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

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ABSTRACT

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.

Introduction

Accreditation Council for Graduate Medical Education (ACGME) accredited residency programs in all specialties in the United States are required to report milestones for residents.[1,2] Early direction for how programs should modify their existing assessment efforts to integrate milestones was ambiguous despite some guidance.[3–6] While this high-level guidance may have helped programs, it also may have been of variable utility given program- and specialty-specific differences and related practical challenges of implementing milestones-based assessment.[7]

Holmboe and colleagues have called for research to identify circumstances that foster positive milestones implementation to benefit programs, faculty, and learners.[7,8] A framework of realistic evaluation considers the situations in which change happens and the enablers of successful milestones implementation.[8,9] Understanding what works, for whom, and in what circumstances can elucidate best practices for the graduate medical education (GME) community. Such work can identify common pitfalls and potential solutions in milestones implementation.[8,9]

We collected data about milestones implementation from residency programs across multiple specialties. We explored what was retained as well as what was added or changed from the pre-milestones assessment. We also examined the perceived impact of the shift to milestones-based assessment on programs.

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Methods

Setting and Participants

To explore a range of experiences with initial milestones-based assessment practices, we purposively sampled specialties within medical, surgical, and hospital-based fields based on the number of training programs across a large urban city (Boston, Massachusetts). Based on this sampling intent, we compiled a list of all internal medicine, pediatrics, orthopedic surgery, general surgery, anesthesiology, and emergency medicine programs (N = 31). We identified program directors from publicly available websites

TABLE
Program Description

Program Specialty	No. of Program Directors Participating
Internal medicine	3
Pediatrics	3
Orthopedic surgery	1
General surgery	3
Anesthesiology	3
Emergency medicine	2
Total	15
Interviewee Role	**No. of Program Directors by Role**
Program director	13
Associate program director	2
Program Size	**No. of Residents**
Range	24–180

and contacted them via e-mail until 3 program directors (or designated associate program directors) from each specialty agreed to participate or no available participants remained. In total, 21 program directors were contacted and 15 program directors or associate program directors were interviewed (TABLE).

Data Collection

The research team, in consultation with a competency-based medical education (CBME) expert (Eric Holmboe, MD), developed semistructured interview questions with the intent of exploring initial milestones-based assessment practices and experiences (provided as online supplemental material). The interview guide was adapted during the first few interviews to ensure information was being collected in the intended areas.

In-person interviews were conducted by the first author (K.D.), a social scientist and educator trained in qualitative research methods, between August and December 2016. Interviews ranged from 20 to 58 minutes. No incentives were provided. No research team members have leadership roles within the programs included in the study. The first author (K.D.) audio-recorded, transcribed, and reviewed all interviews for quality.

The project was exempted by the Harvard Medical School Institutional Review Board.

Data Analysis

We conducted a thematic analysis following the 5 stages to qualitative research framework.[10] NVivo 11 (QSR International Inc, Burlington, MA) was used to facilitate data management while coding. Data analysis began after the first 5 interviews and ended once we reached thematic sufficiency (15 interviews). First, 2 primary coders (K.D. and K.H.) familiarized themselves with the data, each independently reading the first 2 transcripts to create a preliminary code list. They compared codes and refined definitions as they were applied to the data. Discrepancies were reconciled in person by the coders, and were discussed with the senior author (D.J.S.). The primary coders developed a codebook based on an immersive reading of the first 5 interviews, representing a range of programs. The codebook was entered into NVivo and systematically applied to all 15 interview transcripts; 4 additional codes were identified and 3 were deleted as they did not yield sufficient data.

After independently coding all subsequent interviews, the 2 coders discussed recurring data patterns and codes were combined into themes. A theme was defined as a cluster of codes that, when combined, provided a meaningful statement about how program leaders led milestones implementation and the subsequent results for their programs. The coders independently reread the coded data within each theme to ensure coding consistency and to identify illustrative quotations. Throughout this process, they wrote interpretive memos to ensure coding and theme development represented participant comments. To confirm the primary coder's themes and ensure a robust analysis, the 2 remaining authors (J.K. and D.S.) reviewed the codes, offered critical input, and informed the formation and naming of the final themes. Finally, 3 program leaders (1 each from medical, surgical, and hospital-based groups) served as member checkers by critically reviewing the manuscript and providing feedback that was incorporated into the final version.

What was known and gap
All residency programs accredited by the Accreditation Council for Graduate Medical Education are required to report milestones for residents, but there is little guidance on how to adapt assessment efforts to integrate the milestones.

What is new
A qualitative study, based on semistructured interviews with program leaders from multiple specialties, identified themes in the effects of shifting to milestones-based assessments.

Limitations
A small number of interviews were conducted with leaders from a limited number of specialties in one city, limiting generalizability.

Bottom line
Despite a lack of guidance, residency programs adapted or created assessment tools to integrate milestones, and many reported benefits of the new approach to assessment.

Results

Fifteen program leaders from a range of program sizes (24 to 180 total residents) in 6 specialties at 8

academic medical centers agreed to participate (TABLE). 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; (3) and despite challenges, program leaders see value and utility in their efforts to move to milestones-based assessment. Program leaders across specialties described similar experiences. Illustrative quotes supporting these themes are shown in the BOX.

Theme #1: Program Leaders Faced Challenges to Effective Implementation

Desire for Milestones Implementation Guidance: Nearly all program leaders wanted more implementation guidance, and some felt stuck without knowing *how* to transition their assessment efforts. They expressed a feeling of being mandated to change practice without funding or support and without engagement in the milestones development process. Many described a need for better tools to assess residents, especially measures with validity and reliability.

The perceived lack of guidance was borne out of perceived challenges with milestones implementation. Program leaders who felt less challenged with the shift to milestones tended to either report already having strong assessment systems prior to the milestones or not fully grasping the intensity with which they would need to review and revise their assessment system. Without specific direction or rationale for implementing recommended changes, program leaders felt they lacked both the tools and motivation for making large-scale changes to their assessment systems.

Need for Faculty Development: Part of the perceived challenge of having to review and potentially redesign their assessment systems was the need to simultaneously garner the support of rotation directors and faculty. Program leaders expressed concern that faculty had limited understanding of the importance of assessment and limited motivation to assess learners. These concerns were linked to a perceived lack of leverage to encourage faculty to complete assessments, particularly in a timely manner.

Additional barriers to faculty development that affected milestones implementation included lack of time and resources to organize training, identify faculty needs, and offer effective programs beyond a one-off, brief introduction to milestones. Some program leaders expressed hope that a combination of faculty development and changes to their assessment efforts would gradually change faculty behavior and create a stronger culture of assessment.

Theme #2: Program Leaders Focused on Adaptability and Making Milestones Work in What Felt Like a Less Than Ideal Situation

Adapting Assessment Efforts: As program leaders searched for ways to integrate the milestones into their current assessment systems, having an existing clinical competency committee (CCC) made the transition easier because the group membership, structure, and schedule was already in place. Timing of assessments, such as end of shift, end of rotation, ad-hoc evaluations, and direct observation largely remained the same. In some cases, opportunities for improvement, such as having faculty assess learners more than once per clinical rotation, were identified.

Program leaders typically layered milestones onto existing assessment efforts, yet nearly all recognized the shift to milestones as an opportunity to revise their assessment tools. A small number of program leaders, frustrated with or disinterested in the milestones, made no changes to their assessment systems. They assumed that their existing assessment efforts would be sufficient, or that they would rely on a mix of intuition and perceived benchmarking of peers.

Some program leaders attempted to simplify assessment by limiting how many assessment forms faculty were asked to complete or using basic tools. Others tried to shield faculty from the work of developing a higher-level understanding of the function of milestones, encouraging them to assess residents in the clinical setting, but not offering a clear rationale for changes such as revised assessment tools or increased frequency of assessment.

A small number of program leaders attempted to implement the milestones by incorporating them verbatim into direct assessment tools. Each of these program leaders reported that these initial attempts failed, which proved frustrating and required additional efforts to adopt a viable approach.

Milestones implementation prompted many program leaders to rethink their sources of assessment data and identify assessment gaps within their programs. Some program leaders mapped sources of assessment to ensure multiple data points were available for each milestone. For some, this led to the realization that additional assessment opportunities were necessary, in turn leading to engaging overnight hospitalists, as an example, to complete end-of-shift assessments that were not previously collected.

BOX Selected Illustrative Quotes by Theme

Theme #1: Program Directors Faced Challenges to Effective Implementation

Desire for Milestones Guidance

"Everyone had to do this individually, which was so incredibly frustrating . . . what works for [1 specialty] is not going to work for [another] but the mandate was huge." [Interview #3]

"Can [the ACGME] just give us the form that [they] want, that [they] vetted, and we will do it, rather than us basically working slowly through multiple iterations?" [Interview #5]

Faculty Development

"We firewalled off our faculty that are . . . doing those evaluations from our day to day to faculty who [are not doing them]. The folks that are involved in our clinical competency committee or are doing rotational evaluations, or division directors got some additional coursework or training—both formal and more largely informal." [Interview #13]

"What hasn't worked is being able to figure out how do you get these really stretched faculty to get me all the data." [Interview #4]

Theme #2: Program Directors Focused on Adaptability and Making Milestones Work in What Felt Like Less than an Ideal Situation for Them

Adaptability and Making Milestones Work

Adapting Assessment Efforts

"We had a sort of evaluation committee that we basically renamed the CCC." [Interview #8]

"The milestones have been additive in terms of how we assess residents. I would not use the word transformative . . . They have helped clarify when we're not sure about, for instance, why we might not be comfortable with a particular resident, but the process is still the same. We've incorporated the milestones into it." [Interview #12]

"When we heard the milestones were coming out, we actually changed all of our evaluations into milestone-based evaluations. So we used the milestone wording, and that is what we had the evaluators scoring on . . . And it didn't work well. The faculty didn't understand the wording. [Interview #4]

"From the milestones grid [we asked] 'which of these are we currently observing, and where?' And in that process we discovered there are many things that we don't get to observe properly." [Interview #9]

"We took every rotation and every milestone subcompetency and mapped out basically which rotation is going to be assessing which of those sub competencies and made sure that there were multiple domains . . . so that was a whole overhaul of those rotations." [Interview #4]

Theme #3: Despite Challenges, Program Directors See Value and Utility in Moving to Milestones-Based Assessment

Value and Utility of Assessment Changes

Increased Learner Centeredness and Focus on Residents

"The good thing is we are talking about people who are lagging behind in much more depth and understanding them and discussing that." [Interview #9]

"It has just helped us organize our approach to assessment in a way that's useful to learners, where they are moving along and they can see that." [Interview #15]

"[Milestones-based assessment] allows us to externally tell residents 'If you look at your milestones, you can see that you are struggling in professionalism and you are struggling here and here.' And so, that is the other thing that is different is that we can now articulate someone who is globally struggling versus struggling in one area in a numerical, graphical, factual way for residents, which I think it helpful." [Interview #2]

Transition From Gestalt to Granular

"It has certainly made us look at things like our quality and safety . . . We needed something more discreet to nail down these metrics so it's kind of driving me, and our program, to come up with more discrete or more tools to drive assessments. Whether that's demonstrably better than the gestalt that we have, well had in the past, I don't know. But it will at least be somewhat more objective and that's probably a good thing." [Interview #13]

"We have a lot more direct observations actually going on so what we've realized over time within the CCC is that we need more direct observations to really make sense of the milestones." [Interview #4]

"I think the biggest value of the milestones for us by far has been able to describe where somebody is struggling better than we used to before." [Interview #11]

Clarification of Pathway to Unsupervised Practice

"Pre-2013, you just had to say at the end of their training, 'yep, they're independent.' There was nothing that was submitted to the ACGME other than this person has successfully completed the requirements and is competency to practice independently." [Interview #3]

"What I want to know is where should someone be in terms of when should they be independent. When should they be hitting which milestone at which year across all our programs?" [Interview #4]

Theme #3: Despite Challenges, Program Leaders See Value and Utility in Moving to Milestones-Based Assessment

Increased Learner Centeredness and Focus on Residents: Despite challenges, program leaders recognized that the shift to milestones brought value and utility, in part due to an increased focus on the residents themselves. For example, program leaders described a renewed emphasis on direct observation. Many knew that more direct observation would benefit the program, faculty, and particularly the residents, but they previously felt limited by the resource demands, administrative burden, and lack of faculty leverage.

Program leaders noted that milestones offer enhanced learner centeredness (eg, detailing a learning trajectory and offering more formative feedback) and transparency to residents. Some program leaders required residents to read the milestones and bring questions to their progress meetings. A small number required residents to use the milestones as self-assessment to compare to the CCC's evaluation. Program leaders thought residents benefited from having a clearer picture of areas where they are doing well and areas for additional development, and that this transparency benefited the program overall.

Program leaders also felt that milestones-based assessment led to the development of a more structured process for using assessment information for formative purposes. For example, they described CCCs spending more time on struggling residents or outliers with the greatest need for feedback and guidance. However, this sometimes meant residents who performed at a typical level were not discussed by the CCC. Professionalism and communication are areas where the milestones were perceived to be particularly helpful to elucidate areas for improvement.

Many program leaders identified that milestones provided a framework for faculty to offer feedback on a resident's developmental trajectory. This helped them move from viewing residents as either globally struggling or succeeding to identifying specific strengths and areas for improvement. Milestones enabled faculty to pinpoint specific needs for additional focus or remediation. For some, the ability to characterize deficiencies helped structure feedback to learners.

Transition From Gestalt to Granular: A number of program leaders described the milestones as helping them move from a "gestalt" system of assessment to a more "granular" lens that increases the value and utility of their assessment efforts. For many, this shift was accompanied by a desire to move to a more multidimensional system of assessment. Although some were accustomed to synthesizing assessments from faculty, peers, nurses, patients, simulations, procedure logs, examinations, or objective structured clinical examinations, this was uncommon. Many program leaders preferred depending on faculty rotation assessments, with modest program-specific additions from other sources. Still, some program leaders noted uncertainty as to whether the more meticulous approach of milestones-based assessment offered value beyond the "gestalt" consensus of experts.

Clarification of Pathway to Unsupervised Practice: Finally, program leaders felt that milestones helped clarify expectations for residents along the pathway to unsupervised practice. However, some noted it was not possible to obtain reliable data about residents for certain milestones. These situations led to a benchmark approach to assigning milestones levels where a resident was assumed to be competent at a preestablished level based on postgraduate year, largely due to an absence of reliable data.

Discussion

In this study, we describe themes in initial milestones-based assessment practices that can inform continued implementation and optimization of milestones-based assessment efforts relevant to GME leaders operating in a CBME framework. Program leaders offered insights into the *effect* of shifting to milestones-based assessment, highlighting both positive and negative experiences and beliefs and addressing Holmboe and colleagues' call for more work in this area.[7,8,11] We describe a number of strategies that worked for programs during the transition, such as rethinking sources of assessment data, increasing the number of faculty assessors or assessments, revising or simplifying assessment tools, and having existing CCCs that are adaptable.

Adaptation Has Occurred

Implementing milestones-based assessment practices required almost all program leaders to review, revise, and in some cases overhaul existing assessment tools so they are more explicitly linked to the content of the milestones. Program leaders experienced less success when they attempted to work the verbatim milestones language into assessment instruments, which is not consistent with the intended use of the milestones.[12,13] This provides another caution against using milestones verbatim for frontline assessment purposes. Program leaders also perceived easier

success when they already had a CCC-like structure in place to support change.

For some programs, implementing milestones highlighted residency curriculum gaps, such as quality improvement. Thus, some program leaders utilized their implementation experiences formatively to continue improving curricula and assessment.[8] This is encouraging, as the goal of CBME is to first define what patients need and then map backward to define the optimal curriculum and programs of assessment to ensure those educational outcomes are met.[14]

Challenges Persist

It is clear that program leaders desired more guidance for how to implement milestones. While the ACGME and milestones working groups communicated the rationale for shifting to milestones as well as a vision for implementation when milestones were first implemented, the extent of messaging likely varied by specialty and the degree of uptake likely varied by individual program.[2,14–17] The ACGME has now published guidebooks for CCCs as well as milestones, and much work has been done to understand and optimize CCC efforts.[3,18–26] However, these resources may not provide sufficient guidance and have only recently become available. Indeed, early efforts in the shift to milestones have been likened to "building a plane in flight."[12,13] Like previous work, this study underscores the importance of clear guidance when implementing a complex service intervention, such as a CBME program.[7,8,27]

Many challenges program leaders described are not unique to milestones and relate to both CBME and assessment.[28] Some program leaders would have preferred to be given assessment tools with known validity evidence. However, unless tools are accompanied by rater training and used as they were in studies seeking validity evidence (ie, with a particular learner and setting), scores are likely to have high variation and thus limited evidence of validity.[29] Indeed, faculty development in assessment, including rater training and cognition, has been described as the "missing link" in CBME.[30,31]

Benefits Are Acknowledged

Some program leaders approached the milestones as an improvement opportunity, rather than a punitive mandate, and attributed successes in part to their change mindset. For example, some noted that the shift to milestones improved their ability to obtain previously lacking objective resident performance data. Milestones helped them feel like their efforts may have led to an *actual* program of assessment, with data intentionally collected from multiple sources.[32] This allowed these programs to provide more guidance to residents, including a roadmap for their development, which has been described as a benefit in multiple specialties to date.[13,33]

Program leaders also saw the potential that milestones offer increased transparency to learners. They felt that milestones fostered a better shared understanding and common language with learners about where they are on the path to unsupervised practice and specific areas that may require attention. This can promote greater assurance to all stakeholders, including the public, that a trainee is ready for unsupervised practice.

Our study is limited by a small number of interviews with program leaders from a limited number of specialties at a range of institutions in one large urban city. Data were collected in late 2016 and may have limited applicability in 2019. There may be geographic, program size, and institutional differences (eg, community hospital versus academic) regarding milestones implementation. Future studies should seek to understand these differences and to investigate the prevalence of some of our findings in a national sample. We conducted our study at one moment in time; reactions to milestones likely change and different themes or conclusions might be identified if data were collected longitudinally. Our data were limited to program leaders: future research should focus on the experiences and perspectives of other stakeholders, including residents and other interprofessional team members. Finally, this study relied on self-reports without objective collection of data relevant to changes made or the outcomes of those changes when transitioning to milestones-based assessment.

Conclusion

This study of program director and associate program director experience with milestones implementation found that, despite a general lack of guidance and assessment tools, programs engaged in adaptation or creation of new practices and tools and reported benefits to this new approach to assessment. Programs that attempted to use milestones as assessment tools experienced less success. Benefits were found particularly in providing more specific, transparent information for residents to improve performance.

References

1. Swing SR, Beeson MS, Carraccio C, Coburn M, Iobst W, Selden NR, et al. Educational milestone development in the first 7 specialties to enter the next accreditation system. *J Grad Med Educ.* 2013;5(1):98–106. doi:10.4300/JGME-05-01-33.

2. Nasca TJ, Philibert I, Brigham T, Flynn TC. The next GME accreditation system–rationale and benefits. *N Engl J Med*. 2012;366(11):1051–1056. doi:10.1056/NEJMsr1200117.
3. Accreditation Council for Graduate Medical Education. Andolsek KM, Padmore J, Hauer K, Holmboe ES. Clinical Competency Committees: A Guidebook for Programs. 2017. https://www.acgme.org/Portals/0/ACGMEClinicalCompetencyCommitteeGuidebook.pdf. Accessed June 25, 2019.
4. Philibert I, Brigham T, Edgar L, Swing S. Organization of the educational milestones for use in the assessment of educational outcomes. *J Grad Med Educ*. 2014;6(1):177–182. doi:10.4300/JGME-06-01-35.
5. Holmboe ES. Realizing the promise of competency-based medical education. *Acad Med*. 2015;90(4):411–413. doi:10.1097/ACM.0000000000000515.
6. Colbert CY, Dannefer EF, French JC. Clinical competency committees and assessment: changing the conversation in graduate medical education. *J Grad Med Educ*. 2015;7(2):162–165. doi:10.4300/JGME-D-14-00448.1.
7. Holmboe ES, Call S, Ficalora RD. Milestones and competency-based medical education in internal medicine. *JAMA Intern Med*. 2016;176(11):1601–1602. doi:10.1001/jamainternmed.2016.5556.
8. Holmboe ES. The journey to competency-based medical education-implementing Milestones. *Marshall J Med*. 2017;3(1):3.
9. Pawson R, Tilley N. *Realistic Evaluation*. London, England: SAGE Publications Ltd; 1997.
10. Ritchie J, Spencer L. Qualitative data analysis for applied policy research. In: Bryman A, Burgess B, eds. *Analyzing Qualitative Data*. New York, NY: Routledge; 1994.
11. Edgar L, Roberts S, Holmboe E. Milestones 2.0: a step forward. *J Grad Med Educ*. 2018;10(3):367–369. doi:10.4300/JGME-D-18-00372.1.
12. Wallace A. Carter Jr. Milestone myths and misperceptions. *J Grad Med Educ*. 2014;6(1):18–20. doi:10.4300/JGME-D-13-00438.1.
13. Iobst WF. Building the plane as we fly it. *J Grad Med Educ*. 2015;7(2):259–261. doi:10.4300/JGME-D-15-00095.1.
14. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet*. 2010;376(9756):1923–1958. doi:10.1016/S0140-6736(10)61854-5.
15. Green ML, Aagaard EM, Caverzagie KJ, Chick DA, Holmboe E, Kane G, et al. Charting the road to competence: developmental milestones for internal medicine residency training. *J Grad Med Educ*. 2009;1(1):5–20. doi:10.4300/01.01.0003.
16. Hicks PJ, Margolis M, Poynter SE, Chaffinch C, Tenney-Soeiro R, Turner TL, et al. The pediatrics milestones assessment pilot: development of workplace-based assessment content, instruments, and processes. *Acad Med*. 2016;91(5):701–709. doi:10.1097/ACM.0000000000001057.
17. Hicks PJ, Schumacher DJ, Benson BJ, Burke AE, Englander R, Guralnick S, et al. The pediatrics milestones: conceptual framework, guiding principles, and approach to development. *J Grad Med Educ*. 2010;2(3):410–418. doi:10.4300/JGME-D-10-00126.1.
18. Accreditation Council for Graduate Medical Education. Holmboe ES, Edgar L, Hamstra S. The Milestones Guidebook. 2016. https://www.acgme.org/Portals/0/MilestonesGuidebook.pdf. Accessed June 25, 2019.
19. Promes SB, Wagner MJ. Starting a clinical competency committee. *J Grad Med Educ*. 2014;6(1):163–164. doi:10.4300/JGME-D-13-00444.1.
20. French JC, Dannefer EF, Colbert CY. A systematic approach toward building a fully operational clinical competency committee. *J Surg Educ*. 2014;71(6):22–27. doi:10.1016/j.jsurg.2014.04.005.
21. Chahine S, Cristancho S, Padgett J, Lingard L. How do small groups make decisions? A theoretical framework to inform the implementation and study of clinical competency committees. *Perspect Med Educ*. 2017;6(3):192–198. doi:10.1007/s40037-017-0357-x.
22. Hauer KE, ten Cate O, Boscardin CK, Iobst W, Holmboe ES, Chesluk B, et al. Ensuring resident competence: a narrative review of the literature on group decision making to inform the work of clinical competency committees. *J Grad Med Educ*. 2016;8(2):156–164. doi:10.4300/JGME-D-15-00144.1.
23. Hong R. Observations: we need to stop drowning-a proposal for change in the evaluation process and the role of the clinical competency committee. *J Grad Med Educ*. 2015;7(3):496–497. doi:10.4300/JGME-D-15-00131.1.
24. Donato AA, Alweis R, Wenderoth S. Design of a clinical competency committee to maximize formative feedback. *J Community Hosp Intern Med Perspect*. 2016;6(6):33533. doi:10.3402/jchimp.v6.33533.
25. Friedman KA, Raimo J, Spielmann K, Chaudhry S. Resident dashboards: helping your clinical competency committee visualize trainees' key performance indicators. *Med Educ Online*. 2016;21:29838.
26. Ekpenyong A, Baker E, Harris I, Tekian A. How do clinical competency committees use different sources of data to assess residents' performance on the internal medicine milestones? A mixed methods pilot study.

2017;39(10):1074–1083. doi:10.1080/0142159X.2017.1353070.
27. Witteles RM, Verghese A. Accrediation Council for Graduate Medical Education (ACGME) milestones—time for a revolt? *JAMA Intern Med*. 2016;176(11):1599–1560. doi:10.1001/jamainternmed.2016.5552.
28. Caverzagie KJ, Nousiainen MT, Ferguson PC, ten Cate O, Ross S, Harris KA, et al. Overarching challenges to the implementation of competency-based medical education. *Med Teach*. 2017;39(6):588–593. doi:10.1080/0142159X.2017.1315075.
29. van der Vleuten CP, Schuwirth LW, Scheele F, Driessen EW, Hodges B. The assessment of professional competence: building blocks for theory development. *Best Pract Res Clin Obstet Gynaecol*. 2010;24(6):703–719. doi:10.1016/j.bpobgyn.2010.04.001.
30. Kogan JR, Conforti LN, Iobst WF, Holmboe ES. Reconceptualizing variable rater assessments as both an educational and clinical care problem. *Acad Med*. 2014;89(5):721–727. doi:10.1097/ACM.0000000000000221.
31. Holmboe ES, Ward DS, Reznick RK, Katsufrakis PJ, Leslie KM, Patel VL, et al. Faculty development in assessment: the missing link in competency-based medical education. *Acad Med*. 2011;86(4):460–467. doi:10.1097/ACM.0b013e31820cb2a7.
32. van der Vleuten CPM, Schuwirth LWT, Driessen EW, Govaerts MJB, Heeneman S. Twelve tips for programmatic assessment. *Med Teach*. 2015;37(7):641–646. doi:10.3109/0142159X.2014.973388.
33. Schumacher DJ, Lewis KO, Burke AE, Smith ML, Schumacher JB, Pitman MA, et al. The pediatrics milestones: initial evidence for their use as learning road maps for residents. *Acad Pediatr*. 2013;13(1):40–47. doi:10.1016/j.acap.2012.09.003.

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