

Building a Framework of Entrustable Professional Activities, Supported by Competencies and Milestones, to Bridge the Educational Continuum

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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.

The adoption of the six core competencies of the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties (ABMS) as the foundation for outcomes-based undergraduate medical education (UME) by the Association of American Medical Colleges (AAMC), for graduate medical education (GME) by the ACGME, and for board certification as well as maintenance of certification (MOC) by the ABMS has provided an unprecedented opportunity to create a seamless continuum of learning and assessment in medicine.¹⁻³ Parallel advancements in assessment through entrustable professional activities (EPAs)⁴ and educational milestones, the latter effort initiated by the ACGME and the ABMS,⁵ provide the foundation

and the building blocks, respectively, to realize the implementation of this continuum.

EPAs, first introduced by ten Cate⁶ in the Netherlands in 2005, are receiving increasing attention internationally as a framework for meaningful assessment of physician competence at both the UME and GME levels.⁷⁻¹¹ As measurable units of observable work, EPAs describe important routine activities of a given specialist or subspecialist that require integration of competencies for safe and effective performance. In the aggregate, they define the specialty or subspecialty.⁴ The qualifier of "entrustable" aligns with the ultimate ability of an individual to perform the professional activity safely and effectively without supervision and has resulted in the proposal of rating scales with levels of supervision leading to readiness for unsupervised practice.^{8,12,13} Specialties have developed EPAs for residents, and the AAMC has developed Core EPAs for Entering Residency.^{7,9-11} The Core EPAs for Entering Residency set the expectation that trainees should be able to perform 13 EPAs on Day 1 of residency without direct supervision, but experts agree that ongoing observation

and feedback are essential for further professional development.

Parallel to and complementing the work of EPAs, the ACGME and member boards of the ABMS partnered to initiate the process that developed the milestones, with each specialty creating a shared mental model of performance levels or milestones for competencies within the specialty.⁵

The pediatrics community has integrated the two frameworks of EPAs and milestones.¹⁴ This integration provides a pathway that leads to assessment across the educational continuum from UME to GME and from GME to practice. We wrote this article to (1) briefly describe the evolution of the Pediatrics Milestone Project and the identification of EPAs for the specialty and subspecialties of pediatrics, (2) discuss the value added to assessment by integrating the EPAs with competencies and milestones, (3) illustrate the bridge between UME and GME built upon alignment of Core EPAs for Entering Residency with pediatrics EPAs, and (4) propose how assessment in GME based on EPAs and milestones can guide MOC to complete the bridge across the educational

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continuum, not only for pediatrics but also for other specialties.

The Unfolding of the Pediatrics Milestone Project

In 2009, the ACGME and the American Board of Pediatrics (ABP) invited the pediatrics community to initiate the development of the milestones for pediatrics. Creation of the guiding principles, process, and outcome of this three-year endeavor has previously been described.¹⁵ The full pediatrics milestone document is published as a supplement to *Academic Pediatrics*.¹⁶

In brief, the pediatrics milestones are narrative descriptions of behaviors across the developmental continuum beginning with a novice learner (early medical student) and progressing along the continuum to advanced beginner, then to competent learner, proficient learner, and, finally, expert learner (after years of deliberate practice). The competencies (e.g., “gather essential and accurate information about the patient”) and thus their narratives are context independent and therefore do not define the complexity of the patient encounter or the clinical environment in which the skills will be demonstrated. Reporting of individual performance levels or milestones for 21 of the 48 competencies, within the six competency domains, on a semiannual basis began in 2014 as part of the data collection for the ACGME’s Next Accreditation System.^{5*}

Identifying General Pediatrics EPAs

As the first iteration of the milestones was being developed, a body of literature on EPAs was emerging. As early as 2005,⁶ ten Cate began to write about the construct of EPAs with a seminal article⁴ published in 2007 that spoke to the implementation of their use for assessment in obstetrics–gynecology in the Netherlands. By focusing on care delivery, which requires the integration of multiple competencies, EPAs align what clinicians assess with what they do in the authentic environment, adding meaning and value to assessment. Some of us (C.C., R.E., J.G.) began to identify

the potential list of EPAs for the general pediatrician. Through an online survey, we vetted the initial list of EPAs with members of the Association of Pediatric Program Directors. In response to their feedback, we revised the list and then sent a second survey asking for additional refinements. We also communicated with other members of our community asking for their input. The final first iterations of the 17 EPAs defining the desired outcomes for the pediatrics residency-to-practice transition appear in the middle columns of Charts 1 and 2, with 6 in Chart 1 and the remaining 11 in Chart 2.

As conceived by the pediatrics community, the EPA and competency/ milestone frameworks should be integrated, not only in pediatrics but for other specialties as well:

The combination of the top-down and bottom-up approach to evaluating EPA performance is ultimately the most powerful. EPAs provide the clinical context for the assessment of competencies, which uses a “panoramic” lens for assessing learners who must integrate competencies to deliver care, and their milestones, which provide a “zoom” lens for assessing the learner at a more granular level.¹⁷

Pangaro and ten Cate¹⁸ suggest conceptual frameworks for assessment that can be categorized as analytic, synthetic, or developmental. The ACGME competencies would be considered an analytic framework, breaking down core domains into further detailed descriptions of competencies. Milestones are an example of a developmental framework, representing a logical

Chart 1
Examples of EPAs That Directly Align Across the Continuum of Pediatrics Education and Training^a

The AAMC’s Core EPAs for Entering Residency ⁷	Pediatric residency EPAs for entering practice ^b	Pediatric fellowship EPAs
Give or receive a patient handover to transition care responsibility.	Facilitate handovers to another health care provider, either within or across settings.	<i>Facilitate handovers to another health care provider, either within or across settings.</i>
Recognize a patient requiring urgent or emergent care and initiate evaluation and management.	Resuscitate, initiate stabilization of the patient, and then triage to align care with severity of illness.	Diagnose, initially manage, and refer children with advanced or end-stage heart failure and/ or pulmonary hypertension to experts for medical therapy, ECMO, ventricular assist device, and/or cardiac transplantation. ^c
Collaborate as a member of an interprofessional team.	Lead an interprofessional health care team.	<i>Lead an interprofessional health care team.</i> <i>Lead within the profession.</i>
Obtain informed consent for tests and/or procedures. Perform general procedures of a physician.	Demonstrate competence in performing the common procedures of the general pediatrician.	Demonstrate competence in performing the common procedures of the pediatric pulmonary subspecialist. ^c
Identify system failures and contribute to a culture of safety and improvement.	Apply public health principles and quality improvement methods to improve care and safety for populations, communities, and systems.	<i>Apply public health principles and quality improvement methods to improve care and safety for populations, communities, and systems.</i>
Recommend and interpret common diagnostic and screening tests.	Provide recommended pediatric health screening.	Provide preventive health care that includes conditions specific to the adolescent and young adult population. ^c

Abbreviations: EPA indicates an entrustable professional activity; AAMC, Association of American Medical Colleges; ECMO, extracorporeal membrane oxygenation.

^aThe alignments shown in this chart and Chart 2 help build the bridge between undergraduate and graduate medical education. The authors propose how assessment in GME, based on EPAs and milestones, can guide both certification and maintenance of certification programs to complete the bridge across the medical education continuum.

^bThis chart shows 6 of the general pediatrics EPAs in the middle column. Chart 2 shows the other 11 in its middle column. See <https://www.abp.org/entrustable-professional-activities-epas> for more about the pediatrics EPAs.

^cSubspecialty-specific EPA. Common subspecialty EPAs are shown in italics.

*In this article, we are using the proposed international terms¹ *domain of competence* (which in the United States is typically either *competency* or *core competency*) and *competency* (which in the United States is typically *subcompetency*).

Chart 2

Examples of EPAs That Are Sequenced Across the Continuum of Pediatrics Education, With Subsequent EPAs Building on Preceding EPAs^a

The AAMC's Core EPAs for Entering Residency ⁷	Pediatric residency EPAs for entering practice ^b	Pediatric fellowship EPAs
Gather a history and perform a physical examination.	Provide a medical home for well children of all ages.	Manage healthy patients with pediatric infectious diseases. ^c
Prioritize a differential diagnosis following a clinical encounter.	Provide a medical home for patients with complex, chronic, or special health care needs.	Provide a medical home for patients with hematologic, oncologic, or stem cell transplant needs. ^c
Enter and discuss orders and prescriptions.	Recognize, provide initial management, and refer patients presenting with surgical problems.	Provide care to patients in the neonatal intensive care unit with surgical problems in collaboration with pediatric and subspecialty surgeons. ^c
Document a clinical encounter in the patient record.	Assess and manage patients with common behavior/mental health problems.	Recognize and longitudinally manage behavioral variations, problems, and disorders in typically developing children and children with developmental disabilities. ^c
Provide an oral presentation of a clinical encounter.	Provide consultation to other health care providers caring for children.	<i>Provide for and obtain consultation from other health care providers caring for children.</i>
	Refer patients who require consultation.	
	Manage patients with acute, common diagnoses in an ambulatory, emergency, or inpatient setting.	Manage patients with acute complex respiratory disease in an ambulatory, emergency, or inpatient setting. ^c
	Care for the well newborn.	Manage neonates with acute, common single-system diseases in an inpatient setting. ^c
	Facilitate the transition from pediatric to adult care.	Facilitate the transition of patients with endocrine disorders from pediatric to adult health care. ^c
Form clinical questions and retrieve evidence to advance patient care.	Manage information from a variety of sources for both learning and application to patient care.	<i>Engage in scholarly activities through the discovery, application, and dissemination of new knowledge.</i>
	Contribute to the fiscally sound and ethical management of a practice (e.g., coding billing, scheduling, and record keeping).	<i>Contribute to the fiscally sound and ethical management of a practice (e.g., coding billing, scheduling, and record keeping).</i>

Abbreviations: EPA indicates an entrustable professional activity; AAMC, Association of American Medical Colleges.

^aThe alignments shown in this chart and Chart 1 help build the bridge between undergraduate and graduate medical education. The authors propose how assessment in GME, based on EPAs and milestones, can guide both certification and maintenance of certification programs to complete the bridge across the medical education continuum.

^bThis chart shows 11 of the general pediatrics EPAs in the middle column. Chart 1 shows the other 6 in its middle column. See <https://www.abp.org/entrustable-professional-activities-epas> for more about the pediatrics EPAs.

^cSubspecialty-specific EPA. Common subspecialty EPAs are shown in italics.

progression of steps over time. Finally, EPAs represent a synthetic framework that combines multiple domains of competence. The framework we propose embraces the above models in that it is a framework of EPAs integrated with competencies and milestones.

Once identified, EPAs are judiciously mapped to those competencies and milestones critical to making an entrustment decision for that specific EPA.¹⁹ Through this mapping process we create, for pediatrics, a matrix of the critical competencies for a given EPA and their respective milestones (see Chart 3). The first column of the matrix (on the left) lists the competencies that are critical for making an entrustment decision for the given EPA. Each row represents the progression of milestones for the given competency. Columns two through six represent all of the milestones

for a given level of performance (novice to expert) across the competencies in the map. For example, in Chart 3, the behaviors of the novice are described in the second column, advanced beginner in the third, competent learner in the fourth, proficient learner in the fifth, and expert in the sixth column.

Our model suggests that reading down any column provides the requisite behaviors of a learner at a specific level of performance for all of the critical competencies required for an entrustment decision on that EPA. For example, integrating the behaviors in the third column of Chart 3 into a clinical vignette paints a picture of an advanced beginner performing the EPA. This same process would apply to each performance level, the end result being a picture of a learner at each performance level carrying out the EPA.¹⁴ This shared

mental model of performance could then be applied to learner assessment, with faculty choosing the vignette that most closely aligns with the behaviors of the trainees that they have directly observed over some period of time to assess performance level.

Learners in the workplace will likely not demonstrate all the described behaviors of one column or performance level but, rather, some of the behaviors from two or possibly three performance levels. The shared mental models painted by the behaviors in each column are meant to be anchors that frame a discussion between the learner and a mentor or the learner and a clinical competency committee around *which* behaviors have been demonstrated and *which* behaviors are desired. The information gleaned about a learner's performance level using this framework will be combined with many

Chart 3

The “Handover EPA”^a Mapped to Competencies and Their Milestones That Are Critical to Making an Entrustment Decision, With Examples of Behaviors Associated With the Milestone for One of the Performance Levels^b

Competencies critical for making an entrustment decision for this EPA	Milestone level 1	Milestone level 2	Milestone level 3	Milestone level 4	Milestone level 5
<i>Patient care.</i> Organize and prioritize responsibilities to provide care that is safe, effective, and efficient.		Organizes the simultaneous care of a few patients with efficiency; occasionally prioritizes patient care responsibilities to proactively anticipate future needs; each additional patient or interruption in work leads to notable decreases in efficiency and ability to effectively prioritize; permanent breaks in task with interruptions are less common, but prolonged breaks in task are still common.			
<i>Patient care.</i> Provide transfer of care that ensures seamless transitions.		Uses a standard template for the information provided during the handoff. Unable to deviate from that template to adapt to more complex situations. May have errors of omission or commission, particularly when clinical information is not synthesized. Neither anticipates nor attends to the needs of the receiver of information.			
<i>Interpersonal and communication skills.</i> Communicate with physicians and other health professionals.		Begins to understand the purpose of the communication and at times adjusts length to context, as appropriate. However, will often still err on the side of inclusion of excess details.			
<i>Interpersonal and communication skills.</i> Maintain comprehensive, timely, and legible medical records.		Documentation often contains all appropriate data sections, although some information may be missing from some sections or presented in a sequence that confuses the reader (evolution of symptoms is not documented chronologically). Documentation may be overly lengthy and detailed. It may contain erroneous information carried forward from review of the past medical record. However, the practitioner at this stage begins to go beyond documentation of specific encounters and may update the patient-specific databases (e.g., problem list and diabetes care flowsheet) where applicable. Documentation is often in the medical record in a timely manner, but may need subsequent amendment to be considered complete. Handwritten documentation is usually legible, timed, dated, and signed.			
<i>Practice-based learning and improvement.</i> Incorporate formative evaluation feedback into daily practice.		Dependent on external sources of feedback for improvement; beginning to acknowledge other points of view, but reinterprets feedback in a way that serves his or her own need for praise or consequence-avoidance rather than informing a personal quest for improvement; little to no behavioral change occurs in response to feedback (e.g., listens to feedback but takes away only those messages he or she wants to hear).			
<i>Practice-based learning and improvement.</i> Use information technology to optimize learning and care delivery.		Demonstrates a willingness to try new technology for patient care assignments or learning. Able to identify and use several available databases, search engines, or other appropriate tools, resulting in a manageable volume of information, most of which is relevant to the clinical question. Basic use of an EHR is improving, as evidenced by greater efficacy and efficiency in performing needed tasks. Beginning to identify shortcuts to getting to the right information quickly, such as use of filters. Also beginning to avoid shortcuts that lead one astray of the correct information or perpetuate incorrect information in the electronic health record.			

^aA general pediatrics and common subspecialty EPA: “Facilitate handovers to another healthcare provider either within or across settings.”

^bThis chart illustrates the mapping of the pediatrics “handover EPAs” to the competencies (shown in the left-hand column) and their associated milestones for five performance levels (shown in columns 2 through 6). The chart includes descriptions of behaviors for the milestone for level 2 to illustrate how the milestones for the five performance levels are associated with their competencies. Levels 1 to 5 represent progression along a developmental trajectory from novice to advanced beginner, competent learner, proficient learner, and expert learner. The authors caution that labels of the levels (e.g., “advanced beginner”) be avoided, to keep the learner and the assessor focused on behaviors rather than labels. The authors propose how assessment in GME, based on EPAs and milestones, can guide both certification and maintenance of certification programs to complete the bridge across the medical education continuum.

other data points that experts will use in making a balanced judgment regarding entrustment.

Regehr et al²⁰ provide some support for this assessment strategy. Creating video vignettes of each of the five performance levels provides an additional tool for faculty development in the assessment of EPAs and milestones.²¹ Using EPAs, with their dimension of entrustment, allows a formal decision to trust a learner to safely perform the professional activity *without direct supervision* at the UME-to-GME transition and *without supervision* at the GME-to-practice transition, thus bringing the required level of supervision as another data point into the assessment equation.¹³ Being mindful that context matters, verification of a learner's readiness to practice at a given level of supervision through ongoing observation and feedback is warranted at transition points until readiness for unsupervised practice is truly achieved. Even then, significant changes in context may require self-assessment, peer observation, and coaching until readiness for unsupervised practice is regained.

As the development of the general pediatrics milestones was being completed, the ACGME required that each of the subspecialties within a given specialty develop subspecialty-specific milestones. The pediatrics milestones were unique in that they spanned the continuum from early medical students to practicing pediatricians, thus including performance levels applicable for fellows. Embedding the competencies in clinical contexts or EPAs relevant to each of the 14 pediatrics subspecialties with ABP certification was the next and best step for our community. The ACGME agreed that this plan represented a reasoned approach, and the ABP took the lead in this effort.

Identifying EPAs for the Pediatrics Subspecialties

In March 2013, the ABP, with the help of the Council of Pediatric Subspecialties (CoPS), convened a workshop for education thought leaders from each of the ABP-certified pediatrics subspecialties to identify EPAs common to the subspecialties.²² The two-day workshop began with faculty development around defining and distinguishing pediatrics EPAs, competencies, and milestones

and illustrating their relationships to each other. The subspecialists then reviewed the general pediatrics EPAs, adopting five that spanned the generalist to subspecialist role and that applied to all subspecialties. Through a consensus process, the group identified two additional common subspecialty EPAs (see Charts 2 and 3), one on leading within the profession and a second on scholarly activity. With regard to the latter EPA, the ABP requires the completion of scholarly work during fellowship in order for the learner to sit for the subspecialty certification examination, which provides the rationale for the identification of an EPA on scholarly activity. The second day of the workshop concluded with a discussion of the approach to identifying subspecialty-specific EPAs to maximize consistency across subspecialties.

The participants left with two challenges: (1) to lead the effort to identify the subspecialty-specific EPAs for their community by developing a title, short description, and functions (list of tasks that one needs to do to perform the EPA) as well as to judiciously map each EPA to its critical competencies²³; and (2) with the help of CoPS, to obtain and incorporate feedback from their communities into the work product. Each subspecialty community identified between three and six subspecialty-specific EPAs to add to the seven common subspecialty EPAs. Leadership from the ABP worked with each subspecialty community to ensure a consistent approach.

The Bridge Across the UME-to-GME Continuum

Shortly after work began on the pediatrics EPAs, the AAMC constituted a multidisciplinary drafting panel to identify the Core EPAs for Entering Residency. A panel comprising approximately 100 thought leaders across the spectrum of medical education provided feedback to the drafting panel, resulting in an iterative process of creation, reaction, and revision. The final document details 13 EPAs that medical students should be entrusted to perform without direct supervision on Day 1 of residency training.⁷

With the creation of the Core EPAs for Entering Residency, the pediatrics community now had the infrastructure

to build the bridge that connects EPAs for medical students with general pediatrics EPAs for all residents, which in turn connects to the pediatrics EPAs for fellowships. Review of the lists of EPAs illustrates the natural linkages that represent either a direct alignment (e.g., as a student, collaborating as a member of an interprofessional team; as a resident or fellow, leading an interprofessional health care team—see Chart 1) or where student EPAs serve as building blocks for residency EPAs, the latter serving as building blocks for fellowship EPAs (e.g., as a student, entering and discussing orders and prescriptions; as a resident or fellow, managing patients with common acute illnesses in a variety of settings—see Chart 2). This bridge across the continuum of learning and assessment is reminiscent of what Harden and Stamper²⁴ highlighted as the value of the “spiral curriculum,” where the “competence of students increases with each visit until the final overall objectives are achieved.”

The Missing Link: Guiding MOC With GME EPAs

On the basis of performance in residency and fellowship, one can envision specific EPAs and competencies forming the foundation for improvement during the first cycle of MOC and beyond. As a prerequisite, our community must decide the performance level that equates with entrustment for each EPA, for residents as well as fellows, and whether a level of supervision short of readiness for unsupervised practice for any of the EPAs will be acceptable for transition from residency or fellowship into practice.

The ABP just initiated research with our community to address these questions for pediatrics learners. For example, in a case where a learner is entrusted with 16 of the 17 EPAs, with the exception being the EPA to “manage information from a variety of sources for both learning and application to patient care,” would we accept a level of performance that equates with a requisite period of indirect supervision or guidance in a new practice by a peer/colleague who is more experienced in this professional activity? Or consider this scenario: A resident is entrusted to perform all 17 EPAs at the completion of training and enters a general pediatrics practice that cares for a large number of adolescent

patients, many of whom are struggling with either an anxiety disorder or depression. While the new practicing physician had demonstrated the requisite competencies to be entrusted during residency to perform without supervision the EPA “Assess and manage patients with common behavior/mental health problems,” the more limited patient volume and experience during training did not allow for the development of proficiency. The new practicing physician realizes that patients will benefit if he or she continues to move along the developmental trajectory toward proficiency and expertise. Seen in this light, EPAs may focus reflection on practice that helps individuals identify gaps and seek learning activities to fill those gaps.

Of note, entrustment for unsupervised practice during training does not equate with expertise. In both of these examples, the opportunity to address identified gaps during the transition from residency to practice presents an opportunity to design a cycle of MOC that enhances the professional development of the pediatrician—or any other physician—toward expertise. Investment in improvement through continuous professional development and MOC should be used to facilitate a process of structured learning throughout a physician’s career. When gaps are identified during training, learning activities can be initiated as part of an individualized curriculum and continued into MOC. In addition, there may be new EPAs identified as a physician’s career evolves or changes in scope. According to ten Cate et al,²⁵ “entrustment decisions should ... have an expiration date if no or too little practice has occurred.” Further work in this area holds promise of ensuring that MOC remains meaningful throughout a physician’s career.

The Critical Contributions of the Continuum to Competency-Based Education

One of the current concerns about trainees is that they may not be well prepared for real-world practice. The EPAs for residents and fellows are based on what one expects in practice, and thus a backward-visioning process is used to set expectations and outcomes for GME.²⁶ Thus, the continuum enables the alignment of the work of UME

and GME with the desired outcomes for practicing physicians. For example, in the UME setting it is essential to lay the foundation for handovers by introducing a template, which includes situation awareness, illness severity, action planning, and contingency planning as well as the communication skills to effectively engage as either a sender or a receiver of the handover (e.g., skill at readbacks). These foundational skills as well as content knowledge must be advanced during GME, building on and reinforcing what came before to provide deeper learning and ultimately readiness for entrustment. In addition, faculty development for assessment can focus on experience with a given set of tools used across the continuum, developing expertise among faculty raters.

Next Steps

Although the road ahead is long, for the first time it is continuous. As the work of the pediatrics community indicates, bridges are available to connect us at the transition points from UME to GME and from GME to fellowship and practice for any specialty that has developed EPAs. As our response to those who will invariably question whether the road ahead will lead to a physician workforce that delivers better quality of care and who are reluctant to follow a path without proof, we offer three thoughts:

First, although we will not have proof that our proposed road leads to desired patient care outcomes until implementation and study, we have little evidence supporting the current model despite its entrenchment, and we have clear evidence that this discontinuous path leads us away from, rather than closer to, desired outcomes.^{27,28}

Second, program directors’ expectations of what new residents should be able to do are not aligned with residents’ actual skills.²⁹ First-year residents also report performing some professional activities with less supervision than clinical supervisors say they expect, particularly at night.³⁰ Misalignment between actual skills and expected skills or between an expected level of supervision and an actual level of supervision puts a patient’s safety at risk and puts the learner in a position of making a potentially preventable medical error.

Third, the scaffolding that supports the bridges we are building is constructed of sound educational theory.^{20,31–33}

We did not create our list of EPAs with broad input from practitioners or input from patients; however, practicing general pediatricians and pediatric subspecialists created the original lists. These lists were subsequently vetted among our various communities of practice, which include general pediatricians and the 14 subspecialties for which ABP certification is offered, and we revised the lists on the basis of their feedback. However, we need to “test” the lists, which we are currently doing, with studies at both the residency and fellowship levels in pediatrics. Of note, the AAMC is engaging a number of medical schools in piloting the Core EPAs for Entering Residency.³⁴ Testing in practice will come by having trainees carry EPAs from GME into practice for the first cycle of MOC as a way of moving them further along the trajectory from competent/proficient to expert. Plans for testing in practice are also on the horizon.

Dr. David Leach, a former executive director of the ACGME, a visionary who saw the road ahead before we could even begin to imagine it, said of assessment that it is

dependent on an integrated version of the competencies, whereas measurement relies on a speciated version of the competencies. The paradox cannot be resolved easily. The more the competencies are specified, the less relevant to the whole they become.³⁵

The integration of the EPAs, competencies, and milestones across the educational continuum provides the road map to resolving this paradox.

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References

- Englander R, Cameron T, Ballard AJ, Dodge J, Bull J, Aschenbrenner CA. Toward a common taxonomy of competency domains for the health professions and competencies for physicians. *Acad Med.* 2013;88:1088–1094.
- Accreditation Council for Graduate Medical Education. ACGME common program requirements. <http://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/CPRs2013.pdf>. Revised July 1, 2013. Accessed January 15, 2016.
- American Board of Medical Specialties. Based on core competencies. <http://www.abms.org/board-certification/a-trusted-credential/based-on-core-competencies/>. Accessed January 15, 2016.
- ten Cate O, Scheele F. Competency-based postgraduate training: Can we bridge the gap between theory and clinical practice? *Acad Med.* 2007;82:542–547.
- Nasca TJ, Philibert I, Brigham T, Flynn TC. The next GME accreditation system—rationale and benefits. *N Engl J Med.* 2012;366:1051–1056.
- ten Cate O. Entrustability of professional activities and competency-based training. *Med Educ.* 2005;39:1176–1177.
- Association of American Medical Colleges. Core entrustable professional activities for entering residency (updated). www.mededportal.org/icolaborative/resource/887. Accessed January 15, 2016.
- Chen HC, van den Broek WE, ten Cate O. The case for use of entrustable professional activities in undergraduate medical education. *Acad Med.* 2015;90:431–436.
- Caverzagie KJ, Cooney TG, Hemmer PA, Berkowitz L. The development of entrustable professional activities for internal medicine residency training: A report from the Education Redesign Committee of the Alliance for Academic Internal Medicine. *Acad Med.* 2015;90:479–484.
- Hauer KE, Kohlwes J, Cornett P, et al. Identifying entrustable professional activities in internal medicine training. *J Grad Med Educ.* 2013;5:54–59.
- Shaughnessy AF, Sparks J, Cohen-Osher M, Goodell KH, Sawin GL, Gravel J Jr. Entrustable professional activities in family medicine. *J Grad Med Educ.* 2013;5:112–118.
- Kennedy TJ, Lingard L, Baker GR, Kitchen L, Regehr G. Clinical oversight: Conceptualizing the relationship between supervision and safety. *J Gen Intern Med.* 2007;22:1080–1085.
- ten Cate O. Nuts and bolts of entrustable professional activities. *J Grad Med Educ.* 2013;5:157–158.
- Carraccio C, Englander R, Holmboe E, Kogan J. Driving care quality: Aligning trainee assessment and supervision through practical application of entrustable professional activities, competencies and milestones. *Acad Med.* 2016;91:199–203.
- Hicks PJ, Schumacher DJ, Benson BJ, et al. The pediatrics milestones: Conceptual framework, guiding principles, and approach to development. *J Grad Med Educ.* 2010;2:410–418.
- Carraccio C, Gusic M, Hicks P, eds. The pediatrics milestone project. *Acad Pediatr.* 2014;14(2 suppl):S13–S97.
- Englander R, Carraccio C. From theory to practice: Making entrustable professional activities come to life in the context of milestones. *Acad Med.* 2014;89:1321–1323.
- Pangaro L, ten Cate O. Frameworks for learner assessment in medicine: AMEE guide no. 78. *Med Teach.* 2013;35:e1197–e1210.
- Jones MD Jr, Rosenberg AA, Gilhooly JT, Carraccio CL. Perspective: Competencies, outcomes, and controversy—linking professional activities to competencies to improve resident education and practice. *Acad Med.* 2011;86:161–165.
- Regehr G, Ginsburg S, Herold J, Hatala R, Eva K, Oulanova O. Using “standardized narratives” to explore new ways to represent faculty opinions of resident performance. *Acad Med.* 2012;87:419–427.
- Calaman S, Hepps JH, Bismilla Z, et al. Creation of standard-setting videos to support faculty observations of learner performance and entrustment decisions [published online August 11, 2015]. *Acad Med.* doi:10.1097/ACM.0000000000000853.
- Council of Pediatric Subspecialties. Entrustable professional activities. <http://pedsubs.org/issues/EPAs.cfm>. Accessed January 15, 2016.
- ten Cate O. AM last page: What entrustable professional activities add to a competency-based curriculum. *Acad Med.* 2014;89:691.
- Harden RM, Stamper N. What is a spiral curriculum? *Med Teach.* 1999;21:141–143.
- ten Cate O, Chen HC, Hoff RG, Peters H, Bok H, van der Schaaf M. Curriculum development for the workplace using entrustable professional activities (EPAs): AMEE guide no. 99. *Med Teach.* 2015;37:983–1002.
- Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet.* 2010;376:1923–1958.
- Di Francesco L, Pistoria MJ, Auerbach AD, Nardino RJ, Holmboe ES. Internal medicine training in the inpatient setting. A review of published educational interventions. *J Gen Intern Med.* 2005;20:1173–1180.
- Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err Is Human—Building a Safer Health Care System*. Washington, DC: National Academies Press; 1999.
- Raymond MR, Mee J, King A, Haist SA, Winward ML. What new residents do during their initial months of training. *Acad Med.* 2011;86(10 suppl):S59–S62.
- Touchie C, De Champlain A, Pugh D, Downing S, Bordage G. Supervising incoming first-year residents: Faculty expectations versus residents’ experiences. *Med Educ.* 2014;48:921–929.
- Gingerich A, Regehr G, Eva KW. Rater-based assessments as social judgments: Rethinking the etiology of rater errors. *Acad Med.* 2011;86(10 suppl):S1–S7.
- Crossley J, Johnson G, Booth J, Wade W. Good questions, good answers: Construct alignment improves the performance of workplace-based assessment scales. *Med Educ.* 2011;45:560–569.
- Pangaro LN. Two cheers for milestones. *J Grad Med Educ.* 2015;7:4–6.
- Association of American Medical Colleges. Medical schools to test guidelines for preparing medical students for residency training. <https://www.aamc.org/newsroom/newsreleases/403960/09122014.html>. Accessed January 15, 2016.
- Ginsburg S, McIlroy J, Oulanova O, Eva K, Regehr G. Toward authentic clinical evaluation: Pitfalls in the pursuit of competency. *Acad Med.* 2010;85:780–786.