METHODS

This study is a prospective stratified cluster sample survey of all U.S. EM residency programs. Programs were stratified based on their geographic location (Northeast, South, Midwest, West), presence/absence of ultrasound fellowship program, and size of residency with programs sampled randomly from each stratum. The survey was reviewed by experts in the field and pilot tested on EM residents. Summary statistics and 95% confidence intervals account for the survey design, with sampling weights equal to the inverse of the probability of selection, and represent national estimates of all EM residents.

RESULTS

There were 539 participants from 18 residency programs with an overall survey response rate of 85.1%. EM residents considered several applications to be core applications that were not considered core applications by CORD-AEUS (quantitative bladder volume, diagnosis of joint effusion, interstitial lung fluid, peritonsillar abscess, fetal presentation, and gestational age estimation). Of several core and advanced applications, the Focused Assessment with Sonography in Trauma examination, vascular access, diagnosis of pericardial effusion, and cardiac standstill were considered the most likely to be used in future clinical practice. Residents responded that procedural guidance would be more crucial to their future clinical practice than resuscitative or diagnostic ultrasound. They felt that an average of 325 (301-350) ultrasound examinations would be required to be proficient, but felt that number of examinations poorly represented their competency. They reported high levels of concern about medicolegal liability while using EUS. Eighty-nine percent of residents agreed that EUS is necessary for the practice of EM.

CONCLUSIONS

EM resident physicians' opinion of what basic and advanced skills they are likely to utilize in their future clinical practice differs from what has been set forth by various groups of experts. Their opinion of how many ultrasound examinations should be required for competency is higher than what is currently expected during training.

Emergency Medicine Resident Orientation: How Training Programs Get their Residents Started

McGrath J, Barrie M, Way DP, Western Journal of Emergency Medicine, Vol 18, Iss 1, Pp 97-104 (2017)

INTRODUCTION:

The first formal orientation program for incoming emergency medicine (EM) residents was started in 1976. The last attempt to describe the nature of orientation programs was by Brillman in 1995. Now almost all residencies offer orientation to incoming residents, but little is known about the curricular content or structure of these programs. The purpose of this project was to describe the current composition and purpose of EM resident orientation programs in the United States.

METHODS:

In autumn of 2014, we surveyed all U.S. EM residency program directors (n=167). We adapted our survey instrument from one used by Brillman (1995). The survey was designed to assess the orientation program's purpose, structure, content, and teaching methods.

RESULTS:

The survey return rate was 63% (105 of 167). Most respondents (77%) directed three-year residencies, and all but one program offered intern orientation. Orientations lasted an average of nine clinical (Std. Dev.=7.3) and 13 non-clinical days (Std. Dev.=9.3). The prototypical breakdown of program activities was 27% lectures, 23% clinical work, 16% skills training, 10% administrative activities, 9% socialization and 15% other activities. Most orientations included activities to promote socialization among interns (98%) and with other members of the department (91%). Many programs (87%) included special certification courses (ACLS, ATLS, PALS, NRP). Course content included the following: use of electronic medical records (90%), physician wellness (75%), and chief complaint-based lectures (72%). Procedural skill sessions covered ultrasound (94%), airway management (91%), vascular access (90%), wound management (77%), splinting (67%), and trauma skills (62%).

CONCLUSION:

Compared to Brillman (1995), we found that more programs (99%) are offering formal orientation and allocating more time to them. Lectures remain the most common educational activity. We found increases in the use of skills labs and specialty certifications. We also observed increases in time dedicated to clinical work during orientation. Only a few programs reported engaging in baseline or milestone assessments, an activity that could offer significant benefits to the residency program.

National Survey of US Academic Anesthesiology Chairs on Clinician Wellness

Vinson AE, Zurakowski D, Randel GI, Schlecht KD. *J Clin Anesth.* 2016 Nov;34:623-31. doi: 10.1016/j.jclinane.2016.06.015. Epub 2016 Aug 2.

STUDY OBJECTIVE:

The prevalence of anesthesiology department wellness programs is unknown. A database of wellness programs is needed as a resource for departments attempting to respond to the Accreditation Council for Graduate Medical Education Anesthesiology Milestones Project. The purpose of this study was to survey academic anesthesiology chairs on wellness issues, characterize initiatives, and establish wellness contacts for a Wellness Initiative Database (WID).

DESIGN:

An Internet-based survey instrument was distributed to academic anesthesiology department chairs in the United States.

SETTING:

On-line.

PATIENTS:

None.

INTERVENTIONS:

None.

MEASUREMENTS:

Analysis for continuous variables used standard means, modes, and averages for individual responses; 95% confidence intervals for proportions were calculated by Wilson's method.

MAIN RESULTS:

Seventy-five (56.4%) responses (of a potential 133 programs) were obtained. Forty-one (of 71 responders; 57.8%) expressed interest in participating in a WID, and 33 (44%) provided contact information. Most (74.7%) had recently referred staff for counseling or wellness resources, yet many (79.5% and 67.1%, respectively) had never surveyed their department's interest in wellness resources. Thirty-four percent had a wellness resources repository. Of 22 wellness topics, 8 garnered >60% strong interest from respondents: Addiction Counseling, Sleep Hygiene, Peer Support Program, Stress Management, Conflict Management, Burnout Counseling, Time Management, and Dealing with Adverse Events Training. There was a statistically significant difference in interest between those willing to participate or not in the WID across most topics but no significant difference based on need for recent staff referral.

CONCLUSIONS:

The majority of chairs needed to recently refer a department member to wellness resources or counseling. Most were interested in participating in a WID, whereas a minority had gauged staff interest in wellness topics or had a wellness resource repository. Highest interest was in topics most related to function as an anesthesiologist. Those willing to participate in the database had statistically significant differences in interest across most wellness topics.

Goal-directed Focused Ultrasound Milestones Revised: A Multiorganizational Consensus

Nelson M, Abdi A, Adhikari S, Boniface M, Bramante RM, Egan DJ, Matthew Fields J, Leo MM, Liteplo AS, Liu R, Nomura JT, Pigott DC, Raio CC, Ruskis J, Strony R, Thom C, Lewiss RE. Acad Emerg Med. 2016 Nov;23(11):1274-1279. doi: 10.1111/acem.13069. Epub 2016 Oct 31.

ABSTRACT:

In 2012 the Accreditation Council for Graduate Medical Education and the American Board of Emergency Medicine released the emergency medicine milestones. The Patient Care 12 (PC12) subcompetency delineates staged and progressive accomplishment in emergency ultrasound. While valuable as an initial framework for ultrasound resident education, there are limitations to PC12. This consensus paper provides a revised description of criteria to define the subcompetency. A multiorganizational task force was formed between the American College of Emergency Physicians Ultrasound Section, the Council of Emergency Medicine Residency Directors, and the Academy of Emergency Ultrasound of the Society for Academic Emergency Medicine. Representatives from each organization created this consensus document and revision.

Patients, Nurses, and Physicians Working Together to Develop a Discharge Entrustable Professional Activity Assessment Tool

Meade LB, Suddarth KH, Jones RR, Zaas AK, Albanese T, Yamazaki K, O'Malley CW. Acad Med. 2016 Oct;91(10):1388-1391.

PROBLEM:

The Accreditation Council for Graduate Medical Education milestones were written by physicians and thus may not reflect all the behaviors necessary for physicians to optimize their performance as a key member of an interprofessional team.

APPROACH:

From April to May 2013, the authors, Educational Research Outcomes Collaborative leaders, assembled interprofessional team discussion groups, including patients or family members, nurses, physician trainees, physician educators, and other staff (optional), at 11 internal medicine (IM) programs. Led by the site's principal investigator, the groups generated a list of physician behaviors related to the entrustable professional activity (EPA) of a safe and effective discharge of a patient from the hospital, and prioritized those behaviors.

OUTCOMES:

A total of 182 behaviors were listed, with lists consisting of between 10 and 29 behaviors. Overall, the site principal investigators described all participants as emerging from the activity with a new understanding of the complexity of training physicians for the discharge EPA. The authors batched behaviors into six components of a safe and effective discharge: medication reconciliation, discharge summary, patient/caregiver communication, team communication, active collaboration, and anticipation of posthospital needs. Specific, high-priority behavior examples for each component were identified, and an assessment tool for direct observation was developed for the discharge EPA.

NEXT STEPS:

The authors are currently evaluating trainee and educator perceptions of the assessment tool after implementation in 15 IM programs. Additional next steps include developing tools for other EPAs, as well as a broader evaluation of patient outcomes in the era of milestone-based assessment.

Using Milestones as Evaluation Metrics during an Emergency Medicine Clerkship

Quinn SM, WorriLOW CC, Jayant DA, Bailey B, Eustice E, Kohlhepp J, Rogers R, Kane BG. J Emerg Med. 2016 Oct;51(4):426-431.

BACKGROUND:

The Accreditation Council for Graduate Medical Education's (ACGME) Milestones presumes graduating medical students will enter residency proficient at Milestone level 1 for 23 skills. The Next Accreditation System now includes Milestones for each postgraduate specialty, and it is unlikely that schools will document every emergency medicine (EM) applicant's EM-specific skills in their performance evaluation.

OBJECTIVES:

The goals of this research were to determine if assessment of the Milestones was feasible during a medical student clerkship and examine the proportion of medical students performing at Milestone level 1.

METHODS:

This study was conducted at a center with Liaison Committee on Medical Education-approved medical training and a 4-year EM residency. Using traditional clerkship, we studied the feasibility of an ACGME EM Milestones-based clerkship assessment. Data led to redesign of the clerkship and its evaluation process, including all level 1 anchor(s) to add "occasionally" (>60%), "usually" (>80%), and "always" (100%) on a Likert scale to on-shift assessment forms.

RESULTS:

During the feasibility phase (2013-14), 75 students rotated through the clerkship; 55 evaluations were issued and 50 contained the Milestone summary. Eight deficiencies were noted in Milestone 12 and three in Milestone 14. After changes, 49 students rotated under the new evaluation rubric. Of 575 completed on-shift evaluations, 16 Milestone deficiencies were noted. Of 41 institutional evaluations issued, only one student had deficiencies noted, all of which pertained to patient care. All evaluations in this second cohort contained each student's Milestone proficiency.

CONCLUSIONS:

Assessment of the Milestones is feasible. Communication of ACGME EM Milestone proficiency may identify students who require early observation or remediation. The majority of students meet the anchors for the Milestones, suggesting that clerkship assessment with the ACGME EM Milestones does not adequately differentiate students.

Making Milestones: Development and Implementation of a Formal Socioeconomic Curriculum in a Neurosurgical Residency Training Program

Youngerman BE, Zacharia BE, Hickman ZL, Bruce JN, Solomon RA, Benzil DL. Neurosurgery. 2016 Sep;79(3):492-8. doi: 10.1227/NEU.0000000000001126.

BACKGROUND:

Improved training in the socioeconomic aspects of medicine is a priority of the Accreditation Council for Graduate Medical Education and the American Board of Neurological Surgeons. There is evidence that young neurosurgeons feel ill equipped in these areas and that additional education would improve patient care.

OBJECTIVE:

To present our experience with the introduction of a succinct but formal socioeconomic training course to the residency curriculum at our institution.

METHODS:

A monthly series of twelve 1-hour interactive modules was designed to address the pertinent Accreditation Council for Graduate Medical Education-American Board of Neurological Surgeons outcomes-based educational milestones. Slide-based lectures provided a comprehensive overview of social, legal, and business issues, and a monthly forum for open discussion allowed residents to draw on their applied experience. Residents took a 20-question pre- and postcourse knowledge assessment, as well as feedback surveys at 6 and 12 months.

RESULTS:

Residents were able to participate in the lectures, with an overall attendance rate of 91%. Residents felt that the course goals and objectives were well defined and communicated (4.88/5) and rated highly the content, quality, and relevance of the lectures (4.94/5).

Performance on the knowledge assessment improved from 58% to 66%.

CONCLUSION:

Our experience demonstrates the feasibility of including a formal socioeconomic course in neurosurgical residency training with positive resident feedback and achievement of outcomes-based milestones. Extension to a 2-year curriculum cycle may allow the course to cover more material without compromising other residency training goals. Online modules should also be explored to allow for wider and more flexible participation.

The Road Ahead in Education: Milestones for Geriatric Psychiatry Subspecialty Training

Swantek SS, Maixner SM, Llorente MD, Cheong JA, Edgar L, Thomas CR, Ahmed I. *Am J Geriatr Psychiatry*. 2016 Sep;24(9):675-89. doi: 10.1016/j.jagp.2016.03.011. Epub 2016 Apr 6.

OBJECTIVE:

The Accreditation Council of Graduate Medical Education (ACGME) Milestone Project is the next step in a series of changes revamping the system of graduate medical education. In 2013 the ACGME completed the general psychiatry milestones. The ACGME then pursued creation of milestones for accredited psychiatric subspecialty fellowships. This article documents the work of the geriatric psychiatry subspecialty milestones work group. It reports the history and rationale supporting the milestones, the milestone development process, and the implications for geriatric psychiatry fellowship training.

METHODS:

In consultation with the American Association for Geriatric Psychiatry, the American Board of Psychiatry and Neurology, and the ACGME Psychiatry Residency Review Committee, the ACGME appointed a working group to create the geriatric psychiatry milestones using the general psychiatry milestones as a guide.

CONCLUSION:

The geriatric psychiatry milestones are the result of an iterative process resulting in the definition of the characteristics vital to a fellowship-trained geriatric psychiatrist. It is premature to assess their effect on psychiatric training. The true impact of the milestones will be determined as each training director uses the milestones to re-evaluate their program curriculum and the educational and clinical learning environment. The ACGME is currently collecting the information about the milestone performance of residents and fellows to further refine and determine how the milestones can best be used to assist programs in improving training.

Defining, Achieving, and Maintaining Competence in Cardiovascular Training and Practice

Kuvin JT, Williams ES. J Am Coll Cardiol. 2016 Sep 20;68(12):1342-7. doi: 10.1016/j.jacc.2016.05.097.

ABSTRACT:

Patients, hospitals, insurers, and the public rely on competent physicians. The definition and documentation of competency in cardiovascular training and practice continues to evolve. New tools, such as the American College of Cardiology's in-training examination, restructured Core Cardiovascular Training Statement, curricular and lifelong learning competencies, and the Accreditation Council for Graduate Medical Education Milestones help define competent trainees and practitioners, and level the playing field. The American Board of Internal Medicine's Maintenance of Certification program is undergoing critical review, and a common vision of its future form and role are not yet clear. This paper explores present-day cardiovascular competency components, assessment tools, and strategies, and identifies challenges for the future.

Genetic Counseling Milestones: A Framework for Student Competency Evaluation

Guy C. J Genet Couns. 2016 Aug;25(4):635-43. doi: 10.1007/s10897-015-9895-8. Epub 2015 Oct 14.

ABSTRACT:

Graduate medical education has recently increased focus on the development of medical specialty competency milestones to provide a targeted tool for medical resident evaluation. Milestones provide developmental assessment of the attainment of competencies over the course of an educational program. An educational framework is described to explore the development of Genetic Counseling Milestones for the evaluation of the development of genetic counseling competencies by genetic counseling students. The development of Genetic Counseling Milestones may provide a valuable tool to assess genetic counseling students across all program activities. Historical educational context, current practices, and potential benefits and challenges in the development of Genetic Counseling Milestones are discussed.

What Is a Rheumatologist and How Do We Make One?

Brown CR Jr, Criscione-Schreiber L, O'Rourke KS, Fuchs HA, Putterman C, Tan IJ, Valeriano- Marcet J, Hsieh E, Zirkle S, Bolster MB. *Arthritis Care Res (Hoboken)*. 2016 Aug;68(8):1166-72. doi: 10.1002/acr.22817.

OBJECTIVE:

Graduate medical education is a critical time in the training of a rheumatologist, and purposeful evaluation of abilities during this time is essential for long-term success as an independent practitioner. The internal medicine subspecialties collectively developed a uniform set of reporting milestones by which trainees can be assessed and receive formative feedback, providing clarity of accomplishment as well as areas for improvement in training. Furthermore, the reporting milestones provide a schema for assessment and evaluation of fellows by supervisors. The internal medicine subspecialties were also tasked with considering entrustable professional activities (EPAs), which define the abilities of a subspecialty physician who has attained sufficient mastery of the field to be accountable to stakeholders and participate in independent practice. Although EPAs have been established for a few specialties, they had not yet been described for rheumatology. EPAs have value as descriptors of the comprehensive abilities, knowledge, and skills of a practicing rheumatologist. The rheumatology EPAs have a role in defining a specialist in rheumatology upon completion of training, and also represent the ways our specialty defines our abilities that are enduring throughout practice.

METHODS:

We describe the collaborative process of the development of both the subspecialty reporting milestones and the rheumatology EPAs. The reporting milestones evolved through discussions and collaborations among representatives from the Association of Specialty Professors, the Alliance for Academic Internal Medicine, the American Board of Internal Medicine, and the Accreditation Council for Graduate Medical Education. The EPAs were a product of deliberations by the Next Accreditation System (NAS) working group of the American College of Rheumatology (ACR) Committee on Rheumatology Training and Workforce Issues.

RESULTS:

Twenty-three subspecialty reporting milestones and 14 rheumatology EPAs were advanced and refined over the course of 3 subspecialty reporting milestone development summits and 3 ACR NAS working group meetings, respectively.

CONCLUSION:

The subspecialty reporting milestones and rheumatology EPAs presented here stipulate reasonable and measurable expectations for rheumatologists-in-training. Together, these tools aim to promote enrichment and greater accountability in the training of fellows. Additionally, the EPAs define, for all stakeholders, the expertise of a rheumatologist in practice.

Musculoskeletal Ultrasound Training for Radiology Residents: Lecture versus Interactive Learning Module

Maloney E, Hippe DS, Paladin A, Chew FS, Ha AS. Acad Radiol. 2016 Jul;23(7):789-96. doi: 10.1016/j.acra.2015.11.018. Epub 2016 Apr 8.

RATIONALE AND OBJECTIVES:

A prospective randomized study was conducted to assess whether an electronic learning module was as effective as a didactic lecture to teach musculoskeletal ultrasound to radiology residents.

MATERIALS AND METHODS:

Thirty-three residents were randomized into a module group versus a didactic group. All residents took a written "pretest" to assess baseline knowledge. Subsequently, the 17 residents in the didactic group attended a live didactic session delivered by a subspecialist musculoskeletal radiology faculty member. The 16 residents in the module group completed an electronic learning module that contained similar content to the live didactic session. Finally, all residents completed a written "posttest," which served as the outcome measure.

RESULTS:

Mean score significantly improved between pre- and posttest by $10.6 \pm 11.2\%$ in the didactic group (DG; $P = 0.002$) and $14.0 \pm 8.2\%$ in the module group (MG; $P < 0.001$), with a nonsignificant difference between groups ($P = 0.4$). Mean pretest scores ($75.6 \pm 9.4\%$ DG and $73.7 \pm 9.2\%$ MG, $P = 0.6$) and posttest scores ($86.2 \pm 9.7\%$ DG and $87.7 \pm 5.2\%$ MG, $P = 0.5$) were not significantly different. The adjusted mean difference in posttest scores between groups was -1.9% (95% confidence interval: -7.2 to 3.5%).

CONCLUSION:

If didactic training was better than electronic module training, the difference was relatively small ($<5\%$). A similar web-based, interactive module could be employed to teach American Board of Radiology Core Examination and Accreditation Council for Graduate Medical Education (ACGME) Diagnostic Radiology Milestone musculoskeletal ultrasound learning objectives to radiology residents. An electronic module could reduce demands on faculty staff time invested in musculoskeletal ultrasound training and be more widely available to residents.

To the Point: Integrating Patient Safety Education into the Obstetrics and Gynecology Undergraduate Curriculum

Abbott JF, Pradhan A, Buery-Joyner S, Casey PM, Chuang A, Dugoff L, Dalrymple JL, Forstein DA, Hampton BS, Hueppchen NA, Kaczmarczyk JM, Katz NT, Nuthalapaty FS, Page-Ramsey S, Wolf A, Cullimore AJ; APGO Undergraduate Medical Education Committee. *J Patient Saf.* 2016 Jul 26.

ABSTRACT:

This article is part of the To the Point Series prepared by the Association of Professors of Gynecology and Obstetrics Undergraduate Medical Education Committee. Principles and education in patient safety have been well integrated into academic obstetrics and gynecology practices, although progress in safety profiles has been frustratingly slow. Medical students have not been included in the majority of these ambulatory practice or hospital-based initiatives. Both the Association of American Medical Colleges and Accreditation Council for Graduate Medical Education have recommended incorporating students into safe practices. The Accreditation Council for Graduate Medical Education milestone 1 for entering interns includes competencies in patient safety. We present data and initiatives in patient safety, which have been successfully used in undergraduate and graduate medical education. In addition, this article demonstrates how using student feedback to assess sentinel events can enhance safe practice and quality improvement programs. Resources and implementation tools will be discussed to provide a template for incorporation into educational programs and institutions.

Medical student involvement in the culture of safety is necessary for the delivery of both high- quality education and high-quality patient care. It is essential to incorporate students into the ongoing development of patient safety curricula in obstetrics and gynecology.

"What Program Directors Think" III: Results of the 2014/2015 Annual Surveys of the Association of Program Directors in Radiology (APDR)

Rozenstein A, Heitkamp DE, Muhammed TL, Sclamborg JS, Paladin AM, Smith SE, Nguyen JB, Robbin M. Acad Radiol. 2016 Jul;23(7):861-9. doi: 10.1016/j.acra.2016.03.005. Epub 2016 Jun 8.

RATIONALE AND OBJECTIVES:

The Association of Program Directors in Radiology regularly surveys its members regarding issues of importance to support radiology residency programs and their directors.

MATERIALS AND METHODS:

This is an observational cross-sectional study using two Web-based surveys posed to the Association of Program Directors in Radiology membership in the fall of 2014 (49 items) and the spring of 2015 (46 items) on the subjects of importance to the members, including the Accreditation Council on Graduate Medical Education Milestones, the Non-Interpretative Skills Curriculum, the American Board of Radiology Core Examination, the effect of the new resident testing and program accreditation paradigms on training outcomes, the 2015 Residency Match, the Interventional Radiology/Diagnostic Radiology (IR/DR) Residency, and Program Director (PD)/Program Coordinator resources.

RESULTS:

Responses were collected electronically, results were tallied using Survey Monkey software, and qualitative responses were tabulated or summarized as comments. Findings were reported during the 63rd annual meeting of the Association of University Radiologists. The maximal response rate was 33% in the fall of 2014 and 36% in the spring of 2015.

CONCLUSIONS:

PDs believed that the radiology Milestones, now largely implemented, did not affect overall resident evaluation, was not reflective of resident experience, and actually made evaluation of residents more difficult. PDs also felt that although the American Board of Radiology oral examination had been a better test for clinical practice preparedness, their new residents knew at least as much as before. There was little evidence of recall reemergence. The radiology training community saw a drop in residency applicant quality as demonstrated by the United States Medical Licensing Examination scores and clinical rotation grades. Because the new IR/DR Residency positions were to be funded at the expense of the traditional DR positions, the majority of PDs expected a negative effect of the impending IR/DR match on their DR recruitment. PDs were in favor of a unified clinical radiology curriculum similar to the Radiological Society of North America online physics modules.

Teaching the Healthcare Economics Milestones to Radiology Residents: Our Pilot Curriculum Experience

Prober AS, Mehan WA Jr, Bedi HS. Acad Radiol. 2016 Jul;23(7):885-8. doi: 10.1016/j.acra.2016.02.014. Epub 2016 Apr 1.

RATIONALE AND OBJECTIVES:

Since July 2013, the Accreditation Council for Graduate Medical Education (ACGME) has required radiology residency programs to implement a set of educational milestones to track residents' educational advancement in six core competencies, including Systems-based Practice. The healthcare economics subcompetency of Systems-based Practice has traditionally been relatively neglected, and given the new increased ACGME oversight, will specifically require greater focused attention.

MATERIALS AND METHODS:

A multi-institutional health-care economics pilot curriculum combining didactic and practical components was implemented across five residency programs. The didactic portion included a package of online recorded presentations, reading, and testing materials developed by the American College of Radiology (ACR's) Radiology Leadership Institute. The practical component involved a series of local meetings led by program faculty with the production of a deliverable based on research of local reimbursement for a noncontrast head computed tomography. The capstone entailed the presentation of each program's deliverable during a live teleconference webcast with a Radiology Leadership Institute content expert acting as moderator and discussion leader.

RESULTS:

The pilot curriculum was well received by residents and faculty moderators, with 100% of survey respondents agreeing that the pilot met its objective of introducing how reimbursement works in American radiology in 2015 and how business terminology applies to their particular institutions.

CONCLUSION:

A health-care economics curriculum in the style of a Massive Open Online Course has strong potential to serve as many residency programs' method of choice in meeting the health-care economics milestones.

What's New in 10 Years? A Revised Cardiothoracic Curriculum for Diagnostic Radiology Residency with Goals and Objectives Related to General Competencies

Nguyen ET, Ackman JB, Rajiah P, Little B, Wu C, Bueno JM, Gilman MD, Christensen JD, Madan R, Laroia AT, Lee C, Kanne JP, Collins J. Acad Radiol. 2016 Jul;23(7):911-8. doi: 10.1016/j.acra.2016.01.022. Epub 2016 May 27.

ABSTRACT:

This is a cardiothoracic curriculum document for radiology residents meant to serve not only as a study guide for radiology residents but also as a teaching and curriculum reference for radiology educators and radiology residency program directors. This document represents a revision of a cardiothoracic radiology resident curriculum that was published 10 years ago in Academic Radiology. The sections that have been significantly revised, expanded, or added are (1) lung cancer screening, (2) lung cancer genomic profiling, (3) lung adenocarcinoma revised nomenclature, (4) lung biopsy technique, (5) nonvascular thoracic magnetic resonance, (6) updates to the idiopathic interstitial pneumonias, (7) cardiac computed tomography updates, (8) cardiac magnetic resonance updates, and (9) new and emerging techniques in cardiothoracic imaging. This curriculum was written and endorsed by the Education Committee of the Society of Thoracic Radiology. This curriculum operates in conjunction with the Accreditation Council for Graduate Medical Education (ACGME) milestones project that serves as a framework for semiannual evaluation of resident physicians as they progress through their training in an ACGME-accredited residency or fellowship programs. This cardiothoracic curriculum document is meant to serve not only as a more detailed guide for radiology trainees, educators, and program directors but also complementary to and guided by the ACGME milestones.

Shortening the Miles to the Milestones: Connecting EPA-Based Evaluations to ACGME Milestone Reports for Internal Medicine Residency Programs

Choe JH, Knight CL, Stiling R, Corning K, Lock K, Steinberg KP. Acad Med. 2016 Jul;91(7):943- 50. doi: 10.1097/ACM.0000000000001161.

ABSTRACT:

The Next Accreditation System requires internal medicine training programs to provide the Accreditation Council for Graduate Medical Education (ACGME) with semiannual information about each resident's progress in 22 subcompetency domains. Evaluation of resident "trustworthiness" in performing entrustable professional activities (EPAs) may offer a more tangible assessment construct than evaluations based on expectations of usual progression toward competence. However, translating results from EPA-based evaluations into ACGME milestone progress reports has proven to be challenging because the constructs that underlay these two systems differ. The authors describe a process to bridge the gap between rotation-specific EPA-based evaluations and ACGME milestone reporting. Developed at the University of Washington in 2012 and 2013, this method involves mapping EPA-based evaluation responses to "milestone elements," the narrative descriptions within the columns of each of the 22 internal medicine subcompetencies. As faculty members complete EPA-based evaluations, the mapped milestone elements are automatically marked as "confirmed." Programs can maintain a database that tallies the number of times each milestone element is confirmed for a resident; these data can be used to produce graphical displays of resident progress along the internal medicine milestones. Using this count of milestone elements allows programs to bridge the gap between faculty assessments of residents based on rotation-specific observed activities and semiannual ACGME reports based on the internal medicine milestones. Although potentially useful for all programs, this method is especially beneficial to large programs where clinical competency committee members may not have the opportunity for direct observation of all residents.

A Survey of Ultrasound Milestone Incorporation into Emergency Medicine Training Programs

Smalley CM, Dorey A, Thiessen M, Kendall JL. J Ultrasound Med. 2016 Jul;35(7):1517-21. doi: 10.7863/ultra.15.09012. Epub 2016 Jun 7.

OBJECTIVES:

With the introduction of the Emergency Medicine Milestone Project in 2013, residencies now assess emergency ultrasound (US) skills at regular intervals. However, it is unclear how programs are implementing the emergency US milestones and assessing competency. With the use of the milestone tool, a survey was distributed to emergency US educators to determine when programs are providing emergency US education, when residents are expected to attain competency, and whether the milestones reflect their expectations of trainees.

METHODS:

We conducted a prospective cross-sectional survey study distributed electronically to designated emergency US experts at 169 programs. Participants were queried on education and competency evaluation within the context of the milestones by designating a postgraduate year when the 5 milestone levels were taught and competency was expected. Survey findings were reported as percentages of total respondents from descriptive statistics.

RESULTS:

Responses were received from 53% of programs, and 99% were familiar with the milestones. Most programs provide level 1 (88%) and 2 (85%) instruction during postgraduate year 1. Most programs expect level 1 competency before residency (61%) and expect mastery of level 2 by the end of postgraduate year 1 (60%). Sixty-two percent believe the milestones do not accurately reflect their expectations, citing insufficient minimum scan numbers, lack of specificity, and unattainable level 5 requirements.

CONCLUSIONS:

There is substantial variability in the frequency and methods of competency evaluation using the emergency US milestones. However, most responders agree that residents should obtain level 2 competency by postgraduate year 1. Variation exists regarding what year and what skills define level 3 or greater competency.

Teaching and Assessing Ethics in the Newborn ICU

Cummings CL. *Semin Perinatol.* 2016 Jun;40(4):261-9. doi: 10.1053/j.semperi.2015.12.016. Epub 2016 Jan 29.

ABSTRACT:

Ethics and professionalism education has become increasingly recognized as important and incorporated into graduate medical education. However, such education has remained largely unstructured and understudied in neonatology. Neonatal-perinatal fellowship training programs have generally grappled with how best to teach and assess ethics and professionalism knowledge, skills, and behavior in clinical practice, particularly in light of accreditation requirements, milestones, and competencies. This article reviews currently available teaching methods, pedagogy, and resources in medical ethics, professionalism, and communication, as well as assessment strategies and tools, to help medical educators and practicing clinicians ensure trainees achieve and maintain competency. The need for consensus and future research in these domains is also highlighted.

Observing and Giving Feedback to Novice PGY-1s

Tully K, Keller J, Blatt B, Greenberg L. South Med J. 2016 May;109(5):320-5. doi: 10.14423/ SMJ.0000000000000459.

OBJECTIVES:

In this new era of educational milestones and entrustable professional activities, residency programs have recognized the need to directly observe resident performance. In fact, there is little information about how often residents are observed, what procedures they perform early in training, and whether they receive feedback. Previous publications have addressed these issues exclusively through retrospective survey analyses. The purpose of this naturalistic point-of-care study was to answer the following questions about obstetrics/ gynecology (OB/GYN) residents in their second month of training: what activities do residents report performing, how often are they observed and who observes them, how often do they receive feedback and what is their perception of its usefulness, and does the time of shift affect the frequency of observation and feedback?

METHODS:

Nine of 10 first-year OB/GYN residents at George Washington University Hospital participated in a month-long study during their second month of training. Based on point-of-care experiences, participants prospectively recorded the time of shift, activities performed, the person who observed them, whether they received feedback, and whether it was perceived as helpful.

RESULTS:

First-year OB/GYN residents (postgraduate year 1 [PGY-1]) perform a variety of activities early in training while being observed by senior residents, nurses, and attending physicians 70% of the time. Residents commented that feedback was helpful almost every time they received it, regardless of who provided the feedback. There were no significant differences in the quantity of observations and feedback received between day and night shifts; however, nurses and senior residents were most likely to observe residents during night shifts.

CONCLUSIONS:

In this naturalistic pilot study, OB/GYN residents reported performing various procedures in their second month of training, with some observations from faculty, senior residents, and nurses. Feedback, as defined in the study, is an important aspect of their early training, although it is not reported with each patient encounter. This pilot study raises critical issues that need further study, such as the following: What should be the gold standard for observing residents around a particular activity? Where should the bar be set for types and numbers of procedures that residents perform early on in training, either with patients or in simulations? What is an acceptable feedback rate around patient encounters? Should we not consider training nurses and senior residents to deliver effective feedback to residents as part of a 360-degree process, because many trainees were observed most frequently by these members of the medical team?

A Cross-Sectional Study of Medical Student Knowledge of Evidence-Based Medicine as Measured by the Fresno Test of Evidence-Based Medicine

Smith AB, Semler L, Rehman EA, Haddad ZG, Ahmadzadeh KL, Crellin SJ, Falkowska K, Kendig KA, Steinweg BH, Dusza SW, Glenn-Porter B, Kane BG. *J Emerg Med.* 2016 May;50(5):759-64. doi: 10.1016/j.jemermed.2016.02.006. Epub 2016 Mar 5.

BACKGROUND:

Evidence-based medicine (EBM) has been included in the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Emergency Medicine (ABEM) milestones project as a required component during emergency medicine (EM) residency training. Milestone Level One states that graduating medical students must be able to "describe basic principles of EBM."

OBJECTIVE:

We sought to identify the EBM skills of third- and fourth-year medical students.

METHODS:

Our institution, a network with 17 different residencies, hosts US osteopathic and allopathic medical students. As a part of orientation, students are required to complete an entry Fresno Test of EBM (FTEBM). Retrospectively, medical student FTEBM scores from 2011 were assessed using descriptive statistics.

RESULTS:

Four hundred seventeen FTEBM scores were analyzed. Participants represented 40 medical schools, including 17 allopathic (MD) and 23 osteopathic (DO) schools. Fifty percent of participants (n = 210) were female, and 51.6% (n = 215) were from a DO medical school.

Overall mean performance for the FTEBM was 47.2%. Exploring the results by individual question were (individual EBM question topics are in parentheses): 1A (study question), 62.0%; 1B (study question), 64.4%; 2 (sources of evidence), 67.6%; 3 (study design), 57.1%; 4 (search strategies), 53.2%; 5 (relevance), 41.2%; 6 (internal validity), 43.6%; 7 (magnitude), 37.8%; 8 (two-by-two grids), 30.0%; 9 (number needed to treat), 16.9%; 10 (confidence intervals), 34.3%; 11 (diagnosis), 5.0%; and 12 (prognosis), 43.4%.

CONCLUSIONS:

As measured by the FTEBM, senior medical students demonstrate understanding of about half of EBM. EM residencies can anticipate the need to instruct their residents in EBM concepts in order to meet ACGME/ABEM milestone requirements.

Reporting Achievement of Medical Student Milestones to Residency Program Directors: An Educational Handover

Sozener CB, Lypson ML, House JB, Hopson LR, Dooley-Hash SL, Hauff S, Eddy M, Fischer JP, Santen SA. Acad Med. 2016 May;91(5):676-84. doi: 10.1097/ACM.0000000000000953.

PROBLEM:

Competency-based education, including assessment of specialty-specific milestones, has become the dominant medical education paradigm; however, how to determine baseline competency of entering interns is unclear-as is to whom this responsibility falls. Medical schools should take responsibility for providing residency programs with accurate, competency-based assessments of their graduates.

APPROACH:

A University of Michigan ad hoc committee developed (spring 2013) a post-Match, milestone-based medical student performance evaluation for seven students matched into emergency medicine (EM) residencies. The committee determined EM milestone levels for each student based on assessments from the EM clerkship, end-of-third-year multistation standardized patient exam, EM boot camp elective, and other medical school data.

OUTCOMES:

In this feasibility study, the committee assessed nearly all 23 EM milestones for all seven graduates, shared these performance evaluations with the program director (PD) where each student matched, and subsequently surveyed the PDs regarding this pilot. Of the five responding PDs, none reported using the traditional medical student performance evaluation to customize training, four (80%) indicated that the proposed assessment provided novel information, and 100% answered that the assessment would be useful for all incoming trainees.

NEXT STEPS:

An EM milestone-based, post-Match assessment that uses existing assessment data is feasible and may be effective for communicating competency-based information about medical school graduates to receiving residency programs. Next steps include further aligning assessments with competencies, determining the benefit of such an assessment for other specialties, and articulating the national need for an effective educational handover tool between undergraduate and graduate medical education institutions.

Rating the Quality of Entrustable Professional Activities: Content Validation and Associations with the Clinical Context

Post JA, Wittich CM, Thomas KG, Dupras DM, Halvorsen AJ, Mandrekar JN, Oxentenko AS, Beckman TJ. *J Gen Intern Med.* 2016 May;31(5):518-23. doi: 10.1007/s11606-016-3611-8. Epub 2016 Feb 22.

BACKGROUND:

Entrustable professional activities (EPAs) have been developed to assess resident physicians with respect to Accreditation Council for Graduate Medical Education (ACGME) competencies and milestones. Although the feasibility of using EPAs has been reported, we are unaware of previous validation studies on EPAs and potential associations between EPA quality scores and characteristics of educational programs.

OBJECTIVES:

Our aim was to validate an instrument for assessing the quality of EPAs for assessment of internal medicine residents, and to examine associations between EPA quality scores and features of rotations.

DESIGN:

This was a prospective content validation study to design an instrument to measure the quality of EPAs that were written for assessing internal medicine residents.

PARTICIPANTS:

Residency leadership at Mayo Clinic, Rochester participated in this study. This included the Program Director, Associate program directors and individual rotation directors.

INTERVENTIONS:

The authors reviewed salient literature. Items were developed to reflect domains of EPAs useful for assessment. The instrument underwent further testing and refinement. Each participating rotation director created EPAs that they felt would be meaningful to assess learner performance in their area. These 229 EPAs were then assessed with the QUEPA instrument to rate the quality of each EPA.

MAIN MEASURES:

Performance characteristics of the QUEPA are reported. Quality ratings of EPAs were compared to the primary ACGME competency, inpatient versus outpatient setting and specialty type.

KEY RESULTS:

QUEPA tool scores demonstrated excellent reliability (ICC range 0.72 to 0.94). Higher ratings were given to inpatient versus outpatient (3.88, 3.66; $p = 0.03$) focused EPAs. Medical knowledge EPAs scored significantly lower than EPAs assessing other competencies (3.34, 4.00; $p < 0.0001$).

CONCLUSIONS:

The QUEPA tool is supported by good validity evidence and may help in rating the quality of EPAs developed by individual programs. Programs should take care when writing EPAs for the outpatient setting or to assess medical knowledge, as these tended to be rated lower.

Ensuring Resident Competence: A Narrative Review of the Literature on Group Decision Making to Inform the Work of Clinical Competency Committees

Hauer KE, Cate OT, Boscardin CK, Iobst W, Holmboe ES, Chesluk B, Baron RB, O'Sullivan PS. *J Grad Med Educ.* 2016 May;8(2):156-64. doi: 10.4300/JGME-D-15-00144.1.

INTRODUCTION:

The expectation for graduate medical education programs to ensure that trainees are progressing toward competence for unsupervised practice prompted requirements for a committee to make decisions regarding residents' progress, termed a clinical competency committee (CCC). The literature on the composition of these committees and how they share information and render decisions can inform the work of CCCs by highlighting vulnerabilities and best practices.

OBJECTIVE:

We conducted a narrative review of the literature on group decision making that can help characterize the work of CCCs, including how they are populated and how they use information.

METHODS:

English language studies of group decision making in medical education, psychology, and organizational behavior were used.

RESULTS:

The results highlighted 2 major themes. Group member composition showcased the value placed on the complementarity of members' experience and lessons they had learned about performance review through their teaching and committee work. Group processes revealed strengths and limitations in groups' understanding of their work, leader role, and information-sharing procedures. Time pressure was a threat to the quality of group work.

CONCLUSIONS:

Implications of the findings include the risks for committees that arise with homogeneous membership, limitations to available resident performance information, and processes that arise through experience rather than deriving from a well-articulated purpose of their work. Recommendations are presented to maximize the effectiveness of CCC processes, including their membership and access to, and interpretation of, information to yield evidence-based, well-reasoned judgments.

Reflections in a Time of Transition: Orthopaedic Faculty and Resident Understanding of Accreditation Schemes and Opinions on Surgical Skills Feedback

Gundle KR, Mickelson DT, Hanel DP. Med Educ Online. 2016 Apr 12;21:30584. doi: 10.3402/meo.v21.30584. eCollection 2016.

INTRODUCTION:

Orthopaedic surgery is one of the first seven specialties that began collecting Milestone data as part of the Accreditation Council for Graduate Medical Education's Next Accreditation System (NAS) rollout. This transition from process-based advancement to outcome-based education is an opportunity to assess resident and faculty understanding of changing paradigms, and opinions about technical skill evaluation.

METHODS:

In a large academic orthopaedic surgery residency program, residents and faculty were anonymously surveyed. A total of 31/32 (97%) residents and 29/53 (55%) faculty responded to Likert scale assessments and provided open-ended responses. An internal end-of-rotation audit was conducted to assess timeliness of evaluations. A mixed-method analysis was utilized, with nonparametric statistical testing and a constant-comparative qualitative method.

RESULTS:

There was greater familiarity with the six core competencies than with Milestones or the NAS ($p < 0.05$). A majority of faculty and residents felt that end-of-rotation evaluations were not adequate for surgical skills feedback. Fifty-eight per cent of residents reported that end-of-rotation evaluations were rarely or never filled out in a timely fashion. An internal audit demonstrated that more than 30% of evaluations were completed over a month after rotation end. Qualitative analysis included themes of resident desire for more face-to-face feedback on technical skills after operative cases, and several barriers to more frequent feedback.

DISCUSSION:

The NAS and outcome-based education have arrived. Residents and faculty need to be educated on this changing paradigm. This transition period is also a window of opportunity to address methods of evaluation and feedback. In our orthopaedic residency, trainees were significantly less satisfied than faculty with the amount of technical and surgical skills feedback being provided to trainees. The quantitative and qualitative analyses converge on one theme: a desire for frequent, explicit, timely feedback after operative cases. To overcome the time-limited clinical environment, feedback tools need to be easily integrated and efficient. Creative solutions may be needed to truly achieve outcome-based graduate medical education.

The Problem Resident Behavior Guide: Strategies for Remediation

Williamson K, Quattromani E, Aldeen A. Intern Emerg Med. 2016 Apr;11(3):437-49. doi: 10.1007/s11739-015-1367-5. Epub 2015 Dec 14.

ABSTRACT:

In 2012, the ACGME supplemented the core competencies with outcomes-based milestones for resident performance within the six competency domains. These milestones address the knowledge, skills, abilities, attitudes, and experiences that a resident is expected to progress through during the course of training. Even prior to the initiation of the milestones, there was a paucity of EM literature addressing the remediation of problem resident behaviors and there remain few readily accessible tools to aid in the implementation of a remediation plan. The goal of the "Problem Resident Behavior Guide" is to provide specific strategies for resident remediation based on deficiencies identified within the framework of the EM milestones. The "Problem Resident Behavior Guide" is a written instructional manual that provides concrete examples of remediation strategies to address specific milestone deficiencies. The more than 200 strategies stem from the experiences of the authors who have professional experience at three different academic hospitals and emergency medicine residency programs, supplemented by recommendations from educational leaders as well as utilization of valuable education adjuncts, such as focused simulation exercises, lecture preparation, and themed ED shifts. Most recommendations require active participation by the resident with guidance by faculty to achieve the remediation expectations. The ACGME outcomes-based milestones aid in the identification of deficiencies with regards to resident performance without providing recommendations on remediation. The Problem Resident Behavior Guide can therefore have a significant impact by filling in this gap.

Entrustable Professional Activities: Ten Things Radiologists Do

Deitte LA, Gordon LL, Zimmerman RD, Stern EJ, McLoud TC, Diaz-Marchan PJ, Mullins ME. Acad Radiol. 2016 Mar;23(3):374-81. doi: 10.1016/j.acra.2015.11.010. Epub 2016 Jan 15.

RATIONALE AND OBJECTIVES:

Learner assessment in medical education has undergone tremendous change over the past two decades. During this time frame, the concept of Entrustable Professional Activities (EPAs) was introduced to guide the faculty when making competency-based decisions on the level of supervision required by trainees. EPAs are gaining momentum in medical education as a basis for decisions related to transitioning from residency training to clinical practice. The purpose of this article is twofold: (1) define EPAs for radiology (EPA-R) and (2) illustrate radiology-specific examples of these EPAs.

MATERIALS AND METHODS:

A multi-institutional work group composed of members of the Alliance of Directors and Vice Chairs of Education in Radiology convened at the 2015 Association of University Radiologists annual meeting to discuss radiology EPAs. The EPAs initially developed by the Accreditation Council for Graduate Medical Education (ACGME) Radiology milestone work group and the resultant ACGME Radiology milestones formed the basis for this discussion.

RESULTS:

A total of 10 radiology EPAs and illustrative vignettes were developed to help radiology educators and trainees better understand milestone assessment and how this translates to the necessary skills and responsibilities of practicing radiologists. Examples of EPA mapping to the ACGME subcompetencies and methods of assessment were included.

CONCLUSIONS:

EPAs offer an opportunity to improve our approach to training by increasing our focus on how we provide appropriate supervision to our residents and assess their progress. In this work, through suggested lists and vignettes, we have attempted to establish the framework for further discussion and development of EPA-Rs.

Survey of the Child Neurology Program Coordinator Association: Workforce Issues and Readiness for the Next Accreditation System

Feist TB, Campbell JL, LaBare JA, Gilbert DL. *J Child Neurol*. 2016 Mar;31(3):333-7. doi: 10.1177/0883073815592226. Epub 2015 Jun 26.

ABSTRACT:

In preparation for the implementation of the Next Accreditation System in Child Neurology, the authors organized the first meeting of child neurology program coordinators in October 2014. A workforce and program-readiness survey was conducted initially. Coordinator job titles varied widely. Most respondents (65%) managed 1 or more fellowships plus child neurology residency. Most had worked in graduate medical education less than 5 years (53%), with no career path (88%), supervised by someone without graduate medical education experience (85%), in divisions where faculty knowledge was judged inadequate (72%). A small proportion of programs had established clinical competency committee policies (28%) and was ready to implement milestone-based evaluations (56%). A post-conference survey demonstrated substantial improvements in relevant skills. The complexity of residency program management in the Next Accreditation System era supports substantive modifications to the program coordinator role. Such changes should include defined career pathway, managerial classification, administrative support, and continuing education.

A Suggested Emergency Medicine Boot Camp Curriculum for Medical Students Based on the Mapping of Core Entrustable Professional Activities to Emergency Medicine Level 1 Milestones

Lamba S, Wilson B, Natal B, Nagurka R, Anana M, Sule H. *Adv Med Educ Pract.* 2016 Mar 1;7:115-24. doi: 10.2147/AMEP.S97106. eCollection 2016.

BACKGROUND:

An increasing number of students rank Emergency Medicine (EM) as a top specialty choice, requiring medical schools to provide adequate exposure to EM. The Core Entrustable Professional Activities (EPAs) for Entering Residency by the Association of American Medical Colleges combined with the Milestone Project for EM residency training has attempted to standardize the undergraduate and graduate medical education goals. However, it remains unclear as to how the EPAs correlate to the milestones, and who owns the process of ensuring that an entering EM resident has competency at a certain minimum level. Recent trends establishing specialty-specific boot camps prepare students for residency and address the variability of skills of students coming from different medical schools.

OBJECTIVE:

Our project's goal was therefore to perform a needs assessment to inform the design of an EM boot camp curriculum. Toward this goal, we 1) mapped the core EPAs for graduating medical students to the EM residency Level 1 milestones in order to identify the possible gaps/needs and 2) conducted a pilot procedure workshop that was designed to address some of the identified gaps/needs in procedural skills.

METHODS:

In order to inform the curriculum of an EM boot camp, we used a systematic approach to 1) identify gaps between the EPAs and EM milestones (Level 1) and 2) determine what essential and supplemental competencies/skills an incoming EM resident should ideally possess. We then piloted a 1-day, three-station advanced ABCs procedure workshop based on the identified needs. A pre-workshop test and survey assessed knowledge, preparedness, confidence, and perceived competence. A post-workshop survey evaluated the program, and a posttest combined with psychomotor skills test using three simulation cases assessed students' skills.

RESULTS:

Students (n=9) reported increased confidence in the following procedures: intubation (1.5-2.1), thoracostomy (1.1-1.9), and central venous catheterization (1.3-2) (a three-point Likert-type scale, with 1= not yet confident/able to perform with supervision to 3= confident/able to perform without supervision). Psychomotor skills testing showed on average, 26% of students required verbal prompting with performance errors, 48% with minor performance errors, and 26% worked independently without performance errors. All participants reported: 1) increased knowledge and confidence in covered topics and 2) overall satisfaction with simulation experience.

CONCLUSION:

Mapping the Core EPAs for Entering Residency to the EM milestones at Level 1 identifies educational gaps for graduating medical students seeking a career in EM. Educators designing EM boot camps for medical students should consider these identified gaps, procedures, and clinical conditions during the development of a core standardized curriculum.

Driving Care Quality: Aligning Trainee Assessment and Supervision through Practical Application of Entrustable Professional Activities, Competencies, and Milestones

Carraccio C, Englander R, Holmboe ES, Kogan JR. Acad Med. 2016 Feb;91(2):199-203. doi: 10.1097/ACM.0000000000000985.

ABSTRACT:

To address the long-standing challenge of meaningful trainee assessment, the authors reviewed and expanded on the Accountable Assessment for Quality Care and Supervision (AAQCS) equation. The equation proposes that care quality is the product of the interaction between trainee performance (measured by workplace assessment) and supervision (required level of intervention to ensure care quality) in the context of the environment where the care occurs: Trainee performance \times Appropriate supervision = Safe, effective patient-centered care. Assessing trainee performance and matching that performance to "appropriate" supervision, however, is fraught with challenges. The authors suggest a unifying framework that integrates entrustable professional activities (EPAs), competencies, and milestones to inform trainee assessment and supervision, thereby enabling the practical application of the AAQCS equation in the workplace. Because the unit of measure for an EPA is the outcome of whether the trainee can safely and effectively perform the professional activity without supervision, the proposed unifying framework directly aligns with the dependent variable in the AAQCS equation: care quality. The value of applying a unifying framework that integrates EPAs, competencies, and milestones to the AAQCS equation in the clinical learning environment lies in its ability to provide supervisors with a shared mental model of performance expectations for trainees, reducing unwanted variability and improving assessment accuracy; guidance for aligning performance milestones of trainees with the needed level of supervisor intervention to ensure care quality; and substrate for specific feedback to improve the trainee's professional development as a way to ensure future care quality.

Comprehensive Observations of Resident Evolution: A Novel Method for Assessing Procedure-Based Residency Training

Cooney CM, Cooney DS, Bello RJ, Bojovic B, Redett RJ, Lifchez SD. *Plast Reconstr Surg*. 2016 Feb;137(2): 673-8. doi: 10.1097/01.prs.0000475797.69478.0e.

BACKGROUND:

Assessment of surgical skills in the operating room remains a challenge. Increasing documentation requirements of the Accreditation Council for Graduate Medical Education are necessitating mechanisms to document trainee competence without hindering operative turnover. The authors created a comprehensive electronic resource to facilitate plastic surgery training program compliance with changes mandated by Next Accreditation System Milestones and the ACGME.

METHODS:

In 2013, the authors implemented the Comprehensive Observations of Resident Evolution, or CORE, a Web-based tool to assess plastic surgery residents. It comprises a rapid electronic assessment of resident operating room performance completed after each surgery; a data dashboard displaying graphical summaries of resident progress by case, Milestone, or current procedural terminology code; and an electronic Milestones tracker (MileMarker), which enables ongoing trainee assessments.

RESULTS:

From January through October of 2014, 24 residents completed nearly 1300 Operative Entrustability Assessments. Thirty-eight percent of residents reported more immediate feedback regarding operative performance. The assessment demonstrates construct validity, which distinguishes novice residents from experienced residents. Individual case data identify resident-specific operative strengths and weaknesses. Using assessment data, the first two Clinical Competency Committee reviews were 81 percent and 87 percent shorter than Milestones pilot test site reports (average, 11.5 and 8 minutes versus 60 minutes per resident, respectively).

CONCLUSIONS:

Comprehensive Observations of Resident Evolution is capable of capturing operative performance data on all operating room cases by primary current procedural terminology code. It increases immediate attending/ trainee feedback and assessment transparency, enables trainee self-monitoring, and informs end-of-rotation reviews, program-wide assessments, and tailoring of training to address specific needs. It is a valuable resource for tracking resident progress in real-time while maintaining compliance with evolving ACGME requirements.

Assessment of Competence: The Accreditation Council for Graduate Medical Education/Residency Review Committee Perspective

Potts JR 3rd. Surg Clin North Am. 2016 Feb;96(1):15-24. doi: 10.1016/j.suc.2015.08.008.

ABSTRACT:

Competency is an individual trait. As an agency that accredits programs and institutions, the Accreditation Council for Graduate Medical Education (ACGME) does not define or assess competency. However, in the past 15 years the ACGME has promulgated several initiatives to aid programs in the assessment of the competence of their residents and fellows. Those initiatives include the Outcomes Project (which codified the competencies), the Milestones, and the Clinical Learning Environment Review Program. In the near future, the ACGME will implement an initiative by which programs can develop and study the results of competency-based residency curricula.

Academic Affairs and Global Health: How Global Health Electives Can Accelerate Progress towards ACGME Milestones

Hayward AS, Jacquet GA, Sanson T, Mowafi H, Hansoti B. *Int J Emerg Med*. 2015 Dec;8(1):45. doi: 10.1186/s12245-015-0093-0. Epub 2015 Dec 2.

ABSTRACT:

Global health electives (GHEs) have become a standard offering in many residency programs. Residency electives should aid residents in achieving outcomes in the Accreditation Council for Graduate Medical Education (ACGME) competency domains. In this paper, the authors review existing literature and provide expert opinion to highlight how global health electives can complement traditional training programs to assist residents in achieving ACGME milestones, using emergency medicine residency as an example. Recommendations are provided for identifying exemplary global health electives and for the development of institutional global health elective curricula in order to facilitate milestone achievement. Global health electives can advance progress towards ACGME milestones; however, they may vary greatly in terms of potential for learner advancement. Electives should thus be rigorously vetted to ensure they meet standards that will facilitate this process. Given that milestones are a newly introduced tool for assessing resident educational achievement, very little research is available currently to directly determine impacts, and further study will be needed.

Using Transitional Year Milestones to Assess Graduating Medical Students' Skills during a Capstone Course

Clay AS, Andolsek K, Grochowski CO, Engle DL, Chudgar SM. J Grad Med Educ. 2015 Dec;7(4):658-62. doi: 10.4300/JGME-D-14-00569.1.

BACKGROUND:

Undergraduate medical education (UME) follows the lead of graduate medical education (GME) in moving to competency-based assessment. The means for and the timing of competency-based assessments in UME are unclear.

OBJECTIVE:

We explored the feasibility of using the Accreditation Council for Graduate Medical Education Transitional Year (TY) Milestones to assess student performance during a mandatory, fourth-year capstone course.

METHODS:

Our single institution, observational study involved 99 medical students who completed the course in the spring of 2014. Students' skills were assessed by self, peer, and faculty assessment for 6 existing course activities using the TY Milestones. Evaluation completion rates and mean scores were calculated.

RESULTS:

Students' mean milestone levels ranged between 2.2 and 3.6 (on a 5-level scoring rubric). Level 3 is the performance expected at the completion of a TY. Students performed highest in breaking bad news and developing a quality improvement project, and lowest in developing a learning plan, working in interdisciplinary teams, and stabilizing acutely ill patients. Evaluation completion rates were low for some evaluations, and precluded use of the data for assessing student performance in the capstone course. Students were less likely to complete separate online evaluations. Faculty were less likely to complete evaluations when activities did not include dedicated time for evaluations.

CONCLUSIONS:

Assessment of student competence on 9 TY Milestones during a capstone course was useful, but achieving acceptable evaluation completion rates was challenging. Modifications are necessary if milestone scores from a capstone are intended to be used as a handoff between UME and GME.

Have First-Year Emergency Medicine Residents Achieved Level 1 on Care-Based Milestones?

Weizberg M, Bond MC, Cassara M, Doty C, Seamon J. J Grad Med Educ. 2015 Dec;7(4):589-94

BACKGROUND:

Residents in Accreditation Council for Graduate Medical Education accredited emergency medicine (EM) residencies were assessed on 23 educational milestones to capture their progression from medical student level (Level 1) to that of an EM attending physician (Level 5). Level 1 was conceptualized to be at the level of an incoming postgraduate year (PGY)-1 resident; however, this has not been confirmed.

OBJECTIVES:

Our primary objective in this study was to assess incoming PGY-1 residents to determine what percentage achieved Level 1 for the 8 emergency department (ED) patient care-based milestones (PC 1- 8), as assessed by faculty. Secondary objectives involved assessing what percentage of residents had achieved Level 1 as assessed by themselves, and finally, we calculated the absolute differences between self- and faculty assessments.

METHODS:

Incoming PGY-1 residents at 4 EM residencies were assessed by faculty and themselves during their first month of residency. Performance anchors were adapted from ACGME milestones.

RESULTS:

Forty-one residents from 4 programs were included. The percentage of residents who achieved Level 1 for each subcompetency on faculty assessment ranged from 20% to 73%, and on self-assessment from 34% to 92%. The majority did not achieve Level 1 on faculty assessment of milestones PC-2, PC-3, PC-5a, and PC-6, and on self-assessment of PC-3 and PC-5a. Self-assessment was higher than faculty assessment for PC-2, PC-5b, and PC-6.

CONCLUSIONS:

Less than 75% of PGY-1 residents achieved Level 1 for ED care-based milestones. The majority did not achieve Level 1 on 4 milestones. Self-assessments were higher than faculty assessments for several milestones.

Use of a Formal Assessment Instrument for Evaluation of Resident Operative Skills in Pediatric Neurosurgery

Hadley C, Lam SK, Briceño V, Luerssen TG, Jea A. *J Neurosurg Pediatr*. 2015 Nov;16(5):497- 504. doi: 10.3171/2015.1.PEDS14511. Epub 2015 Aug 28.

OBJECTIVE:

Currently there is no standardized tool for assessment of neurosurgical resident performance in the operating room. In light of enhanced requirements issued by the Accreditation Council for Graduate Medical Education's Milestone Project and the Matrix Curriculum Project from the Society of Neurological Surgeons, the implementation of such a tool seems essential for objective evaluation of resident competence. Beyond compliance with governing body guidelines, objective assessment tools may be useful to direct early intervention for trainees performing below the level of their peers so that they may be given more hands-on teaching, while strong residents can be encouraged by faculty members to progress to conducting operations more independently with passive supervision. The aims of this study were to implement a validated assessment tool for evaluation of operative skills in pediatric neurosurgery and determine its feasibility and reliability.

METHODS:

All neurosurgery residents completing their pediatric rotation over a 6-month period from January 1, 2014, to June 30, 2014, at the authors' institution were enrolled in this study. For each procedure, residents were evaluated by means of a form, with one copy being completed by the resident and a separate copy being completed by the attending surgeon. The evaluation form was based on the validated Objective Structured Assessment of Technical Skills for Surgery (OSATS) and used a 5-point Likert-type scale with 7 categories: respect for tissue; time and motion; instrument handling; knowledge of instruments; flow of operation; use of assistants; and knowledge of specific procedure. Data were then stratified by faculty versus resident (self-) assessment; postgraduate year level; and difficulty of procedure. Descriptive statistics (means and SDs) were calculated, and the results were compared using the Wilcoxon signed-rank test and Student t- test. A p value < 0.05 was considered statistically significant. **RESULTS** Six faculty members, 1 fellow, and 8 residents completed evaluations for 299 procedures, including 32 ventriculoperitoneal (VP) shunt revisions, 23 VP shunt placements, 19 endoscopic third ventriculostomies, and 18 craniotomies for tumor resection. There was no significant difference between faculty and resident self-assessment scores overall or in any of the 7 domains scores for each of the involved residents. On self-assessment, senior residents scored themselves significantly higher ($p < 0.02$) than junior residents overall and in all domains except for "time and motion." Faculty members scored senior residents significantly higher than junior residents only for the "knowledge of instruments" domain ($p = 0.05$). When procedure difficulty was considered, senior residents' scores from faculty members were significantly higher ($p = 0.04$) than the scores given to junior residents for expert procedures only. Senior residents' self- evaluation scores were significantly higher than those of junior residents for both expert ($p = 0.03$) and novice ($p = 0.006$) procedures.

CONCLUSIONS:

OSATS is a feasible and reliable assessment tool for the comprehensive evaluation of neurosurgery resident performance in the operating room. The authors plan to use this tool to assess resident operative skill development and to improve direct resident feedback.

Establishing a Surgical Skills Laboratory and Dissection Curriculum for Neurosurgical Residency Training

Liu JK, Kshetry VR, Recinos PF, Kamian K, Schlenk RP, Benzel EC. J Neurosurg. 2015 Nov;123(5):1331-8.
doi: 10.3171/2014.11.JNS14902. Epub 2015 May 26.

ABSTRACT:

Surgical education has been forced to evolve from the principles of its initial inception, in part due to external pressures brought about through changes in modern health care. Despite these pressures that can limit the surgical training experience, training programs are being held to higher standards of education to demonstrate and document trainee competency through core competencies and milestones. One of the methods used to augment the surgical training experience and to demonstrate trainee proficiency in technical skills is through a surgical skills laboratory. The authors have established a surgical skills laboratory by acquiring equipment and funding from nondepartmental resources, through institutional and private educational grants, along with product donations from industry. A separate educational curriculum for junior- and senior-level residents was devised and incorporated into the neurosurgical residency curriculum. The initial dissection curriculum focused on cranial approaches, with spine and peripheral nerve approaches added in subsequent years. The dissections were scheduled to maximize the use of cadaveric specimens, experimenting with techniques to best preserve the tissue for repeated uses. A survey of residents who participated in at least 1 year of the curriculum indicated that participation in the surgical skills laboratory translated into improved understanding of anatomical relationships and the development of technical skills that can be applied in the operating room. In addition to supplementing the technical training of surgical residents, a surgical skills laboratory with a dissection curriculum may be able to help provide uniformity of education across different neurosurgical training programs, as well as provide a tool to assess the progression of skills in surgical trainees.

How Do Emergency Medicine Residency Programs Structure their Clinical Competency Committees? A Survey

Doty CI, Roppolo LP, Asher S, Seamon JP, Bhat R, Taft S, Graham A, Willis J. Acad Emerg Med. 2015 Nov;22(11):1351-4. doi: 10.1111/acem.12804. Epub 2015 Oct 16.

BACKGROUND:

The Accreditation Council for Graduate Medical Education (ACGME) recently has mandated the formation of a clinical competency committee (CCC) to evaluate residents across the newly defined milestone continuum. The ACGME has been nonproscriptive of how these CCCs are to be structured in order to provide flexibility to the programs.

OBJECTIVES:

No best practices for the formation of CCCs currently exist. We seek to determine common structures of CCCs recently formed in the Council of Emergency Medicine Residency Directors (CORD) member programs and identify unique structures that have been developed.

METHODS:

In this descriptive study, an 18-question survey was distributed via the CORD listserv in the late fall of 2013. Each member program was asked questions about the structure of its CCC. These responses were analyzed with simple descriptive statistics.

RESULTS:

A total of 116 of the 160 programs responded, giving a 73% response rate. Of responders, most (71.6%) CCCs are chaired by the associate or assistant program director, while a small number (14.7%) are chaired by a core faculty member. Program directors (PDs) chair 12.1% of CCCs. Most CCCs are attended by the PD (85.3%) and selected core faculty members (78.5%), leaving the remaining committees attended by any core faculty. Voting members of the CCC consist of the residency leadership either with the PD (53.9%) or without the PD (36.5%) as a voting member. CCCs have an average attendance of 7.4 members with a range of three to 15 members. Of respondents, 53.1% of CCCs meet quarterly while 37% meet monthly. The majority of programs (76.4%) report a system to match residents with a faculty mentor or advisor. Of respondents, 36% include the resident's faculty mentor or advisor to discuss a particular resident. Milestone summaries (determination of level for each milestone) are the primary focus of discussion (93.8%), utilizing multiple sources of information.

CONCLUSIONS:

The substantial variability and diversity found in our CORD survey of CCC structure and function suggest that there are myriad strategies that residency programs can use to match individual program needs and resources to requirements of the ACGME. Identifying a single protocol for CCC structure and development may prove challenging.

Assessing EM Patient Safety and Quality Improvement Milestones Using a Novel Debate Format

Mamtani M, Scott KR, DeRoos FJ, Conlon LW. West J Emerg Med. 2015 Nov;16(6):943-6. doi: 10.5811/westjem.2015.9.27269. Epub 2015 Nov 12.

ABSTRACT:

Graduate medical education is increasingly focused on patient safety and quality improvement; training programs must adapt their curriculum to address these changes. We propose a novel curriculum for emergency medicine (EM) residency training programs specifically addressing patient safety, systems-based management, and practice-based performance improvement, called "EM Debates." Following implementation of this educational curriculum, we performed a cross-sectional study to evaluate the curriculum through resident self-assessment. Additionally, a cross-sectional study to determine the ED clinical competency committee's (CCC) ability to assess residents on specific competencies was performed. Residents were overall very positive towards the implementation of the debates. Of those participating in a debate, 71% felt that it improved their individual performance within a specific topic, and 100% of those that led a debate felt that they could propose an evidence-based approach to a specific topic. The CCC found that it was easier to assess milestones in patient safety, systems-based management, and practice-based performance improvement (sub-competencies 16, 17, and 19) compared to prior to the implementation of the debates. The debates have been a helpful venue to teach EM residents about patient safety concepts, identifying medical errors, and process improvement.

Implementation of Competency-Based Medical Education: Are We Addressing the Concerns and Challenges?

Hawkins RE, Welcher CM, Holmboe ES, Kirk LM, Norcini JJ, Simons KB, Skochelak SE. *Med Educ.* 2015 Nov;49(11):1086-102. doi: 10.1111/medu.12831.

CONTEXT:

Competency-based medical education (CBME) has emerged as a core strategy to educate and assess the next generation of physicians. Advantages of CBME include: a focus on outcomes and learner achievement; requirements for multifaceted assessment that embraces formative and summative approaches; support of a flexible, time-independent trajectory through the curriculum; and increased accountability to stakeholders with a shared set of expectations and a common language for education, assessment and regulation.

OBJECTIVES:

Despite the advantages of CBME, numerous concerns and challenges to the implementation of CBME frameworks have been described, including: increased administrative requirements; the need for faculty development; the lack of models for flexible curricula, and inconsistencies in terms and definitions. Additionally, there are concerns about reductionist approaches to assessment in CBME, lack of good assessments for some competencies, and whether CBME frameworks include domains of current importance. This study will outline these issues and discuss the responses of the medical education community.

METHODS:

The concerns and challenges expressed are primarily categorised as: (i) those related to practical, administrative and logistical challenges in implementing CBME frameworks, and (ii) those with more conceptual or theoretical bases. The responses of the education community to these issues are then summarised.

CONCLUSIONS:

The education community has begun to address the challenges involved in implementing CBME. Models and guidance exist to inform implementation strategies across the continuum of education, and focus on the more efficient use of resources and technology, and the use of milestones and entrustable professional activities-based frameworks. Inconsistencies in CBME definitions and frameworks remain a significant obstacle. Evolution in assessment approaches from in vitro task-based methods to in vivo integrated approaches is responsive to many of the theoretical and conceptual concerns about CBME, but much work remains to be done to bring rigour and quality to work-based assessment.

Pathology Milestones: Assessing Clinical Competency by Committee

Klutts JS, Guerin LA, Bruch LA, Firchau DJ, Knudson CM, Rosenthal NS, Samuelson MI, Jensen CS, Delwiche JL, Krasowski MD. Acad Pathol. 2015 Oct 29;2(4):2374289515614003. doi: 10.1177/2374289515614003. eCollection 2015 Oct-Dec.

ABSTRACT:

All Accreditation Council for Graduate Medical Education accredited pathology residency training programs are now required to evaluate residents using the new Pathology Milestones assessment tool. Similar to implementation of the 6 Accreditation Council for Graduate Medical Education competencies a decade ago, there have been challenges in implementation of the new milestones for many residency programs. The pathology department at the University of Iowa has implemented a process that divides the labor of the task in rating residents while also maintaining consistency in the process. The process is described in detail, and some initial trends in milestone evaluation are described and discussed. Our experience indicates that thoughtful implementation of the Pathology Milestones can provide programs with valuable information that can inform curricular changes.

Reflections on the First 2 Years of Milestone Implementation

Holmboe ES, Yamazaki K, Edgar L, Conforti L, Yaghmour N, Miller RS, Hamstra SJ. J Grad Med Educ. 2015;7(3):506-11. doi: 10.4300/JGME-07-03-43.

-No Abstract Available.

A Retrospective Review of Required Projects in Systems-Based Practice in a Single Anesthesiology Residency: A 10-Year Experience

Sakai T, Emerick TD, Patel RM. *J Clin Anesth.* 2015 Sep;27(6):451-6. doi: 10.1016/j.jclinane. 2015.06.009. Epub 2015 Aug 3.

STUDY OBJECTIVE:

The Accreditation Council for Graduate Medical Education has emphasized in its core competencies and more recently, in its Milestones Project, that residents understand the importance of systems-based practice (SBP). The objectives of the study are to evaluate the quality of residents' SBP projects and to determine the degrees that were subsequently implemented.

DESIGN:

A retrospective educational observational study.

SETTING:

A university-based anesthesiology training institution.

SUBJECTS:

One hundred forty-nine anesthesiology residents in their final (postgraduate year 4) year of training who completed SBP projects for the last 10 years (2004-2013).

INTERVENTIONS:

A structured SBP course was provided for postgraduate year 4 anesthesiology residents with deadlines set such as project identification, data collection, and proposal draft. Each resident's written SBP proposal received inputs by 2 members of the department executive steering committee. The SBP projects concluded with oral presentations by each resident to the department executive steering committee, who provided overall scores.

MEASUREMENTS:

All SBP projects were categorized into 7 categories: safety initiatives, economic analysis, process analysis, policy change recommendations, education initiatives, teamwork/communication, and operating room efficiency. Evaluation scores using a Likert scale (1-9, where 9 is the best) were analyzed. The rate of implementation of project ideas within the department based on the presentations to the executive committee was examined.

MAIN RESULTS:

Of 149 projects, policy change recommendations was the most frequently chosen category (46 projects; 30.9%), followed by process analysis (36 projects; 24.2%). The overall evaluation score was 7.6 ± 0.6 (mean \pm SD). A total of 53 projects (35.6%) were implemented in the department. There was no statistical difference between SBPs with implementation vs SBPs without implementation in terms of evaluation scores, year of the presentation, or categories.

CONCLUSIONS:

This SBP project has given residents the opportunity to participate in a hospital system change aiming to improve efficiency and safety.

Navigating the Next Accreditation System: A Dashboard for the Milestones

Johna S, Woodward B. Perm J. 2015 Fall;19(4):61-3. doi: 10.7812/TPP/15-041.

INTRODUCTION:

In July 2014, all residency programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) were enrolled in a new system called the Next Accreditation System. Residency programs may not be clear on how best to comply with these new accreditation requirements. Large amounts of data must be collected, evaluated, and submitted twice a year to the council's Web-based data collection system. One challenge is that the new "end-of-rotation" evaluations must reflect specialty-specific milestones, on which many faculty members are not well versed. Like other residency programs, we tried to address the challenges using our local resources.

METHODS:

We used our existing electronic goals and objectives for each rotation coupled with appropriate end-of-rotation evaluations reflecting the specialty-specific milestones through a process of editing and mapping.

RESULTS:

Data extracted from these evaluations were added to an interactive dashboard that also contained evaluations on additional program-specific modifiers of residents' performance. A resident's final overall performance was visually represented on a plot graph. The novel dashboard included features to save evaluations for future comparisons and to track residents' progress during their entire training. It proved simple to use and was able to reduce the time needed for each resident evaluation to 5 to 10 minutes.

CONCLUSION:

This tool has made it much easier and less challenging for the members of our Clinical Competency Committee to start deliberation about each resident's performance.

Developing a Comprehensive Resident Education Evaluation System in the Era of Milestone Assessment

Gardner AK, Scott DJ, Choti MA, Mansour JC. J Surg Educ. 2015 Jul-Aug;72(4):618-24. doi: 10.1016/j.jsurg.2014.12.007. Epub 2015 Jan 23.

OBJECTIVES:

In an effort to move training programs toward competency-based education, the Accreditation Council for Graduate Medical Education (ACGME) introduced the Next Accreditation System (NAS), which organizes specific milestones regarding resident skills, knowledge, and abilities along a continuum. In order to foster innovation and creativity, the ACGME has provided programs with minimal guidelines regarding the optimal way to approach these milestones.

METHODS:

The education team at UT Southwestern embraced the milestones and developed a process in which performance assessment methods were critically evaluated, mapped onto an extrapolated performance list corresponding to the areas required by the ACGME milestones, and filled gaps in the previous system by modifying evaluation tools and creating new program components.

RESULTS:

Although the authors are early in the evolution of applying the new milestones system, this approach has thus far allowed them to comprehensively evaluate the residents and the program in an efficient and effective fashion, with notable improvements compared to the prior approach.

CONCLUSIONS:

The authors hope that these experiences can inform others embarking upon similar journeys with the milestones.

The New Accreditation Council for Graduate Medical Education Next Accreditation System Milestones Evaluation System: What Is Expected and How Are Plastic Surgery Residency Programs Preparing?

Sillah NM, Ibrahim AM, Lau FH, Shah J, Medin C, Lee BT, Lin SJ. *Plast Reconstr Surg.* 2015 Jul;136(1): 181-7. doi: 10.1097/PRS.0000000000001368.

BACKGROUND:

The Accreditation Council for Graduate Medical Education Next Accreditation System milestones were implemented for plastic surgery programs in July of 2014. Forward progress through the milestones is an indicator of trainee-appropriate development, whereas regression or stalling may indicate the need for concentrated, targeted training.

METHODS:

Online software at www.surveymonkey.com was used to create a survey about the program's approaches to milestones and was distributed to program directors and administrators of 96 Accreditation Council for Graduate Medical Education-approved plastic surgery programs.

RESULTS:

The authors had a 63.5 percent response rate (61 of 96 plastic surgery programs). Most programs report some level of readiness, only 22 percent feel completely prepared for the Next Accreditation System milestones, and only 23 percent are completely satisfied with their planned approach for compliance. Seventy-five percent of programs claim to be using some form of electronic tracking system. Programs plan to use multiple tools to capture and report milestone data. Most programs (44.4 percent) plan to administer evaluations at the end of each rotation. Over 70 percent of respondents believe that the milestones approach would improve the quality of resident training. However, programs were less than confident that their current compliance systems would live up to their full potential.

CONCLUSIONS:

The Next Accreditation System has been implemented nationwide for plastic surgery training programs. Milestone-based resident training is a new paradigm for residency training evaluation; programs are in the process of making this transition to find ways to make milestone data meaningful for faculty and residents.

Initial Validity Analysis of the Emergency Medicine Milestones

Beeson MS, Holmboe ES, Korte RC, Nasca TJ, Brigham T, Russ CM, Whitley CT, Reisdorff EJ. Acad Emerg Med. 2015 Jul;22(7):838-44. doi: 10.1111/acem.12697. Epub 2015 Jun 25.

OBJECTIVES:

The Accreditation Council for Graduate Medical Education (ACGME) Milestones describe behavioral markers for the progressive acquisition of competencies during residency. As a key component of the Next Accreditation System, all residents are evaluated for the acquisition of specialty-specific Milestones. The objective was to determine the validity and reliability of the emergency medicine (EM) Milestones.

METHODS:

The ACGME and the American Board of Emergency Medicine performed this single-event observational study. The data included the initial EM Milestones performance ratings of all categorical EM residents submitted to the ACGME from October 31, 2013, to January 6, 2014. Mean performance ratings were determined for all 23 subcompetencies for every year of residency training. The internal consistency (reliability) of the Milestones was determined using a standardized Cronbach's alpha coefficient.

Exploratory factor analysis was conducted to determine how the subcompetencies were interrelated.

RESULTS:

EM Milestone performance ratings were obtained on 100% of EM residents (n = 5,805) from 162 residency programs. The mean performance ratings of the aggregate and individual subcompetency scores showed discrimination between residency years, and the factor structure further supported the validity of the EM Milestones. The reliability was $\alpha = 0.96$ within each year of training.

CONCLUSIONS:

The EM Milestones demonstrated validity and reliability as an assessment instrument for competency acquisition. EM residents can be assured that this evaluation process has demonstrated validity and reliability; faculty can be confident that the Milestones are psychometrically sound; and stakeholders can know that the Milestones are a nationally standardized, objective measure of specialty-specific competency acquisition.

Piloting a Structured Practice Audit to Assess ACGME Milestones in Written Handoff Communication in Internal Medicine

Farnan JM, McConville JF, Arora VM. J Grad Med Educ. 2015 Jun;7(2):238-41. doi: 10.4300/JGME-D-14-00482.1.

BACKGROUND:

Written communication skills are integral to patient care handoffs. Residency programs require feasible assessment tools that provide timely formative and summative feedback, ideally linked to the Accreditation Council for Graduate Medical Education Milestones.

OBJECTIVE:

We describe the use of 1 such tool-UPDATED-to assess written handoff communication skills in internal medicine interns.

METHODS:

During 2012-2013, the authors piloted a structured practice audit at 1 academic institution to audit written sign-outs completed by 45 interns, using the UPDATED tool, which scores 7 aspects of sign-out communication linked to milestones. Intern sign-outs were audited by trained faculty members throughout the year. Results were incorporated into intern performance reviews and Clinical Competency Committees.

RESULTS:

A total of 136 sign-outs were audited (averaging 3.1 audits per intern). In the first trimester, 14 interns (31%) had satisfactory audit results. Five interns (11%) had critical deficiencies and received immediate feedback, and the remaining 26 (58%) were assigned future audits due to missing audits or unsatisfactory scores. In the second trimester, 21 interns (68%) had satisfactory results, 1 had critical deficiencies, and 9 (29%) required future audits. Nine of the 10 remaining interns in the final trimester had satisfactory audits. Faculty time was estimated at 10 to 15 minutes per sign-out audited.

CONCLUSIONS:

The UPDATED audit is a milestone-based tool that can be used to assess written sign-out communication skills in internal medicine residency programs. Future work is planned to adapt the tool for use by senior supervisory residents to appraise sign-outs in real time.

Direct versus Remote Clinical Observation: Assessing Learners' Milestones while Addressing Adolescent Patients' Needs

Pitts S, Borus J, Goncalves A, Gooding H. J Grad Med Educ. 2015 Jun;7(2):253-5. doi: 10.4300/JGME-D-14-00484.1.

BACKGROUND:

Direct clinical observation is an essential component of medical trainee assessment, particularly in the era of milestone-based competencies. However, the adolescent patient's perspective on this practice is missing from the literature. Quality health care is patient centered, yet we did not know if our educational practices align with this clinical goal.

OBJECTIVE:

We sought to better understand our adolescent/young adult patients' perspectives of the direct observation of our medical trainees in the outpatient clinical setting.

METHODS:

As a quality improvement initiative, we surveyed adolescent/young adult patients, medical trainees, and physician observers in our outpatient clinical practice regarding their experience following a direct observation encounter. We performed descriptive analyses of the data.

RESULTS:

During a 1-year period, responses were received from 23 adolescent/young adult patients, 8 family members, 14 trainees, and 6 faculty observers. Nearly all adolescent/young adult patients (n=22) and all surveyed family members (n=8) expressed comfort with direct observation, and all respondents felt the care they received was the same or better. All patient/family respondents preferred direct observation to the idea of remote observation, and most, but not all, trainees and faculty observers expressed similar opinions.

CONCLUSIONS:

Adolescent/young adult patients and their family members found direct observation of their trainee providers to be comfortable and beneficial. Despite adolescent and young adults' facility and comfort with modern technologies, there was an expressed preference for direct versus remote observation.

Realizing the Promise of Competency-Based Medical Education

Holmboe ES. Acad Med. 2015 Apr;90(4):411-3. doi: 10.1097/ACM.0000000000000515.

ABSTRACT:

Competency-based medical education (CBME) places a premium on both educational and clinical outcomes. The Milestones component of the Next Accreditation System represents a fundamental change in medical education in the United States and is part of the drive to realize the full promise of CBME. The Milestones framework provides a descriptive blueprint in each specialty to guide curriculum development and assessment practices. From the beginning of the Outcomes project in 1999, the Accreditation Council for Graduate Medical Education and the larger medical education community recognized the importance of improving their approach to assessment. Work-based assessments, which rely heavily on the observations and judgments of clinical faculty, are central to a competency-based approach. The direct observation of learners and the provision of robust feedback have always been recognized as critical components of medical education, but CBME systems further elevate their importance. Without effective and frequent direct observation, coaching, and feedback, the full potential of CBME and the Milestones cannot be achieved. Furthermore, simply using the Milestones as end-of-rotation evaluations to "check the box" to meet requirements undermines the intent of an outcomes-based accreditation system. In this Commentary, the author explores these challenges, addressing the concerns raised by Williams and colleagues in their Commentary. Meeting the assessment challenges of the Milestones will require a renewed commitment from institutions to meet the profession's "special obligations" to patients and learners. All stakeholders in graduate medical education must commit to a professional system of self-regulation to prepare highly competent physicians to fulfill this social contract.

The New Milestones: Do We Need to Take a Step Back to Go a Mile Forward?

Dewan M, Manring J, Satish U. Acad Psychiatry. 2015 Apr;39(2):147-50. doi: 10.1007/s40596-014-0213-9. Epub 2014 Aug 9.

ABSTRACT:

The Milestones Project, like all previous systems and changes in graduate psychiatric education, for example, moving from 3 to 4 years of training or adopting six competency domains, has been devised without any supporting data and does not assess meaningful outcomes, such as improved patient outcomes. No evidence is presented that Milestones-based training will produce better psychiatrists. There is a path forward. First, replace unproven expert consensus with scientific and evidence-based approaches. Second, exchange endpoints that are easy to assess but uncorrelated with real world functioning (e.g., multiple-choice examinations) for outcomes that are meaningful and external to the training program (e.g., patient outcomes). Finally, to prevent possible waste, excess burden, or harm, no changes should be mandated until proven in prospective studies.

Quality Improvement in Neurological Surgery Graduate Medical Education

Parker SL, McGirt MJ, Asher AL, Selden NR. Neurosurg Clin N Am. 2015 Apr;26(2):231-8, ix. doi: 10.1016/j.nec.2014.11.012. Epub 2014 Dec 17.

ABSTRACT:

There has been no formal, standardized curriculum for neurosurgical resident education in quality improvement. There are at least 2 reasons to integrate a formalized quality improvement curriculum into resident education: (1) increased emphasis on the relative quality and value (cost-effectiveness) of health care provided by individual physicians, and (2) quality improvement principles empower broader lifelong learning. An integrated quality improvement curriculum should comprise specific goals and milestones at each level of residency training.

This article discusses the role and possible implementation of a national program for quality improvement in neurosurgical resident education.

The Milestones for Psychosomatic Medicine Subspecialty Training

Boland RJ, Becker M, Levenson JL, Servis M, Crone CC, Edgar L, Thomas CR. Psychosomatics. 2015 Mar-Apr;56(2):153-67. doi: 10.1016/j.psych.2014.11.003. Epub 2014 Nov 13.

BACKGROUND:

The Accreditation Council of Graduate Medical Education Milestones project is a key element in the Next Accreditation System for graduate medical education. On completing the general psychiatry milestones in 2013, the Accreditation Council of Graduate Medical Education began the process of creating milestones for the accredited psychiatric subspecialties.

METHODS:

With consultation from the Academy of Psychosomatic Medicine, the Accreditation Council of Graduate Medical Education appointed a working group to create the psychosomatic medicine milestones, using the general psychiatry milestones as a starting point.

RESULTS:

This article represents a record of the work of this committee. It describes the history and rationale behind the milestones, the development process used by the working group, and the implications of these milestones on psychosomatic medicine fellowship training.

CONCLUSIONS:

The milestones, as presented in this article, will have an important influence on psychosomatic medicine training programs. The implications of these include changes in how fellowship programs will be reviewed and accredited by the Accreditation Council of Graduate Medical Education and changes in the process of assessment and feedback for fellows.

CORR® Curriculum—Orthopaedic Education: Operative Assessment and the ACGME Milestones: Time for Change

Van Heest AE, Dougherty PJ. Clin Orthop Relat Res. 2015 Mar;473(3):775-8. doi: 10.1007/s11999-014-4131-7. Epub 2015 Jan 11.

ABSTRACT:

The article offers information on the implementation of the Milestones program outlined by the Accreditation Council on Graduate Medical Education (ACGME) which provides a detailed framework for determining residency knowledge within specific core competencies in Orthopaedic medical education. Topics discussed include a residency program initiated by surgeon, William S. Halsted, development of formal orthopaedic postgraduate education, and expansion of the education after World War II.

Two Cheers for Milestones

Pangaro LN. J Grad Med Educ. 2015 Mar;7(1):4-6. doi: 10.4300/JGME-D-14-00738.1.

This editorial will explore the implementation of milestones across graduate medical education (GME) from 2 perspectives. The first is my perspective as a clinician, who often asks, “How do I make decisions with a patient when there isn't evidence to use as a guideline?” The second is my perspective as a department chair who asks a different question: “What resources are needed for milestone implementation?”

A Survey of Resident Perspectives on Surgical Case Minimums and the Impact on Milestones, Graduation, Credentialing, and Preparation for Practice: AOA Critical Issues

Jeray KJ, Frick SL. *J Bone Joint Surg Am.* 2014 Dec 3;96(23):e195. doi: 10.2106/JBJS.N.00044.

ABSTRACT:

Residency education continues to evolve. Several major changes have occurred in the past several years, including emphasis on core competencies, duty-hour restrictions, and call. The Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System (NAS) implemented educational milestones in orthopaedic surgery in July 2013. Additionally, the Residency Review Committee for orthopaedic surgery published suggested surgical case minimums in 2012, which overlap with several of the milestones. We conducted a survey to assess the opinions of orthopaedic residents regarding the ACGME-suggested surgical case minimums and the effects that these may have on resident education and potential future privileges in hospitals. The survey was sent via e-mail to all of the residents participating in the American Orthopaedic Association (AOA) Resident Leadership Forum for both 2011 and 2012. Participants in the Resident Leadership Forum are in either postgraduate year 4 or postgraduate year 5, are selected by the program directors as resident leaders, and represent 80% of the orthopaedic residency programs in the United States. The survey was completed by 157 of the 314 participants. Sixty-nine percent of the participants believed that case logs with minimum numbers of surgical procedures were an effective way to monitor the work but were not necessarily the only way to monitor the educational progress of the residents. Thirty-two percent believed that the minimums should not be required. Overwhelmingly, there was agreement that important cases were missing from the currently proposed sixteen core surgical minimums.

Specifically, the residents believed that a minimum number of cases are necessary for distal radial fracture fixation and proximal humeral fracture fixation and possibly have a milestone to reflect the progress of the residents for each fixation. Most residents thought that surgical case minimums are an effective tool in monitoring the progress of residents and measuring the effectiveness of residency programs. However, the surgical ability of an individual resident should not be evaluated on case minimums alone. The development of the milestones to assess competency should continue, but, as surgical skill is not a specific core competency, perhaps other methods for assessing surgical proficiency need to be developed rather than case minimums. Surgical skills laboratories and proctoring residents independently performing procedures may help to assess surgical proficiency, in addition to traditional faculty and 360° evaluations. Combining these types of assessments with surgical case logs documenting the residents' educational experience seems to be the best path going forward in assessing the development of young surgeons.

Cytopathology Fellowship Milestones

Naritoku WY, Black-Schaffer WS. Cancer Cytopathol. 2014 Dec;122(12):859-65. doi: 10.1002/cncy.21483. Epub 2014 Sep 18.

ABSTRACT:

The American Society of Cytopathology has provided guidelines for goals and objectives for cytopathology fellows. There are 90 Accreditation Council for Graduate Medical Education- accredited cytopathology fellowship training programs in the United States, each with its own unique curriculum designed to achieve these goals and objectives. The Accreditation Council for Graduate Medical Education cytopathology fellowship milestones were developed to ensure some uniformity in the outcomes of the various skill sets and competencies expected of a graduating cytopathology fellow. The rationale, development, and details of the cytopathology fellowship milestones are described herein.

Assessment of Resident Operative Performance Using a Real-Time Mobile Web System: Preparing for the Milestone Age

Wagner JP, Chen DC, Donahue TR, Quach C, Hines OJ, Hiatt JR, Tillou A. J Surg Educ. 2014 Nov-Dec;71(6):e41-6. doi: 10.1016/j.jsurg.2014.06.008. Epub 2014 Jul 16.

OBJECTIVE:

To satisfy trainees' operative competency requirements while improving feedback validity and timeliness using a mobile Web-based platform.

DESIGN:

The Southern Illinois University Operative Performance Rating Scale (OPRS) was embedded into a website formatted for mobile devices. From March 2013 to February 2014, faculty members were instructed to complete the OPRS form while providing verbal feedback to the operating resident at the conclusion of each procedure. Submitted data were compiled automatically within a secure Web-based spreadsheet. Conventional end-of-rotation performance (CERP) evaluations filed 2006 to 2013 and OPRS performance scores were compared by year of training using serial and independent-samples *t* tests. The mean CERP scores and OPRS overall resident operative performance scores were directly compared using a linear regression model. OPRS mobile site analytics were reviewed using a Web-based reporting program.

SETTING:

Large university-based general surgery residency program.

PARTICIPANTS:

General Surgery faculty used the mobile Web OPRS system to rate resident performance. Residents and the program director reviewed evaluations semiannually.

RESULTS:

Over the study period, 18 faculty members and 37 residents logged 176 operations using the mobile OPRS system. There were 334 total OPRS website visits. Median time to complete an evaluation was 45 minutes from the end of the operation, and faculty spent an average of 134 seconds on the site to enter 1 assessment. In the 38,506 CERP evaluations reviewed, mean performance scores showed a positive linear trend of 2% change per year of training ($p = 0.001$). OPRS overall resident operative performance scores showed a significant linear ($p = 0.001$), quadratic ($p = 0.001$), and cubic ($p = 0.003$) trend of change per year of clinical training, reflecting the resident operative experience in our training program. Differences between postgraduate year-1 and postgraduate year-5 overall performance scores were greater with the OPRS (mean = 0.96, CI: 0.55-1.38) than with CERP measures (mean = 0.37, CI: 0.34-0.41).

Additionally, there were consistent increases in each of the OPRS subcategories.

CONCLUSIONS:

In contrast to CERPs, the OPRS fully satisfies the Accreditation Council for Graduate Medical Education and American Board of Surgery operative assessment requirements. The mobile Web platform provides a convenient interface, broad accessibility, automatic data compilation, and compatibility with common database and statistical software. Our mobile OPRS system encourages candid feedback dialog and generates a comprehensive review of individual and group-wide operative proficiency in real time.

Fostering and Assessing Professionalism and Communication Skills in Neurosurgical Education

Fontes RB, Selden NR, Byrne RW. J Surg Educ. 2014 Nov-Dec;71(6):e83-9. doi: 10.1016/j.jsurg.2014.06.016. Epub 2014 Aug 29.

INTRODUCTION:

Incorporation of the 6 ACGME core competencies into surgical training has proven a considerable challenge particularly for the two primarily behavioral competencies, professionalism and interpersonal and communication skills. We report on experience with two specific interventions to foster the teaching and continuous evaluation of these competencies for neurosurgery residents.

MATERIAL AND METHODS:

In 2010, the Society of Neurological Surgeons (SNS) organized the first comprehensive Neurosurgery Boot Camp courses, held at six locations throughout the US and designed to assess and teach not only psychomotor skills but also components of all six Accreditation Council for Graduate Medical Education (ACGME) core competencies. These courses are comprised of various educational methodologies, including online material, faculty lectures, clinical scenario and group discussions, manual skills stations, and pre- and post-course assessments. Resident progress in each of the 6 ACGME competencies is now tracked using the neurosurgical Milestones, developed by the ACGME in collaboration with the SNS. In addition, the Milestones drafting group for neurosurgery has formulated a milestone-compatible evaluation system to directly populate Milestone reports. These evaluations utilize formative, summative, and 360-degree evaluations that are considered by a faculty core competency committee in finalizing milestones levels for each resident.

RESULTS:

Initial attendance at the 2010 Boot Camp course was 94% of the incoming resident class and in subsequent years, 100%. Pre- and post-course surveys demonstrated a significant and sustained increase in knowledge. The value of these courses has been recognized by the ACGME, which requires Boot Camp or equivalent participation prior to acting with indirect supervision during clinical activities. Neurosurgery was one of 7 early Milestone adopter specialties, beginning use in July, 2013. Early milestone data will establish benchmarks prior to utilization for "high stake" decisions such as promotion, graduation, and termination.

CONCLUSIONS:

The full impact of the neurosurgical Boot Camps and Milestones on residency education remains to be measured, although published data from the first years of the Boot Camp Courses demonstrate broad acceptance and early effectiveness. A complementary junior resident course has now been introduced for rising second-year residents. The Milestones compatible evaluation system now provides for multi-source formative and summative evaluation of neurosurgical residents within the new ACGME reporting rubric. Combined with consensus milestone assignments, this system provides new specificity and objectivity to resident evaluations. The correlation of milestone level assignments with other measurements of educational outcome awaits further study.

Preparing Medical Students for Obstetrics and Gynecology Milestone Level One: A Description of a Pilot Curriculum

Morgan H, Marzano D, Lanham M, Stein T, Curran D, Hammoud M. Med Educ Online. 2014 Nov 26;19:25746. doi: 10.3402/meo.v19.25746. eCollection 2014.

BACKGROUND:

The implementation of the Accreditation Council for Graduate Medical Education (ACGME) Milestones in the field of obstetrics and gynecology has arrived with Milestones Level One defined as the level expected of an incoming first-year resident.

PURPOSE:

We designed, implemented, and evaluated a 4-week elective for fourth-year medical school students, which utilized a multimodal approach to teaching and assessing the Milestones Level One competencies.

METHODS:

The 78-hour curriculum utilized traditional didactic lectures, flipped classroom active learning sessions, a simulated paging curriculum, simulation training, embalmed cadaver anatomical dissections, and fresh-frozen cadaver operative procedures. We performed an assessment of student knowledge and surgical skills before and after completion of the course. Students also received feedback on their assessment and management of eight simulated paging scenarios. Students completed course content satisfaction surveys at the completion of each of the 4 weeks.

RESULTS:

Students demonstrated improvement in knowledge and surgical skills at the completion of the course. Paging confidence trended toward improvement at the completion of the course. Student satisfaction was high for all of the course content, and the active learning components of the curriculum (flipped classroom, simulation, and anatomy sessions) had higher scores than the traditional didactics in all six categories of our student satisfaction survey.

CONCLUSIONS:

This pilot study demonstrates a practical approach for preparing fourth-year medical students for the expectations of Milestones Level One in obstetrics and gynecology. This curriculum can serve as a framework as medical schools and specific specialties work to meet the first steps of the ACGME's Next Accreditation System.

Impact on House Staff Evaluation Scores When Changing from a Dreyfus- to a Milestone-Based Evaluation Model: One Internal Medicine Residency Program's Findings

Friedman KA, Balwan S, Cacace F, Katona K, Sunday S, Chaudhry S. Med Educ Online. 2014 Nov 24;19:25185. doi: 10.3402/meo.v19.25185. eCollection 2014.

PURPOSE:

As graduate medical education (GME) moves into the Next Accreditation System (NAS), programs must take a critical look at their current models of evaluation and assess how well they align with reporting outcomes. Our objective was to assess the impact on house staff evaluation scores when transitioning from a Dreyfus-based model of evaluation to a Milestone-based model of evaluation. Milestones are a key component of the NAS.

METHOD:

We analyzed all end of rotation evaluations of house staff completed by faculty for academic years 2010-2011 (pre-Dreyfus model) and 2011-2012 (post-Milestone model) in one large university-based internal medicine residency training program. Main measures included change in PGY-level average score; slope, range, and separation of average scores across all six Accreditation Council for Graduate Medical Education (ACGME) competencies.

RESULTS:

Transitioning from a Dreyfus-based model to a Milestone-based model resulted in a larger separation in the scores between our three post-graduate year classes, a steeper progression of scores in the PGY-1 class, a wider use of the 5-point scale on our global end of rotation evaluation form, and a downward shift in the PGY-1 scores and an upward shift in the PGY-3 scores.

CONCLUSIONS:

For faculty trained in both models of assessment, the Milestone-based model had greater discriminatory ability as evidenced by the larger separation in the scores for all the classes, in particular the PGY-1 class.

Practicing Emergency Physicians Report Performing Well on Most Emergency Medicine Milestones

Peck TC, Dubosh N, Rosen C, Tibbles C, Pope J, Fisher J. J Emerg Med. 2014 Oct;47(4):432-40. doi: 10.1016/j.jemermed.2014.04.032. Epub 2014 Jul 8.

BACKGROUND:

The Accreditation Council for Graduate Medical Education's Next Accreditation System endorsed specialty-specific milestones as the foundation of an outcomes-based resident evaluation process. These milestones represent five competency levels (entry level to expert), and graduating residents will be expected to meet Level 4 on all 23 milestones. Limited validation data on these milestones exist. It is unclear if higher levels represent true competencies of practicing emergency medicine (EM) attendings.

OBJECTIVE:

Our aim was to examine how practicing EM attendings in academic and community settings self-evaluate on the new EM milestones.

METHODS:

An electronic self-evaluation survey outlining 9 of the 23 EM milestones was sent to a sample of practicing EM attendings in academic and community settings. Attendings were asked to identify which level was appropriate for them.

RESULTS:

Seventy-nine attendings were surveyed, with an 89% response rate. Sixty-one percent were academic. Twenty-three percent (95% confidence interval [CI] 20%-27%) of all responses were Levels 1, 2, or 3; 38% (95% CI 34%-42%) were Level 4; and 39% (95% CI 35%-43%) were Level 5. Seventy-seven percent of attendings found themselves to be Level 4 or 5 in eight of nine milestones. Only 47% found themselves to be Level 4 or 5 in ultrasound skills ($p = 0.0001$).

CONCLUSIONS:

Although a majority of EM attendings reported meeting Level 4 milestones, many felt they did not meet Level 4 criteria. Attendings report less perceived competence in ultrasound skills than other milestones. It is unclear if self-assessments reflect the true competency of practicing attendings. The study design can be useful to define the accuracy, precision, and validity of milestones for any medical field.

Physician Health and Wellness

McClafferty H, Brown OW; Section on Integrative Medicine; Committee on Practice And Ambulatory Medicine; Section on Integrative Medicine. Pediatrics. 2014 Oct;134(4):830-5. doi: 10.1542/peds.2014-2278.

ABSTRACT:

Physician health and wellness is a critical issue gaining national attention because of the high prevalence of physician burnout. Pediatricians and pediatric trainees experience burnout at levels equivalent to other medical specialties, highlighting a need for more effective efforts to promote health and well-being in the pediatric community. This report will provide an overview of physician burnout, an update on work in the field of preventive physician health and wellness, and a discussion of emerging initiatives that have potential to promote health at all levels of pediatric training. Pediatricians are uniquely positioned to lead this movement nationally, in part because of the emphasis placed on wellness in the Pediatric Milestone Project, a joint collaboration between the Accreditation Council for Graduate Medical Education and the American Board of Pediatrics. Updated core competencies calling for a balanced approach to health, including focus on nutrition, exercise, mindfulness, and effective stress management, signal a paradigm shift and send the message that it is time for pediatricians to cultivate a culture of wellness better aligned with their responsibilities as role models and congruent with advances in pediatric training. Rather than reviewing programs in place to address substance abuse and other serious conditions in distressed physicians, this article focuses on forward progress in the field, with an emphasis on the need for prevention and anticipation of predictable stressors related to burnout in medical training and practice. Examples of positive progress and several programs designed to promote physician health and wellness are reviewed. Areas where more research is needed are highlighted.

The Milestones Passport: A Learner-Centered Application of the Milestone Framework to Prompt Real-Time Feedback in the Emergency Department

Yarris LM, Jones D, Kornegay JG, Hansen M. (2014) The Milestones Passport: A Learner- Centered Application of the Milestone Framework to Prompt Real-Time Feedback in the Emergency Department. *Journal of Graduate Medical Education*: September 2014, Vol. 6, No. 3, pp. 555-560.

BACKGROUND:

In July 2013, emergency medicine residency programs implemented the Milestone assessment as part of the Next Accreditation System.

OBJECTIVE:

We hypothesized that applying the Milestone framework to real-time feedback in the emergency department (ED) could affect current feedback processes and culture. We describe the development and implementation of a Milestone-based, learner-centered intervention designed to prompt real-time feedback in the ED.

METHODS:

We developed and implemented the Milestones Passport, a feedback intervention incorporating subcompetencies, in our residency program in July 2013. Our primary outcomes were feasibility, including faculty and staff time and costs, number of documented feedback encounters in the first 2 months of implementation, and user-reported time required to complete the intervention. We also assessed learner and faculty acceptability.

RESULTS:

Development and implementation of the Milestones Passport required 10 hours of program coordinator time, 120 hours of software developer time, and 20 hours of faculty time. Twenty- eight residents and 34 faculty members generated 257 Milestones Passport feedback encounters. Most residents and faculty reported that the encounters required fewer than 5 minutes to complete, and 48% (12 of 25) of the residents and 68% (19 of 28) of faculty reported satisfaction with the Milestones Passport intervention. Faculty satisfaction with overall feedback in the ED improved after the intervention (93% versus 54%, $P = .003$), whereas resident satisfaction with feedback did not change significantly.

CONCLUSIONS:

The Milestones Passport feedback intervention was feasible and acceptable to users; however, learner satisfaction with the Milestone assessment in the ED was modest.

Entrustable Professional Activities and Curricular Milestones for Fellowship Training in Pulmonary and Critical Care Medicine: Report of a Multisociety Working Group

Fessler HE, Addrizzo-Harris D, Beck JM, Buckley JD, Pastores SM, Piquette CA, Rowley JA, Spevetz A. *Chest*. 2014 Sep;146(3):813-834. doi: 10.1378/chest.14-0710.

ABSTRACT:

This article describes the curricular milestones and entrustable professional activities for trainees in pulmonary, critical care, or combined fellowship programs. Under the Next Accreditation System of the Accreditation Council for Graduate Medical Education (ACGME), curricular milestones compose the curriculum or learning objectives for training in these fields. Entrustable professional activities represent the outcomes of training, the activities that society and professional peers can expect fellowship graduates to be able to perform unsupervised. These curricular milestones and entrustable professional activities are the products of a consensus process from a multidisciplinary committee of medical educators representing the American College of Chest Physicians (CHEST), the American Thoracic Society, the Society of Critical Care Medicine, and the Association of Pulmonary and Critical Care Medicine Program Directors. After consensus was achieved using the Delphi process, the document was revised with input from the sponsoring societies and program directors. The resulting lists can serve as a roadmap and destination for trainees, program directors, and educators. Together with the reporting milestones, they will help mark trainees' progress in the mastery of the six ACGME core competencies of graduate medical education.

Medical Student Milestones in Emergency Medicine

Santen SA, Peterson WJ, Khandelwal S, House JB, Manthey DE, Sozener CB. Acad Emerg Med. 2014 Aug;21(8):905-11. doi: 10.1111/acem.12443. Epub 2014 Aug 24.

OBJECTIVES:

Medical education is a continuum from medical school through residency to unsupervised clinical practice. There has been a movement toward competency-based medical education prompted by the Accreditation Council for Graduate Medical Education (ACGME) using milestones to assess competence. While implementation of milestones for residents sets specific standards for transition to internship, there exists a need for the development of competency-based instruments to assess medical students as they progress toward internship. The objective of this study was to develop competency-based milestones for fourth-year medical students completing their emergency medicine (EM) clerkships (regardless of whether the students were planning on entering EM) using a rigorous method to attain validity evidence.

METHODS:

A literature review was performed to develop a list of potential milestones. An expert panel, which included a medical student and 23 faculty members (four program directors, 16 clerkship directors, and five assistant deans) from 19 different institutions, came to consensus on these milestones through two rounds of a modified Delphi protocol. The Delphi technique builds content validity and is an accepted method to develop consensus by eliciting expert opinions through multiple rounds of questionnaires.

RESULTS:

Of the initial 39 milestones, 12 were removed at the end of round 1 due to low agreement on importance of the milestone or because of redundancy with other milestones. An additional 12 milestones were revised to improve clarity or eliminate redundancy, and one was added based on expert panelists' suggestions. Of the 28 milestones moving to round 2, consensus with a high level of agreement was achieved for 24. These were mapped to the ACGME EM residency milestone competency domains, as well as the Association of American Medical Colleges (AAMC) core entrustable professional activities for entering residency to improve content validity.

CONCLUSIONS:

This study found consensus support by experts for a list of 24 milestones relevant to the assessment of fourth-year medical student performance by the completion of their EM clerkships. The findings are useful for development of a valid method for assessing medical student performance as students approach residency.

Entrustment and Mapping of Observable Practice Activities for Resident Assessment

Warm EJ, Mathis BR, Held JD, Pai S, Tolentino J, Ashbrook L, Lee CK, Lee D, Wood S, Fichtenbaum CJ, Schauer D, Munyon R, Mueller C. J Gen Intern Med. 2014 Aug;29(8):1177-82. doi: 10.1007/s11606-014-2801-5. Epub 2014 Feb 21.

ABSTRACT:

Entrustable Professional Activities (EPAs) and the Next Accreditation System reporting milestones reduce general competencies into smaller evaluable parts. However, some EPAs and reporting milestones may be too broad to use as direct assessment tools. We describe our internal medicine residency curriculum and assessment system, which uses entrustment and mapping of observable practice activities (OPAs) for resident assessment. We created discrete OPAs for each resident rotation and learning experience. In combination, these serve as curricular foundation and tools for assessment. OPA performance is measured via a 5-point entrustment scale, and mapped to milestones and EPAs. Entrustment ratings of OPAs provide an opportunity for immediate structured feedback of specific clinical skills, and mapping OPAs to milestones and EPAs can be used for longitudinal assessment, promotion decisions, and reporting. Direct assessment and demonstration of progressive entrustment of trainee skill over time are important goals for all training programs. Systems that use OPAs mapped to milestones and EPAs provide the opportunity for achieving both, but require validation.

Practice Quality Improvement during Residency: Where Do We Stand and Where Can We Improve?

Choudhery S, Richter M, Anene A, Xi Y, Browning T, Chason D, Morriss MC. Acad Radiol. 2014 Jul;21(7):851-8. doi: 10.1016/j.acra.2013.11.021. Epub 2014 May 13.

RATIONALE AND OBJECTIVES:

Completing a systems-based practice project, equivalent to a practice quality improvement project (PQI), is a residency requirement by the Accreditation Council for Graduate Medical Education and an American Board of Radiology milestone. The aim of this study was to assess the residents' perspectives on quality improvement projects in radiology.

MATERIALS AND METHODS:

Survey data were collected from 154 trainee members of the Association of University Radiologists to evaluate the residents' views on PQI.

RESULTS:

Most residents were aware of the requirement of completing a PQI project and had faculty mentors for their projects. Residents who thought it was difficult to find a mentor were more likely to start their project later in residency ($P < .0001$). Publication rates were low overall, and lack of time was considered the greatest obstacle. Having dedicated time for a PQI project was associated with increased likelihood of publishing or presenting the data ($P = .0091$). Residents who rated the five surveyed PQI steps (coming up with an idea, finding a mentor, designing a project, finding resources, and finding time) as difficult steps were more likely to not have initiated a PQI project ($P < .0001$ for the first four and $P = .0046$ for time).

CONCLUSION:

We present five practical areas of improvement to make PQI a valuable learning experience: 1) Increasing awareness of PQI and providing ideas for projects, 2) encouraging faculty mentorship and publication, 3) educating residents about project design and implementation, 4) providing resources such as books and funds, and 5) allowing dedicated time.

Teaching Ultrasound Professionalism

Hashimoto BE, Kasales C, Wall D, McDowell J, Lee M, Hamper UM. Ultrasound Q. 2014 Jun;30(2):91-5. doi: 10.1097/RUQ.0000000000000063.

ABSTRACT:

Professionalism is part of the milestone program instituted by the Accreditation Council for Graduate Medical Education and the American Board of Radiology. A unique feature of ultrasound professionalism is the relationship between the radiologist and the sonographer. Because this relationship is important for sonographic quality and ultimately patient outcome, residents should be trained to achieve an optimal professional relationship with sonographers. This article describes milestones for ultrasound professionalism and suggests methods of implementation.

Specialty Milestones and the Next Accreditation System: An Opportunity for the Simulation Community

Beeson MS, Vozenilek JA. *Simul Healthc*. 2014 Jun;9(3):184-91. doi: 10.1097/SIH.0000000000000006.

ABSTRACT:

The Accreditation for Graduate Medical Education has developed a new process of accreditation, the Next Accreditation System (NAS), which focuses on outcomes. A key component of the NAS is specialty milestones-specific behavior, attributes, or outcomes within the general competency domains. Milestones will mark a level of proficiency of a resident within a competency domain. Each specialty has developed its own set of milestones, with semiannual reporting to begin July 2013, for 7 specialties, and the rest in July 2014. Milestone assessment must be based on objective data. Each specialty will determine optimal methods of measuring milestones, based on ease, cost, validity, and reliability. The simulation community has focused many graduate medical education efforts at training and formative assessment. Milestone assessment represents an opportunity for simulation modalities to offer summative assessment of milestone proficiencies, adding to the potential methods that residency programs will likely use or adapt. This article discusses the NAS, milestone assessment, and the opportunity to the simulation community to become involved in this next stage of graduate medical education assessment.

Putting the Pediatrics Milestones into Practice: A Consensus Roadmap and Resource Analysis

Schumacher DJ, Spector ND, Calaman S, West DC, Cruz M, Frohna JG, Gonzalez Del Rey J, Gustafson KK, Poynter SE, Rosenbluth G, Southgate WM, Vinci RJ, Sectish TC. *Pediatrics*. 2014 May;133(5):898-906. doi: 10.1542/peds.2013-2917. Epub 2014 Apr 14.

ABSTRACT:

The Accreditation Council for Graduate Medical Education has partnered with member boards of the American Board of Medical Specialties to initiate the next steps in advancing competency-based assessment in residency programs. This initiative, known as the Milestone Project, is a paradigm shift from traditional assessment efforts and requires all pediatrics residency programs to report individual resident progression along a series of 4 to 5 developmental levels of performance, or milestones, for individual competencies every 6 months beginning in June 2014. The effort required to successfully make this shift is tremendous given the number of training programs, training institutions, and trainees. However, it holds great promise for achieving training outcomes that align with patient needs; developing a valid, reliable, and meaningful way to track residents' development; and providing trainees with a roadmap for learning. Recognizing the resources needed to implement this new system, the authors, all residency program leaders, provide their consensus view of the components necessary for implementing and sustaining this effort, including resource estimates for completing this work. The authors have identified 4 domains: (1) Program Review and Development of Stakeholders and Participants, (2) Assessment Methods and Validation, (3) Data and Assessment System Development, and (4) Summative Assessment and Feedback. This work can serve as a starting point and framework for collaboration with program, department, and institutional leaders to identify and garner necessary resources and plan for local and national efforts that will ensure successful transition to milestones-based assessment.

Survey of Developmental Milestones in Internal Medicine among Residents and Faculty

Marhatta A, Messina D, Petrini JR, Lecaj A, Ahmadi R. Conn Med. 2014 May;78(5):293-8.

OBJECTIVES:

The published Accreditation Council for Graduate Medical Education (ACGME) milestones represent a novel method of evaluation of trainees in graduate medical education. We surveyed a group of teaching faculty and residents, regarding the new ACGME milestones project. We obtained their input on the expected timeline for the developmental milestones and compared their responses to the ACGME recommendations.

METHODS:

A 42-item survey questionnaire, derived from the original 142 item publication, was completed by 26 internal medicine teaching faculty and 34 internal medicine residents.

RESULTS:

We found statistically significant differences in the responses given by residents and faculty compared to those in the standard recommendations. The differences were more pronounced with the residents than with the faculty.

CONCLUSIONS:

The results of our survey showed significantly different responses as compared to the standard recommended timelines. Since this is a novel evaluation process, substantial faculty development and resident education regarding the process can help improve its implementation. Future studies should

focus on how learners might better understand and refine the milestone evaluation process.

Progress toward Improved Leadership and Management Training in Pathology

Weiss RL, Hassell LA, Parks ER. Arch Pathol Lab Med. 2014 Apr;138(4):492-7. doi: 10.5858/ arpa.2013-0288-RA.

CONTEXT:

Competency gaps in leadership and laboratory management skills continue to exist between what training programs deliver and what recent graduates and future employers expect. A number of recent surveys substantiate this. Interest in delivering content in these areas is challenged by time constraints, the presence of knowledgeable faculty role models, and the necessary importance placed on diagnostic skills development, which overshadows any priority trainees have toward developing these skills.

OBJECTIVE:

To describe the problem, the near-future horizon, the current solutions, and the recommendations for improving resident training in laboratory management.

DATA SOURCES:

The demands of new health care delivery models and the value being placed on these skills by the Pathology Milestones and Next Accreditation System initiative of the Accreditation Council for Graduate Medical Education for training programs emphasizes their importance. This initiative includes 6 milestone competencies in laboratory management. Organizations like the American Society for Clinical Pathology, the American Pathology Foundation, the College of American Pathologists, and the Association of Pathology Chairs Program Directors Section recognize these competencies and are working to create new tools for training programs to deploy.

CONCLUSIONS:

It is our recommendation that (1) every training program develop a formal educational strategy for management training, (2) greater opportunity and visibility be afforded for peer-reviewed publications on management topics in mainstream pathology literature, and (3) pathology milestones-oriented tools be developed to assist program directors and their trainees in developing this necessary knowledge and skills.

The "Zing Factor" – How Do Faculty Describe the Best Pediatrics Residents?

Rosenbluth G, O'Brien B, Asher EM, Cho CS. J Grad Med Educ. 2014 Mar;6(1):106-11. doi: 10.4300/JGME-D-13-00146.1.

BACKGROUND:

Faculty in graduate medical education programs may not have uniform approaches to differentiating the quality of residents, and reviews of evaluations suggest that faculty use different standards when assessing residents. Standards for assessing residents also do not consistently map to items on evaluation forms. One way to improve assessment is to reach consensus on the traits and behaviors that are (or should be) present in the best residents.

METHODS:

A trained interviewer conducted semistructured interviews with faculty affiliated with 2 pediatrics residency programs until content saturation was achieved. Interviewees were asked to describe specific traits present in residents they identify as the best. Interviews were recorded and transcribed. We used an iterative, inductive approach to generate a coding scheme and identify common themes.

RESULTS:

From 23 interviews, we identified 7 thematic categories of traits and behaviors: personality, energy, professionalism, team behaviors, self-improvement behaviors, patient-interaction behaviors, and medical knowledge and clinical skills (including a subcategory, knowledge integration). Most faculty interviewees focused on traits like passion, enthusiasm, maturity, and reliability. Examination score or intelligence was mentioned less frequently than traits and behaviors categorized under personality and professionalism.

CONCLUSIONS:

Faculty identified many traits and behaviors in the residents they define as the best. The thematic categories had incomplete overlap with Accreditation Council for Graduate Medical Education (ACGME) and CanMEDS competencies. This research highlights the ongoing need to review our assessment strategies, and may have implications for the ACGME Milestone Project.

The Pathology Milestones and the Next Accreditation System

Naritoku WY, Alexander CB, Bennett BD, Black-Schaffer WS, Brissette MD, Grimes MM, Hoffman RD, Hunt JL, Iezzoni JC, Johnson R, Kozel J, Mendoza RM, Post MD, Powell SZ, Procop GW, Steinberg JJ, Thorsen LM, Nestler SP. *Arch Pathol Lab Med.* 2014 Mar;138(3):307-15. doi: 10.5858/arpa.2013-0260-SA.

BACKGROUND:

In the late 1990s, the Accreditation Council for Graduate Medical Education developed the Outcomes Project and the 6 general competencies with the intent to improve the outcome of graduate medical education in the United States. The competencies were used as the basis for developing learning goals and objectives and tools to evaluate residents' performance. By the mid-2000s the stakeholders in resident education and the general public felt that the Outcomes Project had fallen short of expectations.

OBJECTIVE:

To develop a new evaluation method to track trainee progress throughout residency using benchmarks called milestones. A change in leadership at the Accreditation Council for Graduate Medical Education brought a new vision for the accreditation of training programs and a radically different approach to the evaluation of residents.

DATA SOURCES:

The Pathology Milestones Working Group reviewed examples of developing milestones in other specialties, the literature, and the Accreditation Council for Graduate Medical Education program requirements for pathology to develop pathology milestones. The pathology milestones are a set of objective descriptors for measuring progress in the development of competency in patient care, procedural skill sets, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

CONCLUSIONS:

The milestones provide a national standard for evaluation that will be used for the assessment of all residents in Accreditation Council for Graduate Medical Education-accredited pathology training programs.

Time to Trust: Longitudinal Integrated Clerkships and Entrustable Professional Activities

Hirsh DA, Holmboe ES, ten Cate O. Acad Med. 2014 Feb;89(2):201-4. doi: 10.1097/ACM.000000000000111.

ABSTRACT:

Medical education shaped by the learning sciences can better serve medical students, residents, faculty, health care institutions, and patients. With increasing innovation in undergraduate and graduate medical education and more focused attention on educational principles and how people learn, this era of educational transformation offers promise. Principles manifest in "educational continuity" are informing changes in educational structures and venues and are enriching new discourse in educational pedagogy, assessment, and scholarship. The articles by Myhre and colleagues and Woloschuk and colleagues in this issue, along with mounting evidence preceding these works, should reassure that principle-driven innovation in medical education is not only possible but can be achieved safely. In this commentary, the authors draw from these works and the wider literature on longitudinal integrated educational design. They suggest that the confluences of movements for longitudinal integrated clerkships and entrustable professional activities open new possibilities for other educational and practice advancements in quality and safety. With the advent of competency-based education, explicit milestones, and improved assessment regimens, overseers will increasingly evaluate students, trainees, and other learners on their ability rather than relying solely on time spent in an activity. The authors suggest that, for such oversight to have the most value, assessors and learners need adequate oversight time, and redesign of educational models will serve this operational imperative. As education leaders are reassessing old medical school and training models, rotational blocks, and other barriers to progress, the authors explore the dynamic interplay between longitudinal integrated learning models and entrustment.

Applying the Milestones in an Internal Medicine Residency Program Curriculum: A Foundation for Outcomes-Based Learner Assessment under the Next Accreditation System

Lowry BN, Vansaghi LM, Rigler SK, Stites SW. Acad Med. 2013 Nov;88(11):1665-9. doi: 10.1097/ACM.0b013e3182a8c756.

ABSTRACT:

In 2010, University of Kansas Medical Center internal medicine residency program leaders concluded that their competency-based curriculum and evaluation system was not sufficient to promote accurate assessment of learners' performance and needed revision to meet the requirements of the Accreditation Council for Graduate Medical Education (ACGME) Next Accreditation System (NAS).

Evaluations of learners seldom referenced existing curricular goals and objectives and reflected an "everyone is exceptional, no one is satisfactory" view. The authors identified the American Board of Internal Medicine and ACGME's Developmental Milestones for Internal Medicine Residency Training as a published standard for resident development. They incorporated the milestones into templates, a format that could be modified for individual rotations. A milestones-based curriculum for each postgraduate year of training and every rotation was then created, with input from educational leaders within each division in the Department of Internal Medicine and with the support of the graduate medical education office. In this article, the authors share their implementation process, which took approximately one year, and discuss their current work to create a documentation system for direct observation of entrustable professional activities, with the aim of providing guidance to other programs challenged with developing an outcomes-based curriculum and assessment system within the time frame of the NAS.

The ACGME Milestone Project in Ophthalmology

Lee AG, Arnold AC. *Surv Ophthalmol*. 2013 Jul-Aug;58(4):359-69. doi: 10.1016/j.survophthal.2013.01.002.

ABSTRACT:

The ACGME is moving towards the next generation of accreditation in the USA called the Next Accreditation System (NAS). The NAS is anticipated to reduce the burden on programs to comply with accreditation requirements; to produce meaningful, innovative, and continuous benchmark outcomes data; to use ongoing individual and programmatic milestones to judge performance; and ultimately to produce better trained residents, to improve the quality of care, to reduce health care costs and health care disparities, and to provide objective evidence to the public and other external stakeholders of the quality of graduate medical education across the specialties of medicine. We describe the ACGME milestone development process for ophthalmology. If successful, the NAS will benefit all programs by reducing the programmatic burden and paperwork; increasing accreditation cycle length; and improving all programs through formative and summative feedback.

The Development of the Emergency Medicine Milestones

Beeson MS, Carter WA, Christopher TA, Heidt JW, Jones JH, Meyer LE, Promes SB, Rodgers KG, Shayne PH, Swing SR, Wagner MJ. Acad Emerg Med. 2013 Jul;20(7):724-9. doi: 10.1111/acem.12157. Epub 2013 Jun 19.

ABSTRACT:

The Accreditation Council for Graduate Medical Education (ACGME) has outlined its "Next Accreditation System" (NAS) that will focus on resident and residency outcome measurements. Emergency medicine (EM) is one of seven specialties that will implement the NAS beginning July 2013. All other specialties will follow in July 2014. A key component of the NAS is the development of assessable milestones, which are explicit accomplishments or behaviors that occur during the process of residency education. Milestones describe competencies more specifically and identify specialty-specific knowledge, skills, attitudes, and behaviors (KSABs) that can be used as outcome measures within the general competencies. The ACGME and the American Board of Emergency Medicine (ABEM) convened an EM milestone working group to develop the EM milestones. This article describes the development, use within the NAS, and challenges of the EM milestones.

Appendix:**Original Description of the Milestones by Specialty (*Journal of Graduate Medical Education (JGME)* supplementary issue, March 2013)****[A Milestone in the Milestones Movement: the JGME Milestones Supplement](#)**

Gail Sullivan, Deborah Simpson, Thomas Cooney, and Eugene Beresin
Journal of Graduate Medical Education 2013 5:1s1, 1-4

[Emergency Medicine Milestones](#)

Michael S. Beeson, Wallace A. Carter, Theodore A. Christopher, Jonathan W. Heidt, James H. Jones, Lynne E. Meyer, Susan B. Promes, Kevin G. Rodgers, Philip H. Shayne, Mary Jo Wagner, and Susan R. Swing
Journal of Graduate Medical Education 2013 5:1s1, 5-13

[Internal Medicine Milestones](#)

William Iobst, Eve Aagaard, Hasan Bazari, Timothy Brigham, Roger W. Bush, Kelly Caverzagie, Davoren Chick, Michael Green, Kevin Hinchey, Eric Holmboe, Sarah Hood, Gregory Kane, Lynne Kirk, Lauren Meade, Cynthia Smith, and Susan Swing
Journal of Graduate Medical Education 2013 5:1s1, 14-23

[Neurological Surgery Milestones](#)

Nathan R. Selden, Aviva Abosch, Richard W. Byrne, Robert E. Harbaugh, William E. Krauss, Timothy B. Mapstone, Oren Sagher, Gregory J. Zipfel, Pamela L. Derstine, and Laura Edgar
Journal of Graduate Medical Education 2013 5:1s1, 24-35

[Orthopaedic Surgery Milestones](#)

Peter J. Stern, Stephen Albanese, Mathias Bostrom, Charles S. Day, Steven L. Frick, William Hopkinson, Shepard Hurwitz, Keith Kenter, John S. Kirkpatrick, J. L. Marsh, Anand M. Murthi, Lisa A. Taitsman, Brian C. Toolan, Kristy Weber, Rick W. Wright, Pamela L. Derstine, and Laura Edgar
Journal of Graduate Medical Education 2013 5:1s1, 36-58

[Pediatrics Milestones](#)

Carol Carraccio, Bradley Benson, Ann Burke, Robert Englander, Susan Guralnick, Patricia Hicks, Stephen Ludwig, Daniel Schumacher, and Jerry Vasiliadis
Journal of Graduate Medical Education 2013 5:1s1, 59-73

[Diagnostic Radiology Milestones](#)

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