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Core Entrustable Professional Activities for Entering Residency

SUMMARY OF THE 10-SCHOOL PILOT

2014-2021

Association of
American Medical Colleges

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PREFACE

In 2014, the AAMC published a set of 13 activities that a resident could be expected to perform with indirect supervision on the first day of residency: **entrustable professional activities (EPAs) for entering residency (Core EPAs).**

Shortly thereafter, the AAMC convened a 10-school pilot to explore the feasibility of implementing the Core EPAs framework in undergraduate medical education in the United States. This monograph, intended for a general readership, provides an overview of the activities of the pilot over the seven-year period from 2014 to 2021 and summarizes the pilot's major outcomes. The collective experiences and outcomes of the Core EPAs pilot will inform the AAMC's continued collaborative work — with other organizations and with the medical education community at large — to optimize the process of transitioning from medical school to residency and to assure the readiness of all medical school graduates for the responsibilities they will assume on day one of residency.

ACKNOWLEDGMENTS

This report was written by Jonathan Amiel, MD, senior associate dean for innovation in health professions education and professor of psychiatry, Columbia University Vagelos College of Physicians and Surgeons, who served as the Core EPAs pilot team school lead at Columbia University for the duration of the pilot (2014-2021) and as the associate director (2018-2021) of the Core EPAs pilot; Michael S. Ryan, MD, MEHP, who served as the Core EPAs pilot team school lead at Virginia Commonwealth University for the duration of the pilot (2014-2021) in his capacity as the vice chair of education and professor of pediatrics, Children's Hospital of Richmond at Virginia Commonwealth University School of Medicine (through June 2022; Dr. Ryan is currently professor of pediatrics and associate dean for assessment, evaluation, research and scholarly innovation at University of Virginia School of Medicine); Dorothy A. Andriole, MD, senior director for medical education research, AAMC; and Alison J. Whelan, MD, director of the Core EPAs pilot (2016-2021) and chief academic affairs officer, AAMC.

The authors acknowledge with deep gratitude the entire Core EPAs pilot team community that first came together in 2014 to innovate with the hope of improving medical education. The pilot was an undertaking that brought together thousands of dedicated learners, staff, and faculty across 10 medical schools and the AAMC to try, together, to enhance the training of medical students in the United States. The work built on frameworks developed over decades by many others in medical education.

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The additional Core EPAs pilot team members listed below (titles as of May 2022) also made substantive contributions to the preparation of this monograph:

- **William B. Cutrer, MD, MEd,** associate dean for undergraduate medical education and associate professor of pediatrics, Vanderbilt University School of Medicine (team lead).
- **Michael Green, MD,** professor of medicine and director of student assessment, Teaching and Learning Center, Yale School of Medicine (team lead).
- **Mark Hormann, MD,** professor of pediatrics and assistant dean for clinical education, McGovern Medical School at the University of Texas Health Science Center at Houston (team lead).
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- **Vivian Obeso, MD,** associate dean for curriculum and medical education, Florida International University Herbert Wertheim College of Medicine (team lead).
- **Linda Tewksbury, MD,** associate professor, Department of Pediatrics, and associate dean for student affairs, NYU Grossman School of Medicine.
- **Dianne Wagner, MD,** associate dean for undergraduate medical education and professor of medicine, Michigan State University College of Human Medicine (team lead).
- **Sandra Yingling, PhD,** associate dean for educational planning and quality improvement and clinical assistant professor, Department of Medical Education, University of Illinois College of Medicine (team lead).

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EXECUTIVE SUMMARY

Competency-based medical education (CBME) is an outcomes-based approach to medical education.

With the ultimate goal of better patient care, CBME uses an organizing framework of competencies in designing, implementing, assessing, and evaluating a medical education program. It aims to ensure that learners demonstrate preparedness for the professional responsibilities they will assume in each stage of their education.

One emerging approach to CBME uses entrustable professional activities (EPAs) — discrete tasks or responsibilities — that those learners are entrusted to perform once they have attained sufficient specific competence. In 2014, the AAMC published a list of 13 EPAs for entering residency (Core EPAs) that a resident could be expected to perform with indirect supervision on the first day of residency; these 13 EPAs could potentially constitute a discrete subset of all requirements for advancement from undergraduate medical education (UME) to graduate medical education. Shortly thereafter, the AAMC convened a 10-school pilot project to explore the feasibility of implementing the Core EPAs in UME. That seven-year pilot ended in June 2021. The purpose of this report is to provide an overview of the activities of the 10-school pilot over that seven-year period and a summary of its programmatic outcomes. The monograph is written for a broad readership interested in medical education.

A set of nine guiding principles was jointly developed by the 10 participating medical schools' team members at the outset of the project in 2014. The guiding principles informed much of the work of the pilot over the subsequent seven years. Each of the 10 schools implemented curriculum content and formative assessments for at least four Core EPAs, with some schools choosing to do so for all 13 Core EPAs. All 10 schools also explored ways to make decisions about their graduating students' readiness for entrustment to perform those Core EPAs that were implemented at their schools. Six of the 10 schools convened trained entrustment groups to examine Core EPAs data and render mock entrustment decisions for their students in the graduating classes of 2019, 2020, or both and shared these data in a multischool analysis of entrustment process outcomes.

The pilot team reviewed these EPA-specific entrustment process outcomes data, along with other data collected from a broad range of sources over the full duration of the pilot, and synthesized three groups of the 13 Core EPAs.

- **Group 1: Core EPAs aligned with existing curricula.** Group 1 includes six EPAs (EPA 1: "Gather a history and perform a physical examination," EPA 2: "Prioritize a differential diagnosis following a clinical encounter," EPA 5: "Document a clinical encounter in the patient record," EPA 6: "Provide an oral presentation of a clinical encounter," EPA 7: "Form clinical questions and retrieve evidence to advance patient care," and EPA 9: "Collaborate as a member of an interprofessional team"). These six EPAs aligned well with existing curricula at pilot schools and generally allowed for ample assessment. There were relatively high proportions of students deemed ready for entrustment under indirect supervision in each of these six EPAs.
- **Group 2: Core EPAs aligned with sub-internship activities.** Group 2 includes three EPAs (EPA 3: "Recommend and interpret common diagnostic and screening tests," EPA 4: "Enter and discuss orders and prescriptions," and EPA 8: "Give or receive a patient handover to transition care responsibility") that were predominantly addressed in more advanced curricular experiences such as acting internships at pilot schools. However, even in acting internships, some of these EPAs were not routinely expected or assessed. Relatively lower proportions of students were deemed ready for entrustment under indirect supervision in these EPAs.
- **Group 3: Core EPAs typically reserved for interns and residents.** Group 3 includes four EPAs (EPA 10: "Recognize a patient requiring urgent or emergent care and initiate evaluation and management," EPA 11: "Obtain informed consent for tests and/or procedures," EPA 12: "Perform general procedures of a physician," and EPA 13: "Identify system failures and contribute to a culture of safety and improvement") that encompass roles not typically afforded to students at pilot schools. In the UME setting, these EPAs might be practiced in simulation, with the understanding that simulated experiences may lack relevant contextual information and cues. Relatively lower proportions of students were deemed ready for entrustment under indirect supervision in these EPAs.

Implementing the Core EPAs in this pilot was a substantial undertaking that had many benefits for participating schools and their students and is still a work in progress. Based on their collective experiences through the end of the pilot, none of the schools in the Core EPAs pilot were ready to make high-stakes summative entrustment decisions (i.e., for promotion or graduation) in the Core EPAs for their students. The role that Core EPA entrustment decisions may play in the transition to residency at a national systems level in the United States remains to be determined. Nonetheless, for the medical education community at large, the experiences and outcomes of the Core EPAs pilot can inform work ahead in creating a more seamless continuum of medical education, easing the transition to residency, and assuring the readiness of all medical school graduates for the responsibilities they will assume on day one of residency.

Competency-Based Medical Education and Entrustable Professional Activities

Medical education is evolving to increasingly emphasize the development and assessment of learners' readiness to perform the key competencies that modern health systems require as the basis for moving through stages of medical training. A competency has been defined as "an observable ability of a health professional, integrating multiple components such as knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition."[1] A competency-based medical education (CBME) approach, which starts with a defined set of outcomes,[2] aims to ensure that physicians demonstrate preparedness for the professional responsibilities they must assume in each stage of their education. With the ultimate goal of better patient care, CBME uses an organizing framework of competencies in designing, implementing, assessing, and evaluating a medical education program.

One emerging approach to CBME uses entrustable professional activities (EPAs).[3] EPAs are "units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence. EPAs are independently executable, observable, and measurable in their process and outcome, and, therefore, suitable for entrustment decisions."[3]

Entrustment decisions regarding a learner's readiness to perform EPAs under decreased supervision may be made on an ad hoc basis in the clinical workplace or as a summative decision for educational advancement. As described by ten Cate and colleagues, "ad hoc entrustment decisions by clinical supervisors about trainees are usually based on a mix of estimated trustworthiness of the trainee, estimated risk of the situation, urgency of the job to be done, and suitability of this task at this moment for this learner. They do not necessarily constitute a precedent for similar decisions in the future. In contrast, summative entrustment decisions, grounded in sufficient evaluation and made by educational program directors or clinical competency committees, should lead to certification and privileging of the trainee to act in the future with a specified level of supervision."[4]

The Liaison Committee on Medical Education (LCME), the accrediting body for MD-degree granting programs in the United States, has promulgated its Standard 9: Teaching, Supervision, Assessment, and Student and Patient Safety, which states that medical students must be "appropriately supervised at all times" and that "the level of responsibility delegated to the student is appropriate to the student's level of training."[5] However, the LCME standards delegate to individual schools the task of explicitly describing expectations for the format and intensity of supervision and how those expectations can evolve with a learner's level of experience. Explicit expectations or requirements for progressively increasing responsibilities, including trainees' demonstrated readiness to perform particular activities at a specified level of supervision, are not defined or standardized. Medical schools' expectations of their graduates and the opportunities and experiences that MD-degree program graduates will have had during medical school can vary substantially, resulting in a lack of uniform readiness for patient care activities that graduates may be expected to perform at the start of residency training.[6]

TEAM REFLECTION

Columbia University Vagelos College of Physicians and Surgeons

"Participating in the Core EPAs pilot helped us to understand in a deep, applied way the premise of competency-based medical education and how it could shape the arc of medical education in focusing each phase of training on preparing students to take on increasing degrees of responsibility in the next phase of training. We were able to reflect on our assessment practices and develop a continuous program of assessment of clinical skills. Most importantly, we were able to start providing opportunities for enrichment earlier in training to those learners who needed them most and found that with a little extra help, the learners were able to meet their developmental milestones. The community of practice the pilot afforded was also wonderfully inviting and facilitated personal and professional development for us all."

An EPAs framework for a defined set of activities that medical school graduates should be expected to perform encompasses, by definition, the consideration of supervision — a concept critical to the graduate medical education (GME) training environment that U.S. medical school graduates enter for residency training. Understanding a learner's trajectory throughout the course of undergraduate medical education (UME), including preparation for residency and readiness for decreased levels of supervision, requires insights into the development and integration of a learner's clinical skills.

The AAMC Core EPAs for Entering Residency

In 2013, the AAMC convened a 15-member drafting panel with broad expertise across the UME-GME continuum to develop a list of professional activities that medical school graduates should be prepared to perform without direct supervision at the start of residency.[7] The result of this drafting panel's deliberations was a set of 13 EPAs for entering residency (Core EPAs), or core activities, that all medical school graduates regardless of specialty could be expected to perform with indirect supervision on the first day of residency (refer to Figure 1); the Core EPAs could potentially serve as a discrete subset of all requirements for advancement from UME to GME. This list of 13 Core EPAs was released along with guidance documents, also developed by the drafting panel, for curriculum developers[8] and faculty and learners.[9]

The AAMC then conducted a national survey of residency program directors in six specialties (internal medicine, pediatrics, family medicine, general surgery, obstetrics and gynecology, and psychiatry) regarding their confidence that recent medical graduates in their training programs were prepared to perform these Core EPAs.[6] Results of this survey showed wide variation in program directors' confidence that their incoming interns were able to perform the 13 Core EPAs without direct supervision (refer to Figure 2). As noted by Englander and colleagues on the drafting panel, the adoption of the 13 Core EPAs in UME "could significantly narrow the gap between program directors' expectations and new residents' performance, enhancing patient safety and increasing residents', educators', and patients' confidence in the care these learners provide in the first months of their residency training."[7]

1. Gather a history and perform a physical examination.
2. Prioritize a differential diagnosis following a clinical encounter.
3. Recommend and interpret common diagnostic and screening tests.
4. Enter and discuss orders and prescriptions.
5. Document a clinical encounter in the patient record.
6. Provide an oral presentation of a clinical encounter.
7. Form clinical questions and retrieve evidence to advance patient care.
8. Give or receive a patient handover to transition care responsibility.
9. Collaborate as a member of an interprofessional team.
10. Recognize a patient requiring urgent or emergent care and initiate evaluation and management.
11. Obtain informed consent for tests and/or procedures.
12. Perform general procedures of a physician.
13. Identify system failures and contribute to a culture of safety and improvement.

FIGURE 1. The AAMC's Core EPAs for entering residency.[a]

Abbreviation: EPA, entrustable professional activity.

a. AAMC. *Core Entrustable Professional Activities for Entering Residency Curriculum Developers' Guide*. AAMC; 2014. Accessed March 25, 2022. https://store.aamc.org/downloadable/download/sample/sample_id/63/%20

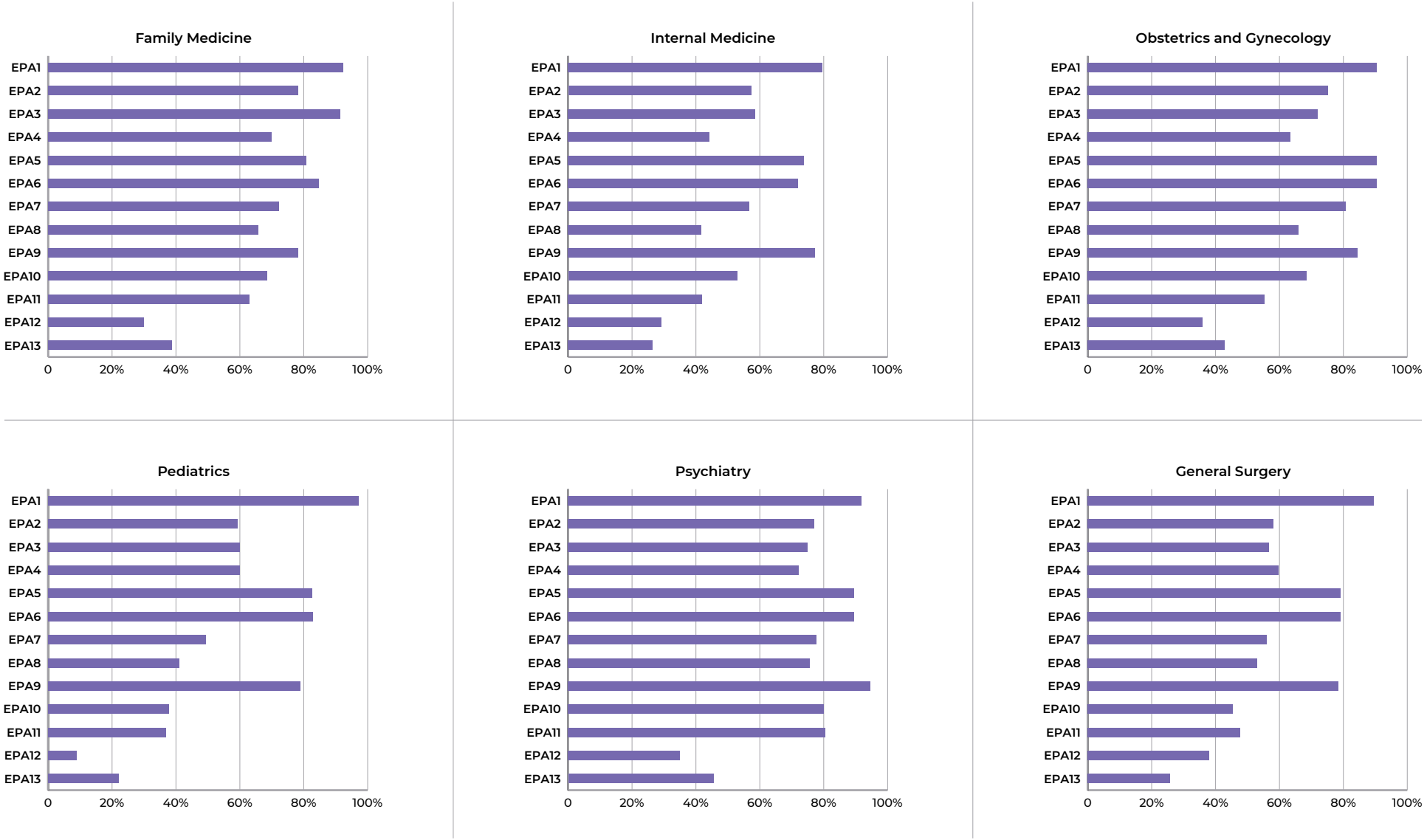


FIGURE 2. Percentage of program directors who responded they were confident "most" or "all" of PGY-1 residents in their program, among 2014 graduates of LCME-accredited U.S. medical schools, were prepared for each EPA without direct supervision in week one of residency.

Notes: Each graph shows the percentage of specialty program directors who responded "most" or "all" to the following item on the Program Director EPA Survey: "Considering only the PGY-1 residents in your program who are 2014 graduates of LCME-accredited U.S. medical schools, please indicate how many residents you are confident were prepared to do the following without direct supervision in the first week of residency" (response choices: "No or few," "some," "most," "all"). *N* = 503 program directors (pediatrics, 74; family medicine, 146; psychiatry, 38; internal medicine, 91; surgery-general, 69; obstetrics and gynecology, 85). Refer to Figure 1 for the complete text of all 13 EPAs.

Abbreviations: EPA, entrustable professional activity; LCME, Liaison Committee on Medical Education; PGY, postgraduate year.

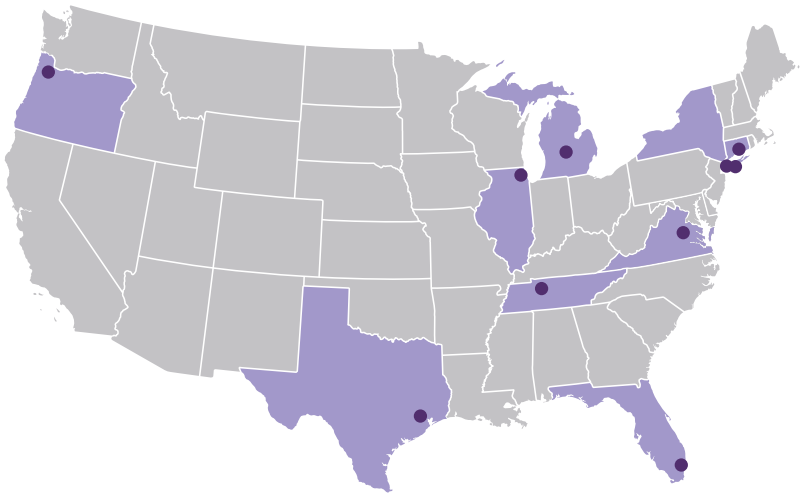
The AAMC Core EPAs Pilot Project Overview

To explore the feasibility of implementing the Core EPAs in UME, the AAMC convened a multischool pilot. Medical schools were eligible to apply to participate in the pilot if they were:

1. Accredited and in good standing with the LCME and clinically affiliated with residency programs in at least two specialties accredited by the Accreditation Council for Graduate Medical Education.
2. Committed to sending a consistent team of four individuals, including a senior education administrator, a core clerkship director, a residency program director, and a faculty member with expertise in curriculum design or faculty development, to two meetings per year.
3. Authorized to commit to a five-year engagement in the pilot by their dean and a person responsible for curriculum governance.

A consortium of 10 schools was convened to pilot the Core EPAs (refer to Figure 3). Selected from among the many schools that applied, the consortium schools represented a diverse range of medical schools. Schools in the consortium were geographically dispersed across the country, were variably resourced, and included schools that were long established and newly created, small and large, public and private, and both with and without regional campuses.

The primary goal of the multischool Core EPAs pilot was to explore the feasibility of implementing the Core EPAs framework in the path to medical school graduation. The 10-school consortium set out to implement the Core EPAs and consider how, ultimately, data regarding students' readiness to perform the Core EPAs under indirect supervision might be used as one consistent cross-institution measure of students' readiness for residency. The work of the pilot proceeded over a seven-year period in four phases, as shown in Table 1 (each phase is described in detail below). The full roster of all schools' Core EPAs pilot team members over the duration of the pilot appears in Appendix 1.



- Columbia University
- Florida International University
- Michigan State University
- New York University
- Oregon Heath & Science University
- University of Illinois
- University of Texas Health Science Center at Houston
- Vanderbilt University
- Virginia Commonwealth University
- Yale University

FIGURE 3. The 10 institutions participating in the AAMC Core EPAs pilot.

Abbreviation: EPA, entrustable professional activity.

TABLE 1. AAMC Core EPAs for Entering Residency Pilot Phases

Academic Year	Phase
I: Theoretical Clarification and Guiding Principles	
2014-2015	• Pilot schools selected and consortium convened. • Pilot members form concept workgroups and EPA-specific workgroups. • Conceptual frameworks around EPA implementation developed. • Core EPAs guiding principles developed.
II: Continued Clarification and Initial Implementation	
2015-2016	• First cohorts of matriculating students enter EPA-oriented curricula at six pilot schools. • Pilot team members initiate dissemination activities at regional/national meetings regarding progress of the pilot, sharing lessons learned and challenges. • Planning started for program evaluation.
2016-2017	• First cohorts of matriculating students enter EPA-oriented curricula at three pilot schools. • Program evaluation plan developed. • Supervisory scale task force formed to identify optimal scales for use in workplace-based assessments — recommended either Ottawa or Chen scales. • Endorsement by pilot schools to include explicit measures of three dimensions of trustworthiness (discernment, truthfulness, and conscientiousness) in student assessments.[a] • *Core Entrustable Professional Activities for Entering Residency: Toolkits for the 13 EPAs* released.[b] • Clerkship assessor training (timeline and approach varied by school). • Dissemination activities continued at regional/national meetings.
III: Continued Implementation and Initial Outcomes Data Collection	
2017-2018	• First cohort of matriculating students enters EPA-oriented curricula at one pilot school. • Clerkship assessor training (timeline and approach varied by school). • Program evaluation plan finalized with priority outcomes identified. • Dissemination activities continued at regional/national meetings.
2018-2019	• Clerkship assessor training (timeline and approach varied by school). • Program outcomes workgroups formed around priority outcomes. • Trained entrustment groups (mock entrustment committees) begin meeting together at each school to plan entrustment decision-making process.[c] • With the support of the leadership at all 10 pilot schools, the AAMC extends pilot for two additional years. • The AAMC administers questionnaire to third-year students at pilot schools. • Randomized study of supervisory rating scales conducted among faculty at pilot schools.[d] • First cycle of mock entrustments made by four schools for their graduates in the class of 2019.[e] • Case study workgroup convened; school team interviews set up. • Dissemination activities continued at regional/national meetings.
IV: Completion of Outcomes Data Collection	
2019-2020	• The AAMC administers questionnaire to class of 2019 graduates of pilot schools early in PGY-1 of training.[f] • Second cycle of mock entrustments made by six schools for their graduates in the class of 2020. • Additional school team interviews for case study conducted. • Dissemination activities continued at regional/national meetings.
2020-2021	• School interviews for case study completed. • Data analyses completed. • Dissemination activities continued at regional/national meetings.

(continued)

(Table 1 continued)

Abbreviations: EPA, entrustable professional activity; PGY, postgraduate year.

a. Brown DR, Warren JB, Hyderi A, et al; AAMC Core Entrustable Professional Activities for Entering Residency Entrustment Concept Group. Finding a path to entrustment in undergraduate medical education: a progress report from the AAMC Core Entrustable Professional Activities for Entering Residency Entrustment Concept Group. *Acad Med.* 2017;92(6):774-779. https://doi.org/10.1097/ACM.0000000000001544

b. Obeso V, Brown D, Aiyer M, et al, eds; Core EPAs for Entering Residency Pilot Program. *Core Entrustable Professional Activities for Entering Residency: Toolkits for the 13 Core EPAs.* AAMC; 2017. Accessed March 25, 2022. https://www.aamc.org/media/20196/download?attachment

c. Moeller JJ, Warren JB, Crowe RM, et al; Core Entrustable Professional Activities for Entering Residency Pilot Program. Developing an entrustment process: insights from the AAMC Core EPA pilot. *Med Sci Educ*. 2020;30(1):395-401. https://doi.org/10.1007/s40670-020-00918-z

d. Ryan MS, Khan AR, Park YS, et al; Core Entrustable Professional Activities for Entering Residency Pilot Program. Workplace-based entrustment scales for the Core EPAs: a multisite comparison of validity evidence for two proposed instruments using structured vignettes and trained raters. *Acad Med.* 2022;97(4):544-551. https://doi.org/10.1097/ACM.0000000000004222

e. Brown DR, Moeller JJ, Grbic D, et al. Entrustment decision making in the Core Entrustable Professional Activities: results of a multi-institutional study. *Acad Med.* 2022;97(4):536-543. https://doi.org/10.1097/ACM.0000000000004242

f. Obeso V, Grbic D, Emery M, et al; Core Entrustable Professional Activities for Entering Residency Pilot. Core Entrustable Professional Activities (EPAs) and the transition from medical school to residency: the postgraduate year one resident perspective. *Med Sci Educ*. 2021;31(6):1813-1822. https://doi.org/10.1007/s40670-021-01370-3

Phase I
Theoretical Clarification and Guiding Principles (2014-2015)

During the 2014-2015 academic year (AY), the Core EPAs pilot team members first sought to generate consensus on the fixed characteristics of EPA implementation. These characteristics formed a set of guiding principles that provided cohesion to the pilot and permitted each school the flexibility to build upon its own curricular and learning support resources.[10] The nine guiding principles are shown in Figure 4.[10] Pilot team members across the 10 schools then organized into three multischool concept workgroups and into 13 multischool EPA-specific workgroups; each pilot team member could join a concept workgroup and also one or more EPA-specific workgroups.

Concept Groups

Three concept groups were formed to work on crosscutting themes: (1) curriculum and assessment, (2) entrustment, and (3) faculty development. The curriculum and assessment group worked with EPA-specific workgroups (refer to the next section) to identify curricular and assessment strategies for EPA implementation. The entrustment concept group focused on the formation, training, processes, and outcomes of trained entrustment groups (TEGs), modeled after clinical competency committees in GME, that would review multimodal longitudinal data to inform entrustment decisions. Notably, for the duration of the pilot, these entrustment decisions (described in detail below in Phases III and IV) were mock decisions that were made for program evaluation purposes and did not impact students' advancement or graduation. The faculty development concept group identified priorities for giving context to members of implementation teams about CBME and EPAs and creating familiarity with new assessment tools and supervisory scales. This group also identified needs of learners who would be navigating aspects of their medical education curricula through the EPAs framework and of faculty who, as coaches, would guide students through these curricula.

EPA-Specific Workgroups

In addition to concept groups, members of the pilot assembled 13 EPA-specific workgroups. Each workgroup was composed of three members, each member representing a different pilot school. Over the ensuing years, these EPA teams worked together, each focusing on a specific EPA in depth, to identify best practices for curricular content and assessment of the EPA. The major output from these EPA workgroups involved the production of EPA-specific toolkits, developed to support users of the published guide for curriculum developers[8] by providing educational leaders with a variety of resources (e.g., assessment instruments, teaching methods, references) pertinent to each of the 13 Core EPAs. Included with each toolkit was a one-page schematic that distilled the progression of a learner for the respective EPA into a series of developmental steps in the pathway toward

1. Employ a systematic approach to map educational opportunities and assessments for each EPA.
2. Explicitly measure the attributes of trustworthiness in addition to the specific knowledge, skills, and attitudes required for each EPA.
3. Create a longitudinal view of each learner's performance via, at minimum, aggregated performance evidence, and consider the added value of longitudinal relationships and formal coaching structures in informing entrustment decisions.
4. Gather multimodal performance evidence from multiple assessors about each learner for each EPA.
5. Include global professional judgments about the entrustment of each learner in the body of evidence that supports summative entrustment decisions.
6. Ensure a process for formative feedback along the trajectory to entrustment to provide opportunities for both remediation and potential acceleration of responsibilities.
7. Create a process to render and maintain formal entrustment decisions by a trained group (entrustment committee) that reviews performance evidence for each learner.
8. Ensure that each learner is an active participant in the entrustment process — aware of expectations, engaged in gathering and reviewing performance evidence, and generating individualized learning plans to attain entrustment.
9. Align formal entrustment decisions regarding individual learners with nationally established performance expectations, as currently described in the Core EPAs *Curriculum Developers' Guide*.[a]

FIGURE 4. Guiding principles for the 10 schools in the Core EPAs pilot.[b]

Abbreviation: EPA, entrustable professional activity.

a. AAMC. *Core Entrustable Professional Activities for Entering Residency Curriculum Developers' Guide*. AAMC; 2014. Accessed March 25, 2022. https://store.aamc.org/downloadable/download/sample/sample_id/63/%20

b. Lomis K, Amiel JM, Ryan MS, et al; AAMC Core EPAs for Entering Residency Pilot Team. Implementing an entrustable professional activities framework in undergraduate medical education: early lessons from the AAMC Core Entrustable Professional Activities for Entering Residency pilot. *Acad Med*. 2017;92(6):765-770. https://doi.org/10.1097/ACM.0000000000001543

TEAM REFLECTION

Oregon Health & Science University School of Medicine

"On both a personal and professional level, participating in the Core EPAs for Entering Residency pilot has been an immensely rewarding experience. The dedication, thoughtfulness, and expertise of the team members from each school were critical to the successful implementation of the EPA framework at Oregon Health & Science University School of Medicine. Working together with colleagues across the country enabled us to accomplish our goals, make meaningful contributions to the field of competency-based education, and form professional relationships that have been extraordinarily fulfilling."

entrustment. Coordination of the toolkits was centralized through leadership from the curriculum and assessment concept group to ensure a consistent final product for dissemination (description follows below).

Collaborative Meetings Across the Core EPAs Pilot

From the start of Phase I (AY 2014-2015), the entire pilot team and AAMC staff supporting the pilot met on a twice-yearly basis through spring 2020. AAMC staff coordinated calls between meetings for concept workgroups and for EPA-specific workgroups. At face-to-face meetings in Phase I of the pilot, the 10 schools' team leaders met with AAMC leadership to discuss at a high level what was working and what was not working in all aspects of the pilot on a school-specific basis and across all schools.

Phase II

Initial Implementation and Continued Clarification (2015-2016, 2016-2017)

In the second phase of the pilot, the pilot leadership was organized around a steering committee structure, Core EPAs curriculum content was introduced at most schools in the pilot, and work began on developing school-specific approaches to workplace-based assessments (WBAs). Also, during the second phase, the AAMC released the EPA-specific toolkit documents, and planning for program evaluation commenced.

Steering Committee

At the beginning of Phase II, the pilot leadership structure was formalized into a steering committee that included all schools' team leaders. The AAMC appointed one member of this steering committee as the associate director of the pilot; the associate director served in conjunction with the AAMC director of the pilot as the conveners for the steering committee. For the remaining duration of the pilot, the steering committee and AAMC staff supporting the pilot held twice-monthly calls; the steering committee also met with AAMC staff supporting the pilot in face-to-face meetings three times a year through February 2020.

Timelines for Implementation of EPA-Specific Curricular Content and Assessments

Timelines for implementation of EPA-specific curricular content and formative assessments varied among the 10 schools. Six schools started the implementation with the class entering medical school in fall 2015, and three schools started with the class entering medical school in fall 2016 (the remaining school did not start until Phase III, with the entering class of 2017). Schools varied in the number of EPAs implemented at each. All schools implemented curriculum content and assessments for at least four EPAs; some schools chose to do so for all 13 EPAs. For each EPA, team members at the pilot schools that were implementing the specific EPA worked together to identify how the designated EPA could be addressed in their curriculum and assessment processes. Pilot schools also chose specific curricular phases or events in which to implement additional Core EPAs. Schools mapped out various points in their respective curricula for assessment of specific EPAs.

Workplace-Based Assessments

The pilot schools rapidly recognized the value of developing WBAs specific to the Core EPAs framework (using a WBA, a supervisor would observe a trainee practicing a given EPA and then rate the learner based on their need for assistance or their readiness for clinical responsibilities with less supervision). Pilot schools started testing EPA-based WBAs for formative feedback purposes. The AAMC convened a task force within the pilot to review two proposed EPA rating scales: the prospective "supervisory" scale (aka the Chen scale)[11] and the retrospective "co-activity" scale (aka the Ottawa scale).[12] The task force recommended that one or both scales should be used for WBAs deployed in the pilot. At each school, ratings using these scales emerged from WBAs and were aggregated with other performance measures to create longitudinal views of student performance of each EPA.

TEAM REFLECTION

Vanderbilt University School of Medicine

"Vanderbilt University School of Medicine (VUSM) benefited tremendously from participating in the Core EPAs pilot. The opportunity to learn with and from medical education experts from around the country, actively doing the hard work of implementation, was priceless. Core EPAs pilot members fostered collegiality, deep friendship, and collaboration that served as the foundation for the work. The Core EPAs pilot group consistently functioned as a sounding board and idea incubator related to our VUSM approach to competency-based medical education. Ideas refined, lessons learned, and our own programmatic assessment system all directly benefited from our participation in the pilot endeavors."

AAMC Toolkits for the 13 Core EPAs Released

The AAMC published the final products of the EPA-specific workgroups, generated with the curriculum and assessment concept group, together in 2017 as a full toolkit set for medical schools interested in implementing the Core EPAs.[13] This toolkit (which expands on the EPA framework that had been previously described in the *Curriculum Developers' Guide*[8]) articulated in one-page schematics the progressive sequences of student behavior that medical educators may encounter as students engage in the curriculum to gain proficiency in integrating their clinical skills for each of the 13 EPAs; each one-page schematic is accompanied by supporting resources.

Creating a Longitudinal View of Each Learner's Performance

Creating a longitudinal view of each student's performance — a guiding principle for the Core EPAs pilot work (refer to Figure 4) — was a significant undertaking at each school. All schools had some form of centralized repository of assessment

TEAM REFLECTION

NYU Grossman School of Medicine

"The NYU Grossman School of Medicine is grateful to the AAMC for choosing us to participate in the Core EPAs pilot and providing the opportunity to work with such dedicated, innovative, and forward-thinking colleagues who care deeply about the education of our future physicians. Our participation provided the impetus to align our curriculum and assessments around the EPA framework. Specifically, student assessment in the clerkships was shifted from a competency-based model to the core EPAs that built on the EPA foundation previously introduced in our preclerkship curriculum. In addition, in our core clerkships, we recently introduced workplace-based assessments that are also based on the EPAs. These changes provided students with more opportunities for direct observation and actionable feedback. We also benefited from the development of a longitudinal system to track student performance over time, enabling early intervention for struggling students. Finally, a coaching program that provides guidance by interpreting longitudinal data while promoting self-reflection, targeted learning, and lifelong growth was also implemented."

data. However, creating an integrated data set that involved mapping students' ratings in assessment items relevant to the school's EPAs via a relational database (generally proprietary and developed by and for each school) and then using a data visualization tool (e.g., Tableau) to display a student's progress over time required substantial work. This effort remains ongoing at many of the pilot schools.

Coaching

In considering the added value of formal coaching structures (as also referenced in the guiding principles for the Core EPAs pilot; refer to Figure 4), some schools implemented coaching programs. Coaches helped students interpret the data they were receiving about their progress in specific EPAs and, more globally, in developing their clinical skills toward being ready to become residents. At these schools, students reflected on their progress with their coaches, identified areas of strength and areas for growth, and sought resources for enrichment to promote their progress. Coaching programs were formative by design and not tied to progression or remediation decisions.

Faculty Development

Depending on their implementation timelines, some pilot schools implemented new training for clinical supervisors on assessing students' performance in the Core EPAs during their required clerkship years. Schools took a range of approaches to faculty development, depending on the EPAs implemented in a curriculum, the clerkships on which the EPAs would be assessed, and the faculty who would be involved in assessing students' performance of the Core EPAs. Training generally included coverage of the principles of CBME and the goals of competency-based assessment, use of behavioral anchors in assessing learners in performing EPAs, and the meaning and use of WBAs. Additional faculty development efforts (at a subset of schools) included training on entrustment scales and level setting. Finally, in this initial implementation and clarification phase of the pilot, the steering committee and the AAMC agreed that one aspect of CBME — time variability — would not be incorporated into the pilot schools because it would require larger-scale curricular revisions well beyond the scope of the pilot.

Program Evaluation Planning

Starting in AY 2016-2017, a program evaluation planning group (comprising a small group of pilot team members and a program evaluation expert on the faculty of one of the pilot schools) was convened. As a starting point for discussion with the entire pilot team of over 40 members, the program evaluation group initially created a detailed logic model that listed possible outcomes of the pilot and linked these to relevant activities and their expected products as well as resources to carry out these activities (refer to Figure 5, page 16). Based on this initial logic model draft, a list that identified short-, intermediate-, and longer-term outcomes was developed with input from the entire pilot team. The full pilot team then discussed, further revised, and clarified these outcomes at several team meetings starting in AY 2016-2017. This work continued in Phase III (as described below).

Inputs	Outputs		Outcomes — Impact		
	Activities	Participation	Short (Learning)	Medium (Actions)	Long (Conditions)
Our resources	What we do	Whom we reach	How should we go about this?	Feasibility: Can we pull it off?	Impact on UME-to-GME transition

• 10 schools
• 13 EPA teams, 3-4 schools per EPA
• 4 concept groups
• Program evaluation team
• AAMC support for meetings of pilot schools, staff support for certain functions
• Each school commits varying resources regarding faculty time, curricular time, staff support, technology, etc.
	• Establish guiding principles
	• Develop and distribute:
	  ◦ One-page schematic of progression to entrustment for each EPA
	  ◦ Toolkits of curricular and assessment tools for each EPA, evidence-based +/- vetted (possibly piloted within or across sites)
	• Develop and pilot trustworthiness measurements
	• Develop and provide faculty development materials
	• Develop materials and provide student education in the EPA framework
	• Develop and pilot workplace-based assessment strategy
	• Develop portfolios and coaching programs
	• Describe process at each institution (case reports, a la Milbank)
	• Describe entrustment at each institution for the graduating class of 2019, iterative plans for future classes
	Process
	• Consortium meetings in Washington, D.C.
	• Working group calls
	• Site progress reports
		• At pilot schools:
		  ◦ Learners
		  ◦ Faculty
		  ◦ Administrators
		• Medical educators nationally/internationally through website, meetings, and publications
		• LISTSERV members
		• AAMC leadership
			• Guiding principles: established consensus opinion to provide guidelines for entrustment for our schools and wider community
			• Provide expert opinion on the utility of the EPAs toolkits; use expert consensus of pilot membership to define direction for future edits to EPAs list and/or descriptions
			★ Ensure student awareness of the Core EPAs list and assessment processes
			• Analyze and revise trustworthiness tools
			★ Analyze and revise workplace-based assessment (e.g., supervisory scale or co-activity scale; report collective validity/reliability)
			• Compare and contrast processes across institutions and report fixed versus variable aspects
			• Establish consensus regarding key attributes and training of entrustment committees
			Process
			• Impact of collective thought on conceptual understanding and adherence to guiding principles at each pilot site
				• Legitimize EPA concepts in medical education — change the conversation in UME around entrustment, discernment, workplace-based assessment, and task-based readiness for a job
				★ Completion of summative entrustment decisions across sites
				★ Level of confidence in those entrustment decisions (volume and quality measures of performance evidence obtained for each student and EPA, potential for peer reviews of entrustment decisions)
				• Determine role of entrustment concept in informing Liaison Committee on Medical Education standards related to professionalism
				Process
				• Impact on Core EPA users throughout medical education community via dissemination (presentations and manuscripts)
				Process
				• Impact of collaboration on progress of implementation at each site (advance or impede?)
					★ Preparedness of our graduates for day one of residency:
					  ◦ As perceived by program directors
					  ◦ As perceived by graduates
					• Reduce gap between graduates' readiness for GME and program directors' expectations for their entering residents
					• Relevance of EPAs to program directors
					• Post-Match handover to residency program directors on individual students
					• Use of EPAs in UME promotions and graduation processes
					• Future use of EPAs in resident selection process
					Process
					• Return on investment/ cost-effective approaches: analysis of confidence in entrustment decisions at each site, correlated with resources invested at each site

FIGURE 5. Core EPAs pilot logic model initially developed by program evaluation group in 2016-2017.

Abbreviations: EPA, entrustable professional activity; GME, graduate medical education; UME, undergraduate medical education.

★ Outcomes that were prioritized for the finalized program evaluation activities.

Phase III

Continued Implementation and Initial Outcomes Data Collection and Analyses (2017-2018, 2018-2019)

During Phase III of the pilot, the program evaluation plan was finalized, the duration of the pilot was extended by two years, third-year students at all pilot schools were surveyed about the Core EPAs, WBA processes were developed and evaluated, and the summative entrustment decisions' data collection and aggregation procedures were developed. As cohorts of students at several schools advanced through their final year of medical school, TEGs were convened to make mock entrustment decisions for the graduating students. Finally, to explore the nature of the Core EPAs pilot implementation more fully at the individual school level, an additional program outcomes workgroup was convened to design and conduct a case study of the Core EPAs pilot.

Final Program Evaluation Plan

Based on the pilot team's progress to date, the entire pilot team reached consensus in prioritizing a discrete set of key program outcomes to monitor and assess over the remaining course of the pilot (starred in Figure 5). These key program outcomes included:

- Complete the mock summative entrustment decision-making process at schools.
- Report levels of confidence in entrustment decisions.
- Ensure student awareness of the Core EPAs list and assessment processes.
- Analyze and revise WBAs (e.g., supervisory scale or co-activity scale; report collective validity/reliability).
- Assess preparedness of graduates for day one of residency, as perceived by program directors and graduates.

As concept and EPA-specific workgroups approached the final stages of their tasks, members of these groups were ultimately redistributed into key program outcomes workgroups (around the key program outcomes listed above) that undertook a range of program evaluation activities. Work performed by these groups comprised the major tasks, beyond ongoing local implementation activities at each school, of the team for the remaining duration of the pilot. These groups were assisted by the program evaluation expert and by AAMC staff with research and data collection and retrieval expertise. Products of the work of these groups to date are included among the Core EPAs pilot publications (refer to Appendix 2).

Extending the Five-Year Pilot

The final school in the pilot to start implementing Core EPAs curriculum content and formative assessments did so with the class entering medical school in fall 2017. Given the complexity of implementation and the different timelines for initial implementation activities, the AAMC extended the duration of the pilot implementation activities, including mock summative entrustment decision-making, for an additional one year (beyond the five-year duration originally planned) and extended program evaluation and data analysis activities for an additional two years. The decision to extend the pilot and related program evaluation activities was made by the AAMC in spring 2018 with the support of all 10 pilot schools' team leaders and the educational leadership at all 10 schools.

Student Awareness of the Core EPAs List and Assessment Processes: Third-Year Student Survey Administration and Data Analysis

In the spring of 2019, the pilot team and AAMC staff jointly developed a questionnaire that was administered by the AAMC to third-year students at all 10 pilot schools. The questionnaire included items pertaining to (among other topics) methods used to introduce the concept of Core EPAs, interactions with supervisors in the clinical

TEAM REFLECTION

Yale School of Medicine

"Participating in the AAMC Core EPAs pilot has impacted the Yale School of Medicine in many ways. The school has moved closer to a competency-based medical education model with an assessment system that is more 'programmatic.' We have conducted several pilots and greatly increased the workplace-based assessment of EPAs 1, 2, 5, and 6 on the clerkships. Finally, we have conducted numerous faculty development programs and incorporated EPAs into our master's degree in medical education program. Future plans include implementing EPAs throughout the curriculum, creating a dashboard to capture student trajectory, and initiating portfolio coaches."

workplace around Core EPAs, and self-assessment of readiness to perform Core EPAs under indirect supervision. The AAMC Core EPAs Pilot Year 3 Questionnaire all schools report is included in Appendix 3. A school-specific report was generated by AAMC staff for each pilot school. The school-specific reports highlighted areas for process improvement; with these data, pilot teams identified those EPAs across all pilot schools that students nearing the end of their third year felt prepared to perform and those EPAs that were more challenging for them. Differences across schools in students' self-assessed preparedness provided opportunities for identification of potentially more effective and less effective implementation approaches on an EPA-specific basis. Across all 10 schools, respondents' positive perceptions of Core EPAs were independently correlated with attitudes that WBAs were of high quality and took place in a supportive learning climate with engaged supervisors, factors that could be monitored, modified, and addressed by individual schools (D. Grbic, PhD, unpublished data, March 2022).

TEAM REFLECTION

Michigan State University College of Human Medicine

"Participating in the Core EPAs pilot has been highly meaningful for our college. We implemented a completely reenvisioned curriculum during our years with the pilot, and we were able to think more intelligently about our competency milestones and assessment system as a result of the rich discussions we had with our wonderful co-piloteers. We were able to incorporate the Core EPAs into our curriculum and to obtain early data on the feasibility and efficacy of the related assessments that we developed. We have learned a great deal while working with new colleagues, many of whom are now friends."

WBAs Data Analysis

Consistent with the key program evaluation outcome to "analyze and revise WBAs (e.g., supervisory scale or co-activity scale; report collective validity/reliability)," pilot members began collecting, aggregating, and analyzing data obtained from WBAs. This work ranged from a single-school, single-clerkship descriptive study[14] to studies evaluating the validity of WBA data[15-17] and included a pilot-wide study of entrustment scales in the simulated environment.[15] Findings from these studies identified some specific challenges associated with WBAs and some potential best practices that were then disseminated to the education community at large (refer to Appendix 2, Assessment section).

Summative Entrustment Decision-Making Process

To test the feasibility of making summative determinations of students' readiness to perform the Core EPAs, pilot schools developed plans to convene TEGs to assess data about their students' readiness for entrustment and render mock summative entrustment decisions for their graduating students.[18,19] Pilot schools explored the approaches they could take to develop TEGs to simulate entrustment processes using data from their learners.[19] Following the pilot's guiding principles (refer to Figure 4), these TEGs would generally be organized to be able to review longitudinal, multimodal evidence, including specific assessments of trustworthiness (for the purposes of the pilot, to include the dimensions of discernment, truthfulness, and conscientiousness[18]) and WBAs as available, with the intention that, based on this evidence, they would render mock entrustment decisions. These mock entrustment decisions would be made for program evaluation purposes only and thus would be theoretical in nature.[10] All pilot schools agreed that these initial attempts at entrustment decisions would be made for the purposes of better understanding the feasibility of implementing the Core EPAs framework in UME and that, based on their implementation work to date, it would be premature for any pilot school to make formal entrustment decisions that would have any impact on promotion or graduation.[10] Pilot schools also uniformly agreed that it would be premature to include any entrustment decisions information generated during the pilot in students' Medical School Performance Evaluations or in any post-Match "warm handovers" while the pilot was in progress.[10]

Summative Entrustment Decisions for the Graduating Class of 2019

Pilot team members in the workgroup focusing on aspects of the summative entrustment decision-making process across schools developed a set of items that would be recorded for the entrustment decisions made by the TEG at each school. This set included three EPA-specific items (entrustment decision made, confidence in the decision, volume of WBAs). As described in the pilot's guiding principles (refer to Figure 4), pilot team members recognized from the beginning that the concept of trust, as well as that of supervision, is foundational to the Core EPAs framework.[18] So, one global assessment item (i.e., not on an

EPA-specific basis) of the overall evidence for trustworthiness was added to the set of EPA-specific items.[20] Procedures were developed with AAMC staff for a standardized approach to data collection, deidentification, and compilation of an aggregated, multischool data set for analysis, fulfilling all institutional review board requirements at both the AAMC and each participating school.

In spring 2019, four schools that had made entrustment decisions for all or a randomly selected subset of their class of 2019 graduates (four to 13 EPAs per student, with the same set of EPAs for all students at a given school) pooled their deidentified data for multischool analysis. The analysis included 2,415 EPA-specific sets of data for 349 students.[20] Of all 2,415 EPA-specific sets of data considered, 41% (997/2,415) resulted in a decision that the student was ready for entrustment to perform the EPA with indirect supervision (71% [710/997] of these "ready for entrustment" decisions were made with moderate-high confidence by the TEG); 23% (558/2,415) resulted in a decision that the student was progressing but not yet ready for entrustment; and 7% (175/2,415) resulted in a decision that the evidence was against the student progressing toward entrustment. For the remaining 28% (685/2,415), the TEG was unable to make an entrustment decision, generally due to insufficient data. The distribution of these four determinations differed considerably on an EPA-specific basis.[20] (Trustworthiness data for the graduating classes of 2019 and 2020 combined are described below in Phase IV).

TEAM REFLECTION

McGovern Medical School at the University of Texas Health Science Center at Houston

"Participation in the AAMC's Core EPAs pilot has led to a number of positive curricular and assessment changes at McGovern Medical School. Reviewing our curriculum through the lens of EPAs forced us to identify where these 13 activities were taught and, probably more importantly, where they were assessed. In some cases, we added in both curricular elements as well as specific and formative feedback, and we created a new framework around workplace-based assessments. Students are now able to solicit specific feedback from residents and faculty on many of the EPAs, facilitating an environment more focused on learner needs. The increased focus on workplace-based assessments has been a significant improvement for our learners."

The four schools that participated in the first cycle of summative entrustment decision-making noted that the process of compiling and evaluating available assessment data on each learner on a longitudinal basis served as an important opportunity to broadly consider each student's progress.[20] The results informed efforts at these four schools to implement increased requirements regarding the number of WBAs for some EPAs; to expand the number of end-of-rotation assessments on core clerkships and, as applicable, on fourth-year electives that were mapped to EPAs; and to explore alternative methods (such as simulation) to assess various skills. Schools also continued their efforts to enhance data visualization for the entrustment process and to provide additional faculty development. The experiences of these four schools with their first cycle of entrustment decision-making also informed efforts at the remaining schools in the pilot in assessing the extent of their data collections as they prepared to initially attempt entrustment decision-making in subsequent years.

Commencing a Case Study of the AAMC Core EPAs Pilot Project

Appreciation for the complexities of many aspects of implementation across the 10 schools steadily increased as the project progressed to the outcomes data collection stage. Team members also recognized that while there were many school-specific challenges, there were also some common facilitators and barriers encountered by multiple schools. To more fully explore the nature of the Core EPAs pilot implementation at the individual school level, the steering committee and AAMC staff convened an additional program outcomes workgroup in 2018-2019 to design and conduct a case study of the Core EPAs pilot. This qualitative research study was undertaken to answer the following questions: What were the mechanisms by which EPAs and related assessments were piloted? What worked and did not work for the pilot schools both individually and collectively? Under what conditions and in what respects did aspects of the pilot work? School interviews of the Core EPAs pilot teams (with additional individuals at the school invited at the discretion of the team leader at the school) started in February 2020 with an on-site interview at the first school; all subsequent interviews at participating schools were conducted virtually due to the COVID-19 pandemic.

Phase IV

Completion of Outcomes Data Collection and Analyses (2019-2020, 2020-2021)

In Phase IV of the pilot, outcomes data were collected from pilot schools' graduates and their program directors, a second cycle of entrustment decisions was completed, data collection for the case study was completed, and the pilot team reviewed all data collected to synthesize three groups of EPAs.

Preparedness of Students for Day One of Residency, as Perceived by Graduates and Program Directors

In fall 2019, the AAMC administered a questionnaire (jointly developed with the Core EPAs pilot team) to the class of 2019 graduates of all pilot schools that chose to have their graduates invited to participate in this data collection. The questionnaire, administered to graduates three months after the start of the first postgraduate year (PGY-1) of training, included items about (among other topics) graduates' readiness to perform the Core EPAs under indirect supervision on day one of residency and the level of supervision they were provided when first performing the Core EPAs during residency.[21] The AAMC Core EPAs Pilot Early PGY-1 Questionnaire all schools report is included in Appendix 4. AAMC staff generated a school-specific report for each participating school. Analysis of the questionnaire results indicated that graduates' readiness to perform the Core EPAs under indirect supervision on day one of internship had varied widely across EPAs, as had the level of supervision (direct versus indirect) initially provided to the graduates when they had first performed each EPA. Although the ease of the transition from medical school to residency varied on the basis of specialty entered, readiness to perform Core EPAs under indirect supervision was independently associated with an easier-than-expected transition to residency.[21]

The AAMC Core EPAs Pilot Early PGY-1 Questionnaire data were also examined on an EPA-specific basis for graduates of those participating schools that had implemented Core EPA-specific curriculum content and assessment for the EPA starting with the incoming class of 2015. Among this subset of Early PGY-1 Questionnaire respondents, readiness to perform the Core EPA under indirect supervision varied widely across EPAs, ranging from 32% (25/79) for EPA 12: "Perform general procedures of a physician" to 100% (98/98) for EPA 1: "Gather a history and perform a physical examination."[6]

Program director survey data, collected at the individual school level for graduates in the class of 2019 by two schools that had implemented Core EPAs curriculum content and assessments starting with the incoming class of 2015 (generally corresponding to the graduating class of 2019), were pooled and examined.

TEAM REFLECTION

University of Illinois College of Medicine

"The University of Illinois College of Medicine was energized by this collaboration with the AAMC and our pilot school colleagues. Our curriculum now has greater emphasis on patient safety than ever before, our clinical supervisors have a shared language of competencies, and our ongoing dialogue between faculty and students about professional identity and professionalism has been shaped by the EPA constructs relating to trustworthiness. We found that the pilot schools helped to hold each other accountable for making progress in competency-based medical education and for clear communications with students about 'the why' — our purpose in viewing clinical skills through an EPA lens is to make tangible our learners' progress toward becoming skilled, safe, and sensitive physicians. The pilot program's guiding principles have been invaluable in our ability to implement curricular innovation."

Proportions of graduates whom program directors had rated as prepared to perform each Core EPA ranged across EPAs from 69% (175/252) for EPA 12: "Perform general procedures of a physician" to 93% (242/260) for EPA 9: "Collaborate as a member of an interprofessional team."[6]

Summative Entrustment Decision-Making (Second Cycle) and Aggregated Outcomes

Six of the 10 pilot schools convened TEGs either for a subset of their students or for all their students in the graduating class of 2020 and pooled their data for analysis. These six schools included four that had also convened TEGs for the class of 2019 and two schools that were doing so for the first time for the class of 2020. Results for all six schools that had attempted to make EPA-specific entrustment decisions for at least some of their graduates in the class of 2019, class of 2020, or both were aggregated and are summarized in Table 2. As shown, in these two cohorts combined (graduating classes of 2019 and 2020), TEGs considered 4,948 EPA-specific sets of data for 773 students (four to 13 EPAs per student, with the same set of

EPAs considered at the individual school level for all students at a school). Of all 4,948 EPA-specific sets of data considered, 50% (2,462/4,948) resulted in a decision that the student was ready for entrustment to perform the EPA with indirect supervision (not shown in Table 2: 81% [2,004/2,462] of the "ready for entrustment" decisions were made with moderate-high confidence by the TEG).

Also shown in Table 2, 26% (1,277/4,948) of the EPA-specific sets of data considered resulted in a decision that the student was progressing but not yet ready for entrustment, and 4% (200/4,948) resulted in a decision that the evidence was against the student progressing toward entrustment (suggesting that earlier reviews for entrustment data, allowing for additional training, will be helpful for learners).

TABLE 2. TEGs' EPA-Specific Entrustment Determinations (*N* = 4,948)

EPA	No. of Respondents (%)				Count
	TEG could not make entrustment decision	Student is ready for entrustment	Student is progressing but not yet ready for entrustment	Evidence is against student progressing toward readiness for entrustment	
1. Gather a history and perform a physical examination.	79 (11%)	519 (69%)	99 (13%)	51 (7%)	748
2. Prioritize a differential diagnosis following a clinical encounter.	55 (18%)	200 (64%)	53 (17%)	4 (1%)	312
3. Recommend and interpret common diagnostic and screening tests.	39 (19%)	84 (41%)	82 (40%)	2 (1%)	207
4. Enter and discuss orders and prescriptions.	49 (24%)	15 (7%)	129 (62%)	14 (7%)	207
5. Document a clinical encounter in the patient record.	51 (11%)	289 (62%)	115 (25%)	14 (3%)	469
6. Provide an oral presentation of a clinical encounter.	53 (8%)	539 (77%)	70 (10%)	41 (6%)	703
7. Form clinical questions and retrieve evidence to advance patient care.	28 (7%)	308 (74%)	74 (18%)	6 (1%)	416
8. Give or receive a patient handover to transition care responsibility.	78 (28%)	21 (8%)	161 (58%)	17 (6%)	277
9. Collaborate as a member of an interprofessional team.	56 (13%)	236 (57%)	104 (25%)	20 (5%)	416
10. Recognize a patient requiring urgent or emergent care and initiate evaluation and management.	38 (21%)	5 (3%)	116 (64%)	23 (13%)	182
11. Obtain informed consent for tests and/or procedures.	174 (58%)	1 (<1%)	120 (40%)	7 (2%)	302
12. Perform general procedures of a physician.	186 (41%)	245 (54%)	26 (6%)	0 (0%)	457
13. Identify system failures and contribute to a culture of safety and improvement.	123 (49%)	0 (0%)	128 (51%)	1 (<1%)	252
Totals	**1,009 (20%)**	**2,462 (50%)**	**1,277 (26%)**	**200 (4%)**	**4,948**

Note: Percentages shown are for row totals within each EPA. Totals may not add up to 100% due to rounding.
Abbreviations: EPA, entrustable professional activity; TEG, trained entrustment group.

For the remaining 20% (1,009/4,948) of the EPA-specific sets of data considered, TEGs were unable to make entrustment decisions due to various limitations of the data available. As shown in Table 2, the distribution of these four determinations varied markedly across EPAs.

Among the subset of schools that convened TEGs for the class of 2019 and the class of 2020 and considered the same set of EPAs at the school level for the students in both years, the proportion of all EPA-specific determinations of "ready for indirect supervision" increased significantly ($p < .001$) from 43% (997/2,296) in 2019 to 65% (1,440/2,229) in 2020; such increases were also evident on an EPA-specific basis for many EPAs.[22]

Across all schools in both years, WBA availability was generally quite low, and there was wide variability in WBA data availability across EPAs, which contributed to the variation in TEG ability to make judgments about the graduates' readiness to perform EPAs under indirect supervision.[6,20] This variation in WBA data availability across EPAs may reflect, at least in part, the limited opportunities for learners to perform some of the EPAs in current UME curricula at participating schools. These observations provide a focus for process improvement regarding quantity and quality of EPA-specific assessment data available to TEGs as they attempt to make entrustment decisions.

For 741 students, evidence for overall trustworthiness was assessed as follows: consistent evidence that supported trustworthiness ("grounded trust"): 413/741 students, 56%; limited data available about trustworthiness but no concerns identified ("presumptive trust"): 236/741 students, 32%; trustworthiness concerns (including evidence of "questioned trust" or "distrust"): 78/741 students, 10%; and vague or conflicting data so that no decision was made about the evidence: 14/741 students, 2%. Trustworthiness evidence was not reported for 32 students in the multischool data set. It is important to note that TEGs did not have access to all data collected and reviewed by their schools' promotions committees. The pilot team considered, in reflecting on these trustworthiness data, that possibly the longitudinal collection of data about the development of the daily work habits of truthfulness, discernment, and conscientiousness could identify issues not necessarily identified in other data collections.

Four of the 10 schools in the pilot did not participate in the multischool data analysis of entrustment determinations data. Contributory factors included (among other factors) local differences in timelines and approaches to implementation. For some schools that had originally intended to convene TEGs in the second cycle (i.e., for the graduating class of 2020), extensive disruptions related to the COVID-19 pandemic precluded convening TEGs for either a subset or all of their graduates. Based on their collective experiences, none of the schools in the Core EPAs pilot were prepared to start making high-stakes summative entrustment decisions (i.e., for promotion or graduation) regarding the Core EPAs for their students through the end of the pilot.

Completion of the Case Study: Major Findings

Case study interviews were completed with all participating schools in 2020 (at one school, the planned interview was continually interrupted by local upticks in COVID-19 cases and was unable to be completed), and data analysis was completed in 2021. Emergent themes from this qualitative research fit into four broad categories: (1) change management; (2) curricular integration, assessment, and entrustment; (3) data management and visualization; and (4) coaching. Major findings included: (1) Quality of buy-in from dean-level administrators and key faculty who had the opportunity to implement EPA training and assessments was critical to the success of programs and larger school buy-in to use of EPAs to assess student progress; (2) closer proximity in time to major changes to/renewal of a medical school's curriculum was perceived to have facilitated the introduction of new forms of

TEAM REFLECTION

Virginia Commonwealth University School of Medicine

"Participation in the Core EPAs pilot has been invaluable. For example, we were able to hear from institutions further along in implementation regarding challenges they encountered. Learning from those experiences provided opportunity to plan strategically to avoid similar difficulty along the way. A notable example of this involved formulation and process for entrustment decisions. Additionally, the opportunity to communicate on a regular basis allowed for a larger sounding board to discuss innovations necessary to carry forth the EPA work. We were able to design our workplace-based assessment system through the collective wisdom of pilot members. The resultant system was significantly more robust and thoughtful than it likely would have been if developed internally alone."

assessment based on EPAs; (3) no school, at the time of the study, was fully able to use or confident with using EPA assessment and progress as the sole or even most important determinant of student progress, yet results of EPA assessments complemented other forms of assessment in providing students with more robust feedback about their progress; and (4) a major contribution of EPA assessments was improvement in faculties' ability to provide useful, relevant, and specific formative feedback to students because of the required feedback mechanism built into these assessments (J. A. Encandela, PhD, unpublished data, January 2022).

TEAM REFLECTION

Florida International University Herbert Wertheim College of Medicine

"It was a great experience to be part of the Core EPAs pilot learning community. Throughout the last several years, we had the opportunity to learn from each other and build on each other's experiences and engage in important multi-institutional scholarship. The implementation of EPAs has helped clarify clinical expectations for our students as well as faculty. It has also provided the unique opportunity to implement and review a more longitudinal approach to performance assessment in key skills. The approach has also helped improve opportunities for direct observation and real-time feedback."

The 13 Core EPAs: Putting Together All the Quantitative Data

After completion of all quantitative data collection activities, the pilot team collectively examined the data collated from multiple sources over the duration of the pilot. These data included TEG entrustment determinations outcomes data, results of the Core EPAs Pilot Early PGY-1 Questionnaire, school-specific entrustment process data, WBA availability data (as collected and reported by each school), and pilot schools' AAMC 2019 Medical School Graduation Questionnaire and AAMC 2020 Medical School Graduation Questionnaire EPA-related item responses.[23,24] Adapting Joint Committee on Standards for Educational Evaluation program evaluation standards, including propriety, feasibility, utility, and accuracy,[25] three groups of EPAs were identified by the pilot team.[6] As shown in Table 3, these groups are as follows:

- **Group 1: Core EPAs aligned with existing curricula.** The first group of six EPAs aligned well with existing curricula at pilot schools and generally allowed for ample assessment. There were relatively high proportions of students deemed ready for entrustment under indirect supervision in these six EPAs, which include EPA 1: "Gather a history and perform a physical examination," EPA 2: "Prioritize a differential diagnosis following a clinical encounter," EPA 5: "Document a clinical encounter in the patient record," EPA 6: "Provide an oral presentation of a clinical encounter," EPA 7: "Form clinical questions and retrieve evidence to advance patient care," and EPA 9: "Collaborate as a member of an interprofessional team."
- **Group 2: Core EPAs aligned with sub-internship/acting internship activities.** The second group of three EPAs was predominantly represented at pilot schools in more advanced curricular experiences such as sub-internships/acting internships and includes the following three EPAs: EPA 3: "Recommend and interpret common diagnostic and screening tests," EPA 4: "Enter and discuss orders and prescriptions," and EPA 8: "Give or receive a patient handover to transition care responsibility." However, even in sub-internships/acting internships, some of these EPAs are not routinely expected or assessed at pilot schools. Relatively lower proportions of students were deemed ready for entrustment under indirect supervision in these EPAs.
- **Group 3: Core EPAs typically reserved for interns and residents.** This final group of four EPAs included roles not typically afforded to students at pilot schools. These four EPAs are as follows: EPA 10: "Recognize a patient requiring urgent or emergent care and initiate evaluation and management," EPA 11: "Obtain informed consent for tests and/or procedures," EPA 12: "Perform general procedures of a physician," and EPA 13: "Identify system failures and contribute to a culture of safety and improvement." In the UME setting, these EPAs could be practiced in simulation, with the understanding that simulated experiences may lack relevant contextual knowledge. Relatively lower proportions of students were deemed ready for entrustment under indirect supervision in these EPAs. In case study team interviews, some school teams described these EPAs as aspirational — the teams recognized that even if students did not get much practice, they had become aware, through the pilot activities at their schools, that these were important clinical skills that would be more fully addressed in residency.

TABLE 3. Groups of Core EPAs

Group	EPAs
1. Core EPAs aligned with existing curricula. Learners have ample opportunities to practice these EPAs with direct observation and feedback.	1. Gather a history and perform a physical examination. 2. Prioritize a differential diagnosis following a clinical encounter. 5. Document a clinical encounter in the patient record. 6. Provide an oral presentation of a clinical encounter. 7. Form clinical questions and retrieve evidence to advance patient care. 9. Collaborate as a member of an interprofessional team.
2. Core EPAs aligned with sub-internship activities. Learners may have opportunities to perform these EPAs in limited volume, with supervision not sufficiently intentional to collect evidence robust enough for entrustment decisions.	3. Recommend and interpret common diagnostic and screening tests. 4. Enter and discuss orders and prescriptions. 8. Give or receive a patient handover to transition care responsibility.
3. Core EPAs typically reserved for interns and residents. In most of our schools' undergraduate medical education curricula, these EPAs appear to remain absent or underdeveloped.	10. Recognize a patient requiring urgent or emergent care and initiate evaluation and management. 11. Obtain informed consent for tests and/or procedures. 12. Perform general procedures of a physician. 13. Identify system failures and contribute to a culture of safety and improvement.

Abbreviation: EPA, entrustable professional activity.

Looking Back and Looking Ahead

Over the past seven years, the Core EPAs pilot team endeavored to widely share its progress and its many challenges during implementation, its outcomes data for the initial student cohorts, and the lessons it was learning across all pilot activities. Pilot team members delivered over 100 peer-reviewed presentations at regional, national, and international meetings throughout the duration of the pilot and continue to develop the pilot's portfolio of peer-reviewed publications (refer to Appendix 2). At the 10 pilot schools, implementation of the Core EPAs framework remains a work in progress.

The 10 schools participating in the pilot faced myriad challenges in the seven years of the pilot: changes in leadership at the AAMC, changes in leadership at their schools, schoolwide efforts involved in preparation for LCME site visits, turnover in Core EPAs team rosters, and, in the final years of the pilot, the systemic disruptions of the COVID-19 pandemic. Looking back at the seven years of the pilot, the wisdom of the AAMC leaders who initially convened the pilot is evident in their selection of the diverse group of 10 medical schools to participate and in their decision, from the pilot's inception, to convene the entire team on a regular basis so that collegial working relationships could develop over time.

One of the early activities of the pilot was drafting the guiding principles for the 10 schools (refer to Figure 4). These nine guiding principles held up well for the ensuing seven years. As the Core EPAs pilot approached its end, team leaders at the 10 pilot schools jointly discussed their day-to-day experiences, over the duration of the pilot, in implementing the Core EPAs at their respective schools through the lens of these guiding principles. The team leaders' personal perspectives, insights, and ideas for future directions, informed by their many years of leadership at their respective schools, are summarized in Appendix 5. That the 10 pilot school leaders chose to reflect on their collective experiences in the pilot through the lens of these guiding principles speaks to the durability and relevance of the principles that informed the work of the local implementations at the 10 schools over the course of the pilot.

The scholarly literature on CBME has expanded markedly since the AAMC initially convened the Core EPAs pilot in 2014. In 2019, Van Melle and colleagues published the results of a research study undertaken to define essential components of a CBME framework.[26] Five components were identified, including a defined set of competencies (intended educational outcomes), sequencing of these competencies in a developmental arc, tailored learning experiences for the developmental acquisition of the competencies, competency-focused instruction, and gauging progress toward mastery through programmatic assessment.[26] Programmatic assessment confirms progression toward mastery and provides actionable data by synthesizing multiple sources of assessment that focus on specific competencies and are collected over time, including assessments drawn from direct observations by others (e.g., supervising residents, attending physicians) in the clinical workplace.[27] In comparing the Core EPAs pilot team guiding principles (refer to Figure 4) developed in 2014 with this core components framework published five years later, one or more of the nine Core EPAs pilot guiding principles align with each of the five essential components described by Van Melle and colleagues.[20]

Another critical aspect of the entire pilot was the active engagement of student leaders at the pilot schools, as well as the participation of students at the biannual meetings of the entire team with AAMC staff. Throughout the duration of the pilot, school teams were given the opportunity to bring students to the face-to-face meetings. The perspective of these student leaders was essential in understanding the experience of learners in all aspects of EPA implementation. They published their viewpoints on six key challenges: timing and approach for EPA introductions, delineation of responsibility for assessment, feedback mechanisms, systems for advising and mentoring students, dynamic between EPAs performance and grades, and use of entrustment decisions to determine promotion or advancement.[28] The role of the learner in coproduction is an increasingly recognized phenomenon and one that must be embraced for successful implementation of CBME.[29,30]

The shared leadership model, with an external constituent serving as an associate project director along with the AAMC project director, was very successful for the AAMC, and the approach is being adapted for other AAMC medical education projects conducted in collaboration with groups of external constituents. At the AAMC, very strong project management support minimized project disruptions due to organizational leadership changes. With the onset of COVID-19 pandemic-related disruptions, the close working relationships that had developed among pilot team members and the set of guiding principles informing the work not only sustained the team but allowed it to segue remarkably seamlessly and very productively into virtual formats for all its remaining activities.

The pilot illuminated numerous complexities of CBME implementation. Across the 13 Core EPAs, ease of implementation and the extent to which graduating students were determined to be ready for entrustment under indirect supervision varied markedly. It is important to acknowledge that the initial list of AAMC Core EPAs, released in 2014, was explicitly identified at that time as "version 1.0," with a certainty

that the list would change over time.[8] With the completion of the pilot and in the context of the many developments in CBME since the pilot's inception, it is time for a reexamination of version 1.0 of the AAMC Core EPAs.

There are many important questions relating to the implementation of CBME that were not directly addressed in this pilot. One is the critical question of time variability on a systems-wide basis. Neither the individual schools in the pilot nor the infrastructure for transitioning from medical school to residency was prepared to adopt variability in graduation timing on an all-in (i.e., schoolwide) basis. Another unaddressed question relates to finding the optimal balance between assessment data to inform summative evaluations and assessment data for formative assessment purposes only to encourage a learning environment that promotes help-seeking behavior.

Based on the experiences of the Core EPAs pilot schools, a potential role for the use of Core EPAs entrustment decisions data at a national systems level (e.g., transition to residency) in the United States is not yet clear. Examination of validity evidence for Core EPAs entrustment decisions may clarify appropriate potential uses of these data in the transition to residency. Notably, in the 2020 *Academic Medicine* supplement that included descriptions of educational programs at 135 participating U.S. LCME-accredited medical schools,[31] 46 of all 135 schools (34%) cited using the AAMC Core EPAs as a framework for their program objectives, as a source for their assessments, or both.[32] Numerous medical schools beyond those in the pilot are gaining experience with the AAMC Core EPAs and contributing to the scholarship around Core EPAs implementation. Major contributions in this regard have been made by the Education in Pediatrics Across the Continuum Study Group,[33,34] supported by the AAMC.

Other medical education organizations have developed EPAs for entering residency. The American Association of Colleges of Osteopathic Medicine released *Osteopathic Considerations for Core Entrustable Professional Activities (EPAs) for Entering Residency* in 2016,[35] and substantial work with EPAs in the transition to residency is ongoing among osteopathic medical schools in the United States.[36] The Association of Faculties of Medicine of Canada finalized its list of 12 EPAs, defined as core EPAs expected of all their medical school graduates, in 2019.[37]

Shortly after the AAMC Core EPAs pilot formally ended in June 2021, the Coalition for Physician Accountability report *Recommendations for Comprehensive Improvement of the UME-GME Transition* was released.[38] This report has brought a renewed and sharpened focus on CBME as an approach to ensure that every medical school graduate is prepared for the responsibilities they will assume at the start of residency. The experiences and outcomes of the AAMC Core EPAs pilot will inform work ahead for the AAMC[39] — in collaboration with other organizations and the medical education community at large — in continued efforts to optimize the continuum of medical education, ease the transition to residency, and assure the readiness of all medical school graduates for the responsibilities they will assume on day one of residency.

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Appendix 1.
Core EPAs Pilot Team Members at Each Participating School, 2014-2021

Columbia University Vagelos College of Physicians and Surgeons

- Jonathan Amiel, MD, senior associate dean for innovation in health professions education and professor of psychiatry (team lead).
- Beth Barron, MD, associate professor of medicine.
- Marina Catallozzi, MD, MSCE, vice president of health and wellness and chief health officer, Barnard College; vice chair of education in pediatrics and associate professor of pediatrics and population and family health, Columbia University Medical Center.

Former member:

- Ronald Drusin, MD, professor emeritus of medicine, Columbia University Medical Center.

Florida International University Herbert Wertheim College of Medicine

- Vivian Obeso, MD, associate dean for curriculum and medical education (team lead).
- Jefry Biehler, MD, chair, Department of Pediatrics; clerkship director for pediatrics and academic advisor; and associate professor.
- David R. Brown, MD, professor, chief of the Division of Family and Community Medicine, and vice chair, Department of Humanities, Health, and Society.

Former members:

- Karin F. Esposito, MD, PhD, senior executive dean for academic and student affairs, Roseman University College of Medicine.
- Carla S. Lupi, MD, associate dean for assessment and evaluation, Kaiser Permanente Bernard J. Tyson School of Medicine.

McGovern Medical School at the University of Texas Health Science Center at Houston

- Mark Hormann, MD, professor of pediatrics and assistant dean for clinical education (team lead).
- Sasha Adams, MD, associate professor and vice chair for surgical education, and program director, general surgery residency.
- Allison R. Ownby, PhD, associate professor, educational programs, and assistant dean for faculty and educational development.
- Jennifer Swails, MD, associate professor, internal medicine, and program director, internal medicine residency.

Former members:

- Philip Orlander, MD, professor and vice chair for education, internal medicine, and associate dean for educational programs.
- Margaret O. Uthman, MD, professor and vice chair for education, pathology and laboratory medicine, and associate dean for educational programs.

Michigan State University College of Human Medicine

- Dianne Wagner, MD, associate dean for undergraduate medical education and professor of medicine (team lead).
- Matthew Emery, MD, associate professor of emergency medicine and associate director for academic affairs, Division of Emergency Medicine; medical director for simulation; and lead clerkship director, emergency medicine, College of Human Medicine Spectrum Health-Butterworth.
- Aron Sousa, MD, dean.
- Angela Thompson-Busch, MD, assistant professor, Office of Medical Education Research and Development and Department of Pediatrics and Human Development.

Former member:

- Heather Laird-Fick, MD, MPH, director of assessment and professor of medicine.

NYU Grossman School of Medicine

- Patrick M. Cocks, MD, Abraham Sunshine assistant professor of clinical medicine and director of the internal medicine residency (team lead).
- Colleen C. Gillespie, MD, associate professor, Department of Medicine, and director, Division of Education Quality.
- Melvin Rosenfeld, MD, senior associate dean for medical education and associate professor, Department of Cell Biology.
- Linda Tewksbury, MD, associate professor, Department of Pediatrics, and associate dean for student affairs.
- Ruth Crowe, MD, PhD, assistant dean of clinical sciences curriculum, assessment, and evaluation, and associate dean for medical education, NYU Long Island School of Medicine.

Former member:

- Sandra Yingling, PhD, associate dean, educational planning, NYU Long Island School of Medicine.

Oregon Health & Science University School of Medicine

- George Mejicano, MD, MS, senior associate dean for education and professor of medicine, Division of Infectious Diseases (team lead).
- Tracy Bumsted, MD, associate dean for undergraduate medical education and professor of pediatrics, Division of Hospital Medicine.
- Carrie A. Phillipi, MD, PhD, vice chair of education, Department of Pediatrics, and professor of pediatrics, Division of General Pediatrics.
- Jamie Warren, MD, vice chair for clinical practice, Department of Pediatrics, and associate professor of pediatrics, Division of Neonatology.

Former members:

- Judy Bowen, MD, associate dean for curriculum, Washington State University Elson S. Floyd College of Medicine.
- Holly Caretta-Weyer, MD, associate residency program director, director of evaluation and assessment for the emergency medicine residency program, and clinical assistant professor, Stanford University School of Medicine.
- Joseph Gilhooly, MD, former vice chair for education in pediatrics and professor of pediatrics, Division of Neonatology; now accreditation field specialist, Accreditation Council for Graduate Medical Education.
- Anna Nelson, MD, emergency medicine specialist, Legacy Good Samaritan Hospital and Medical Center.
- Lalena Yarris, MD, MCR, vice chair for faculty development in emergency medicine and professor of emergency medicine.

University of Illinois College of Medicine

- Sandra Yingling, PhD, associate dean for educational planning and quality improvement and clinical assistant professor, Department of Medical Education (team lead).
- Meenakshy Aiyer, MD, interim regional dean, Peoria Campus, and associate professor of clinical medicine.
- Janet Jokela, MD, acting regional dean, Urbana Campus, and professor of clinical medicine.
- Asra R. Khan, MD, director of competency achievement, associate professor of clinical medicine, and M3/M4 internal medicine clerkship director.

Former members:

- Abbas Hyderi, MD, MPH, senior associate dean for medical education and professor, Kaiser Permanente Bernard J. Tyson School of Medicine.
- Alex Stagnaro-Green, MD, MHPE, MHA, regional dean, Rockford Campus, and professor of obstetrics and gynecology and medical education.

Vanderbilt University School of Medicine

- William B. Cutrer, MD, MEd, associate dean for undergraduate medical education and associate professor of pediatrics (team lead).
- Cody Chastain, MD, assistant professor of medicine, Department of Medicine, Division of Infectious Diseases.
- Kendra Parekh, MD, MHPE, assistant dean for undergraduate medical education and associate professor of emergency medicine.
- Eduard Vasilevskis, MD, associate professor of medicine, Division of General Internal Medicine, and section chief for the Section of Hospital Medicine.

Former members:

- Kimberly Lomis, MD, vice president for UME innovations, American Medical Association.
- Kyla Terhune, MD, MBA, vice president for educational affairs, associate dean for graduate medical education, and associate professor of surgery and anesthesiology.

Virginia Commonwealth University School of Medicine

- Michael S. Ryan, MD, MEHP, vice chair of education and professor of pediatrics (team lead).
- Diane M. Biskobing, MD, professor of medicine and associate dean for pre-clinical medical education.
- Nicole Deiorio, MD, professor, emergency medicine, and associate dean, student affairs.
- Gregory Trimble, MD, associate professor of medicine and assistant dean of student affairs, INOVA-Fairfax (former regional campus of Virginia Commonwealth University School of Medicine).

Former members:

- Stephanie Call, MD, professor of medicine and residency program director, Mountain Area Health Education Center.
- Teresa J. Carter, EdD, professor of medicine and associate dean of faculty development (retired).

Yale School of Medicine

- Michael Green, MD, professor of medicine and director of student assessment, Teaching and Learning Center (team lead).
- Katherine Gielissen, MD, assistant professor of medicine (general medicine) and pediatrics (general pediatrics); associate clerkship director, internal medicine; and faculty director and advisor, Yale Clinician Educator Distinction, Internal Medicine.
- Jeremy J. Moeller, MD, associate professor; associate vice-chair of education, neurology; and neurology residency program director.
- Barry Wu, MD, professor of clinical medicine.

Former members:

- Eve Colson, MD, MHPE, professor of pediatrics and associate dean for program evaluation and continuous quality improvement, Washington University School of Medicine in St. Louis.
- Dana Dunne, MD, MHS, associate chair for education and clerkship director, Department of Medicine, and GME director for educator development.
- Michael Schwartz, PhD, associate dean for curriculum, inaugural director of innovation in medical education, and director, medical studies in neuroscience.

Appendix 2.
Annotated Bibliography for Core EPAs for Entering Residency Pilot Project
(Updated Through April 29, 2022)

General and Overarching Implementation Updates and Lessons Learned

Amiel JM, Andriole DA, Biskobing DM, et al; AAMC Core EPAs for Entering Residency Pilot Team. Revisiting the Core Entrustable Professional Activities for Entering Residency. *Acad Med.* 2021;96(7S):S14-S21. https://doi.org/10.1097/ACM.0000000000004088

In this article, the authors discuss some of the outcomes of Core EPAs implementation for seven of the pilot schools, analyzing data from the AAMC Medical School Graduation Questionnaire, the AAMC Early Postgraduate Year 1 Questionnaire, and data collection tools obtaining information on EPA-specific workplace-based assessments, trained entrustment groups, and program director assessment of graduates' preparedness. The authors organize their findings around the standards of propriety, feasibility, utility, and accuracy. They also reflect on the 13 Core EPAs themselves, discussing which EPAs work well (are relatively easy to teach and assess), which may be missing, and which may be seen as aspirational, as well as what gaps in current curriculum and assessment structures require further attention.

For those interested in implementing EPAs, this article provides outcomes data on many of the essential pieces of EPA implementation. The authors' findings and recommendations around assessment of EPAs and the 13 Core EPAs themselves could be particularly helpful in understanding how to implement them in local contexts.

Garber AM, Ryan MS, Santen SA, Goldberg SR. Redefining the acting internship in the era of entrustment: one institution's approach to reforming the acting internship. *Med Sci Educ.* 2019;29(2):583-591. https://doi.org/10.1007/s40670-019-00692-7

In this article, the authors describe their single-school experience implementing EPAs in the fourth-year acting internship. They developed a specialty-agnostic curriculum addressing specific advanced Core EPAs. The curriculum objectives and assessment are available in the article as Tables 1 and 2, respectively. Implementing EPAs in the acting internship allowed students to practice more complex EPAs — 8 ("Give or receive a patient handover to transition care responsibility"), 10 ("Recognize a patient requiring urgent or emergent care and initiate evaluation and management"), and 12 ("Perform general procedures of a physician") — that they would not have otherwise been able to practice. The article also discusses some of the challenges of implementation.

For those interested in implementing EPAs, this article provides guidance on implementing EPAs in the curriculum outside of the usual context of clerkships.

Lomis KD, Ryan MS, Amiel JM, Cocks PM, Uthman MO, Esposito KF. Core Entrustable Professional Activities for Entering Residency Pilot Group update: considerations for medical science educators. *Med Sci Educ.* 2016;26(4):797-800. https://doi.org/10.1007/s40670-016-0282-3

In this article, the authors describe the role of medical science educators in the preclerkship and clerkship training phases of medical school in helping students along the path to entrustment. While "entrustment is fundamentally a workplace construct," medical science educators are essential in teaching and assessing students in the fundamental building blocks that make up each EPA. The authors also discuss the beginnings of the AAMC Core EPAs for Entering Residency pilot, including early progress and next steps around entrustment, curriculum development, assessment, and faculty development.

For those interested in implementing EPAs, this article provides specific information on the role of medical science educators in teaching and assessing EPAs. As medical science educators play an important role in early phases of medical school curricula, their contribution to implementing EPAs and participation in designing integrated curricula are essential.

Lomis K, Amiel JM, Ryan MS, et al; AAMC Core EPAs for Entering Residency Pilot Team. Implementing an entrustable professional activities framework in undergraduate medical education: early lessons from the AAMC Core Entrustable Professional Activities for Entering Residency pilot. *Acad Med.* 2017;92(6):765-770. https://doi.org/10.1097/ACM.0000000000001543

In this article, the authors describe the beginnings of the AAMC Core EPAs for Entering Residency pilot. They briefly highlight the pilot schools, the pilot timeline, and the pilot's goals, guiding principles, and organizational structure. Additionally, they share early progress and next steps around formal entrustment, assessment, curriculum development, and faculty development.

For those interested in implementing EPAs, this article provides a helpful snapshot of the concepts the pilot found to be most important to focus on early in the project period. It also includes the guiding principles that helped the pilot institutions identify where their efforts should align throughout the project period.

Obeso VT, Phillipi CA, Degnon CA, Carter TJ; AAMC Core Entrustable Professional Activities for Entering Residency Pilot. A systems-based approach to curriculum development and assessment of core entrustable professional activities in undergraduate medical education. *Med Sci Educ.* 2018;28(2):407-416. https://doi.org/10.1007/s40670-018-0540-7

In this article, the authors recommend implementing the Core EPAs using a systems-based approach. They describe following such an approach to implement EPA 11 ("Obtain informed consent for tests and/or procedures") using their Systems-Based Approach Guide (available in the article as Table 1). This guide highlights detailed steps included in each of five systems-based approach principles: (1) define the system, (2) create a pathway for goal accomplishment, (3) develop connections, (4) prepare for work activities, and (5) prepare for continuous quality improvement.

For those interested in implementing EPAs, this article provides a tool to help institutions use a systems-based approach to implementation. The article also includes a detailed pilot institution-based example of using the tool to clarify any points, thereby allowing institutions to see how it could be applied in their local contexts.

Learner Perspectives on EPAs

Geraghty JR, Ocampo RG, Liang S, et al; Core Entrustable Professional Activities for Entering Residency Pilot Program. Medical students' views on implementing the Core EPAs: recommendations from student leaders at the Core EPAs pilot institutions. *Acad Med.* 2021;96(2):193-198. https://doi.org/10.1097/ACM.0000000000003793

In this article, the authors share the perspectives of medical student leaders at five pilot schools on approaches for engaging students in the Core EPAs, implementation challenges, and recommendations around several decisions in implementing Core EPAs. Specifically, the authors center their discussion around six "key tensions": (1) how and when the Core EPAs should be introduced; (2) responsibility for driving the assessment process; (3) feedback mechanisms; (4) systems for advising, mentoring, or coaching students; (5) whether EPA performance should contribute to students' grades; and (6) whether entrustment decisions should be tied to graduation requirements. The article includes a table that summarizes all the tensions, the range of decision options, and associated recommendations.

For those interested in implementing EPAs, this article provides the student perspective, which is an essential piece to understand in implementing EPAs. Additionally, the authors offer specific recommendations around key decisions required for EPA implementation.

Obeso V, Grbic D, Emery M, et al; Core Entrustable Professional Activities for Entering Residency Pilot. Core Entrustable Professional Activities (EPAs) and the transition from medical school to residency: the postgraduate year one resident perspective. *Med Sci Educ.* 2021;31(6):1813-1822. https://doi.org/10.1007/s40670-021-01370-3

In this article, the authors report on first-year residents' self-assessed preparedness to perform the 13 Core EPAs under indirect supervision in the context of their transition to residency. AAMC Core EPAs pilot medical school graduates completed a questionnaire three months into their first year of residency. "Residents who reported that they had been prepared to perform core EPAs under indirect supervision at the start of training felt that their transition to residency was easier than expected." Self-assessed preparedness to perform Core EPAs under indirect supervision at the start of residency varied across EPAs; for example, respondents felt more prepared to perform EPAs 1 ("Gather a history and perform a physical examination"), 5 ("Document a clinical encounter in the patient record"), and 6 ("Provide an oral presentation of a clinical encounter") compared with EPAs 4 ("Enter and discuss orders and prescriptions"), 8 ("Give or receive a patient handover to transition care responsibility"), 10 ("Recognize a patient requiring urgent or emergent care and initiate evaluation and management"), and 11 ("Obtain informed consent for tests and/or procedures"). Specialty was also associated with reported ease of transition to residency.

For those interested in implementing EPAs, this article illustrates that readiness to perform many of the Core EPAs under indirect supervision may contribute to an easier transition for graduates regarding the responsibilities they assume at the start of residency.

Ryan MS, Lockeman KS, Feldman M, Dow A. The gap between current and ideal approaches to the Core EPAs: a mixed methods study of recent medical school graduates. *Med Sci Educ.* 2016;26(3):463-473. https://doi.org/10.1007/s40670-016-0235-x

In this article, the authors report on the perceived readiness of first-year residents at a single hospital system to perform the 13 Core EPAs and what contributed to their reported level of preparedness. Residents completed

a questionnaire, and a subgroup participated in focus groups. They reflected on the training experiences they had as medical students and what activities were most helpful for which EPA, the quality of the assessment and feedback they received on their EPA performance, and the EPAs they felt the most/least prepared to perform in residency. The authors found that "residents felt far more prepared" to perform EPAs 1 ("Gather a history and perform a physical examination"), 5 ("Document a clinical encounter in the patient record"), and 6 ("Provide an oral presentation of a clinical encounter") compared with 4 ("Enter and discuss orders and prescriptions"), 8 ("Give or receive a patient handover to transition care responsibility"), and 13 ("Identify systems failures and contribute to a culture of safety and improvement").

For those interested in implementing EPAs, this article provides insight from first-year residents on the specific medical school activities that they thought did and did not contribute to their self-assessed readiness to perform EPAs. This feedback could help other institutions identify training activities to support their students' development.

Specific EPAs

Brown DR, Gillespie CC, Warren JB; AAMC Core EPAs for Entering Residency EPA 9 Pilot Workgroup. EPA 9—collaborate as a member of an interprofessional team: a short communication from the AAMC Core EPAs for Entering Residency pilot schools. *Med Sci Educ.* 2016;26(3):457-461. https://doi.org/10.1007/s40670-016-0273-4

In this article, the authors discuss their efforts around operationalizing a developmental framework and curriculum mapping tool for EPA 9 ("Collaborate as a member of an interprofessional team"). They performed an in-depth analysis of the components of EPA 9 and conducted a literature review of existing assessment tools and assessment frameworks. The authors used this information to describe the expectations for development of interprofessional collaborative practice skills for use as a shared mental model for expectation setting, workplace-based assessment, and entrustment, available in the article as Table 1, and to develop the curriculum mapping Tool for Assessing Interprofessional Collaboration Training, available in the article as Table 2.

For those interested in implementing EPAs, this article provides a comprehensive analysis of the competencies for collaborating as a member of an interprofessional team. EPA 9 is often cited as one of the more difficult EPAs to teach and assess, so the assessment tool provided in the article may be particularly helpful for those interested in teaching and assessing EPA 9 or any component of interprofessional learning.

Engle B, Brogan-Hartlieb K, Obeso VT, et al. From the classroom to entrustment — the development of motivational interviewing skills as an entrustable professional activity [version 1]. *MedEdPublish.* 2019;8:153. https://doi.org/10.15694/mep.2019.000153.1

In this article, the authors discuss their long-standing efforts around teaching motivational interviewing to medical students, assessing their use of it, and providing faculty with the training necessary to teach and assess it. Motivational interviewing is lacking in current competency frameworks, including the 13 Core EPAs, so the authors built upon their existing body of work using the EPA framework. They developed a one-page schematic (available in the article as Figure 1) and workplace-based assessment (available in the article as Table 3) for motivational interviewing. The authors found that implementing the motivational interviewing EPA was feasible and positively impacted student and faculty motivational interviewing skills.

For those interested in implementing EPAs, this article provides a comprehensive analysis of an EPA not included in current competency-based medical education frameworks but essential to patient care: motivational interviewing. The article also includes detailed information on one institution's faculty development, curricular, and assessment efforts, as well as specific assessment tools other institutions could use.

Assessment

Cutrer WB, Russell RG, Davidson M, Lomis KD. Assessing medical student performance of Entrustable Professional Activities: a mixed methods comparison of co-activity and supervisory scales. *Med Teach.* 2020;42(3):325-332. https://doi.org/10.1080/0142159X.2019.1686135

In this article, the authors report on a single-school, mixed methods study comparing the modified Chen supervisory scale and modified Ottawa co-activity scale (both available in the article as Figure 2) for workplace-based assessment of EPAs 4 ("Enter and discuss orders and prescriptions"), 5 ("Document a clinical encounter in the patient record"), 8 ("Give or receive a patient handover to transition care responsibility"), and 10 ("Recognize a patient requiring urgent or emergent

care and initiate evaluation and management"). Medical students were assessed on both scales during acting internships. The authors also interviewed faculty assessors to help understand their use of the assessments. The authors found that ratings were not aligned across scales, indicating that the scales are "measuring different aspects of performance and should be considered complementary rather than interchangeable assessments."

For those interested in implementing EPAs, this article provides a research-based analysis of the differences between two common EPA workplace-based assessment scales. It highlights that one scale is not better than the other but that they measure different aspects of performance.

Dunne D, Gielissen K, Slade M, Park YS, Green M. WBAs in UME—how many are needed? A reliability analysis of 5 AAMC core EPAs implemented in the internal medicine clerkship. *J Gen Intern Med.* Published online Sept. 24, 2021. https://doi.org/10.1007/s11606-021-07151-3

In this article, the authors report on single-school outcomes of the Ottawa scale using generalizability theory (G-theory) and decision theory (D-theory). Students were assessed on EPAs 1 ("Gather a history and perform a physical examination"), 2 ("Prioritize a differential diagnosis following a clinical encounter"), 5 ("Document a clinical encounter in the patient record"), and 6 ("Provide an oral presentation of a clinical encounter") and on whether the activity was complex or routine. The authors found that "9-11 observations translate into an entrustment rating that is reasonably reproducible for a given student." They also found that residents completed workplace-based assessments more frequently than attending physicians.

For those interested in implementing EPAs, this article provides specific information on the number of workplace-based observations needed for each student. It also discusses their workplace-based assessments tool development and faculty development processes, recommendations, and challenges.

Garber AM, Feldman M, Ryan M, Santen SA, Dow A, Goldberg SR. Core EPAs in the acting internship: early outcomes from an interdepartmental experience. *Med Sci Educ.* 2021;31(2):527-533. https://doi.org/10.1007/s40670-021-01208-y

In this article, the authors describe the outcomes for a single-school study of their implementation of EPAs 4 ("Enter and discuss orders and prescriptions"), 6 ("Provide an oral presentation of a clinical encounter"), 8 ("Give or receive a patient handover to transition care responsibility"), 9 ("Collaborate as a member of an interprofessional team"), and 10 ("Recognize a patient requiring urgent or emergent care and initiate evaluation and management") in the fourth-year acting internship. Based on workplace-based assessment data of these EPAs, they found that "most students achieved a performance level of needing indirect supervision." Additionally, based on a pre- and post-acting internship survey, students were significantly more confident in their performance of EPAs 4, 6, 8, 9, and 10.

For those interested in implementing EPAs, this article provides outcomes data regarding the positive effects of implementing EPAs in the acting internship.

Hasan R, Phillipi CA, Smeraglio A, et al. Implementing a real-time workplace-based assessment data collection system across an entire medical school's clinical learning environment [version 1]. *MedEdPublish.* 2021;10:22. https://doi.org/10.15694/mep.2021.000022.1

In this article, the authors describe developing and implementing a workplace-based assessment process and tool for all 13 EPAs at a single academic health center. This includes how they integrated assessment into their curriculum and the faculty development opportunities they offered. The number of completed workplace-based assessments varied by EPA, as well as by clinical discipline and setting. For example, "EPA 6 ('Provide an oral presentation of a clinical encounter') was most frequently assessed and EPA 10 ('Recognize a patient requiring urgent or emergent care and initiate evaluation and management') was least frequently assessed."

For those interested in implementing EPAs, this article provides a summary of implementing a workplace-based assessment process across a wide variety of EPAs, clinical disciplines, and clinical settings. The article could help others develop their own assessment processes and identify where challenges or opportunities may arise.

Rodgers V, Tripathi J, Lockeman K, Helou M, Lee C, Ryan MS. Implementation of a workplace-based assessment system to measure performance of the Core Entrustable Professional Activities in the pediatric clerkship. *Acad Pediatr.* 2021;21(3):564-568. https://doi.org/10.1016/j.acap.2020.09.016

In this article, the authors report on implementing the Ottawa Clinic Assessment Tool (OCAT) for workplace-based assessment of all medical students in the pediatric clerkship at a single school. They assessed EPAs 1 ("Gather a history and perform

a physical examination"), 2 ("Prioritize a differential diagnosis following a clinical encounter"), 3 ("Recommend and interpret common diagnostic and screening tests"), 5 ("Document a clinical encounter in the patient record"), 6 ("Provide an oral presentation of a clinical encounter"), and 9 ("Collaborate as a member of an interprofessional team"). The authors found that OCAT scores increased over the course of the clerkship and that scores were associated with grades; however, the number of completed workplace-based assessments varied by EPA.

For those interested in implementing EPAs, this article provides a summary of implementing a workplace-based assessment process in a clerkship, as well as some of the resulting successes and ongoing challenges.

Ryan MS, Richards A, Perera R, et al. Generalizability of the Ottawa Surgical Competency Operating Room Evaluation (O-SCORE) scale to assess medical student performance on Core EPAs in the workplace: findings from one institution. *Acad Med.* 2021;96(8):1197-1204. https://doi.org/10.1097/ACM.0000000000003921

In this article, the authors report on the reliability of the Ottawa Surgical Competency Operating Room Evaluation (O-SCORE) scale, determined using G (generalizability)-theory. In this single-institutional study, medical students were assessed across clinical clerkships using a workplace-based assessment. While the O-SCORE "demonstrated modest reliability," more of the variation was due to the rater/assessor than to the student's performance. In addition to these findings, the article includes extensive information about piloting EPAs in the authors' internal medicine clerkship and faculty development efforts across clerkships as supplemental digital appendices.

For those interested in implementing EPAs, this article highlights the challenges of workplace-based assessment and rater/assessor training.

Ryan MS, Khan AR, Park YS, et al; Core Entrustable Professional Activities for Entering Residency Pilot Program. Workplace-based entrustment scales for the Core EPAs: a multisite comparison of validity evidence for two proposed instruments using structured vignettes and trained raters. *Acad Med.* 2022;97(4):544-551. https://doi.org/10.1097/ACM.0000000000004222

In this article, the authors report on the results of their multi-institutional study comparing the validity of the Ottawa and Chen scales. Members of the AAMC Core EPAs pilot teams were grouped and randomized to apply one of the scales to video vignettes of pre-entrustable and entrustable learners. Assessors were also asked to provide feedback on their rating thought process through an open-ended response question at the end of the assessment tool. The authors found that assessment variability was due to the student's performance, not the rater/assessor, for both scales.

For those interested in implementing EPAs, this article provides evidence for the validity of these scales "in a highly structured environment." Additionally, the qualitative responses from assessors offer input on the challenges of using the scales, which could inform institutions' faculty development efforts.

Ryan MS, Khamishon R, Richards A, Perera R, Garber A, Santen SA. A question of scale? Generalizability of the Ottawa and Chen scales to render entrustment decisions for the Core EPAs in the workplace. *Acad Med.* 2022;97(4):552-561. https://doi.org/10.1097/ACM.0000000000004189

In this article, the authors report on the results of their single-school study comparing modified versions of the Ottawa and Chen scales on workplace-based assessment forms. They analyzed the data using G-theory and D-theory. The authors found that "both scales demonstrated relatively low variance attributed to the learner," with the Chen scale performing slightly better than the Ottawa scale for five of the seven Core EPAs studied and the Ottawa scale performing slightly better for the remaining two EPAs. The authors also conducted a root cause analysis to understand assessment challenges more deeply.

For those interested in implementing EPAs, workplace-based assessment is a consistent challenge to successful EPA implementation. This article provides a thoughtful stepwise analysis of the workplace-based assessment process to help others anticipate these challenges. It also helps more clearly delineate the differences between the Chen and Ottawa scales for EPA assessment.

Faculty Development

Favreau MA, Tewksbury L, Lupi C, et al; AAMC Core Entrustable Professional Activities for Entering Residency Faculty Development Concept Group. Constructing a shared mental model for faculty development for the Core Entrustable Professional Activities for Entering Residency. *Acad Med.* 2017;92(6):759-764. https://doi.org/10.1097/ACM.0000000000001511

This article discusses the faculty development elements necessary for those involved in making entrustment decisions, informed by an extensive literature review. The four skill development elements are (1) "observation skills in authentic work environments," (2) "feedback and coaching skills," (3) "self-assessment, role modeling, and reflective practice" skills, and (4) "peer guidance skills." The article also includes two lists: One list provides specific faculty development recommendations from the Core EPAs Pilot Faculty Development Concept Group based on the aforementioned elements. The other highlights future directions for faculty development research from the Core EPAs Pilot Faculty Development Concept Group that are broad enough to inspire and inform additional researchers in this space.

For those interested in implementing EPAs, this article offers a summary of the specific skills areas on which faculty development efforts should focus. It also provides a summary of potential faculty development research questions that could inform a broader constituency exploring these issues.

Lupi CS, Ownby AR, Jokela JA, et al; AAMC Core Entrustable Professional Activities for Entering Residency Faculty Development Concept Group. Faculty development revisited: a systems-based view of stakeholder development to meet the demands of entrustable professional activity implementation. *Acad Med.* 2018;93(10):1472-1479. https://doi.org/10.1097/ACM.0000000000002297

This article discusses the training required for the range of stakeholders involved in implementing competency-based medical education: students, didactic faculty, residents and other postgraduate trainees, short-term clinical supervisors, longitudinal clinical supervisors and clinical course directors, portfolio coaches, entrustment committee members, faculty and deans responsible for oversight of professional behaviors, curriculum deans and resource managers, and faculty developers. To organize the needs of these stakeholders, the authors used Steinert's five domains of faculty development: (1) teacher improvement, (2) leadership and management, (3) research capacity building, (4) academic career building, and (5) organizational change. The article's Table 1 summarizes the knowledge and skill needs for each stakeholder group along these domains.

For those interested in implementing EPAs, this article provides a summary of many of the stakeholders that institutions may need to engage in doing this work and their knowledge and skill needs. This could inform institutions' professional development portfolio and stakeholder engagement strategies.

Entrustment

Brown DR, Moeller JJ, Grbic D, et al. Entrustment decision making in the Core Entrustable Professional Activities: results of a multi-institutional study. *Acad Med.* 2022;97(4):536-543. https://doi.org/10.1097/ACM.0000000000004242

In this article, the authors report on the results of the first round of theoretical entrustment decision-making at four of the participating pilot schools. Whether determinations about readiness for indirect supervision could be made varied across EPAs, dependent primarily upon data availability. Trained entrustment groups used multiple data sources, including workplace-based assessment data, to make their determinations.

For those interested in implementing EPAs, this article discusses the challenges in determining readiness for entrustment and highlights the EPAs for which it may be more or less feasible.

Brown DR, Warren JB, Hyderi A, et al; AAMC Core Entrustable Professional Activities for Entering Residency Entrustment Concept Group. Finding a path to entrustment in undergraduate medical education: a progress report from the AAMC Core Entrustable Professional Activities for Entering Residency Entrustment Concept Group. *Acad Med.* 2017;92(6):774-779. https://doi.org/10.1097/ACM.0000000000001544

In this article, the Core EPAs for Entering Residency Entrustment Concept Group discusses their efforts in operationalizing entrustment decision-making. Based on a literature review and group discussions about decision-making efforts across schools participating in the pilot, the group developed "guiding principles for making formal summative entrustment decisions" as well as a "developmental framework for trustworthiness" based on three dimensions of trustworthiness — discernment, truthfulness, and conscientiousness. Chart 1

in the article outlines the actions of a learner along developmental stages (from "requires remediation" to "proficient") for each of these three dimensions. The article also lists many of the challenges faced by pilot schools in making entrustment decisions in its Table 1.

For those interested in implementing EPAs, this article provides a helpful summary of the challenges institutions may face in implementing entrustment decision-making. It also offers a concrete way of conceptualizing and measuring/assessing a student's level of entrustment.

Moeller JJ, Warren JB, Crowe RM, et al; Core Entrustable Professional Activities for Entering Residency Pilot Program. Developing an entrustment process: insights from the AAMC Core EPA pilot. *Med Sci Educ.* 2020;30(1):395-401. https://doi.org/10.1007/s40670-020-00918-z

In this article, the authors report the findings from interviews with each of the 10 pilot schools around their processes for making summative EPA entrustment decisions. A table highlights the differences and similarities in how pilot schools approached different elements of the process: approach, committee members, number of students reviewed by the committee, number of EPAs reviewed by the committee, assessment data reviewed, review process, electronic dashboard, and outcomes of entrustment committee meetings. The 10 pilot schools each had a different process model, but all followed the guiding principles discussed by Brown and colleagues (2017) in the entry immediately preceding this one. However, implementing the process was found to be challenging — another table details the challenges schools shared in implementing an entrustment process around several high-level considerations; for example, interviewees described ethical considerations around limiting committee membership to minimize conflicts of interest (program directors, coaches, etc.).

For those interested in implementing EPAs, this article provides an illustrative discussion of the different models of entrustment committees the Core EPAs pilot schools developed, while also emphasizing common principles to consider. The article also highlights the challenges schools may face in implementing an entrustment process.

Letters to the Editor, Published Abstracts, and Columns (Listed Chronologically)

Brown DR, Hyderi A, Warren JB. Piloting the Core Entrustable Professional Activities for Entering Residency. Society of Teachers of Family Medicine (STFM) Education Columns. January 2017. Accessed March 25, 2022. https://www.stfm.org/publicationsresearch/publications/educationcolumns/2017/january/

Moeller JJ, Hyderi A, Brown DR. Reconciling entrustment and competence. *J Grad Med Educ.* 2017;9(6):783. https://doi.org/10.4300/JGME-D-17-00579.1

Lomis KD, Obeso VT, Whelan AJ. Building trust in entrustment: pursuing evidence-based progress in the Core Entrustable Professional Activities for Entering Residency. *Acad Med.* 2018;93(3):341-342. https://doi.org/10.1097/ACM.0000000000002061

Brown DR. Narrow phrasing is not always best: in defense of Core EPAs 7, 9, and 13. *Acad Med.* 2021;96(5):614. https://doi.org/10.1097/ACM.0000000000003992

Brown DR, Moeller JJ, Grbic D, et al. The first 2 years of entrustment decisions in the Core Entrustable Professional Activities (EPAs) pilot. *Acad Med.* 2021;96(11S):S201-S202. https://doi.org/10.1097/ACM.0000000000004275

AAMC Publications

AAMC. *Core Entrustable Professional Activities for Entering Residency Curriculum Developers' Guide.* AAMC; 2014. Accessed March 25, 2022. https://store.aamc.org/downloadable/download/sample/sample_id/63/%20

This is one of the two foundational publications released prior to the start of the Core EPAs pilot that informed the pilot's work. This publication is for curriculum developers, including "details about how we [the authors] mapped the EPAs to domains of competence, competencies, and their respective milestones."

AAMC. *Core Entrustable Professional Activities for Entering Residency Faculty and Learners' Guide.* AAMC; 2014. Accessed March 25, 2022. https://store.aamc.org/downloadable/download/sample/sample_id/66/%20

This is one of the two foundational publications released prior to the start of the Core EPAs pilot that informed the pilot's work. This publication is for faculty and learners, including "a description of the EPA, narrative and bulleted descriptions of learner behaviors, and clinical vignettes describing pre-entrustable and entrustable learners."

Obeso V, Brown D, Aiyer M, et al, eds; Core EPAs for Entering Residency Pilot Program. *Toolkits for the 13 Core Entrustable Professional Activities for Entering Residency.* AAMC; 2017. Accessed March 25, 2022. https://www.aamc.org/media/20196/download?attachment

The Core EPAs pilot developed these toolkits to more clearly describe the behaviors associated with each developmental stage for each of the 13 EPAs, displayed as one-page schematics. The toolkits also include the published literature associated with each EPA and the Physician Competency Reference Set competencies associated with each EPA.

Appendix 3.
AAMC Core EPAs Pilot Schools' Survey of Third-Year Medical Students (EPA M3 Survey) All Participating Schools Report

1. Prior to receiving any notification about this survey, were you aware that your school is implementing Core EPAs in the curriculum?	
No [If no, skip to #9.]	14.6%
Yes [If yes, continue with #2 below.]	85.4%
Number of respondents: 686	

2. How did you learn about the Core EPAs at your school? (Please check all that apply.)		
		Count
Application materials/information	4.5%	575
Orientation at the start of medical school	26.8%	575
Email communication from medical school leadership about our school's participation in the Core EPAs project	47.1%	575
Syllabus for a clinical skills or classroom course	39.0%	575
Preclinical preceptor	13.7%	575
Class/course for transition to clerkships	50.1%	575
Orientation session at the start of the clinical phase of training	61.6%	575
Orientation session for a specific clerkship block	42.1%	575
Syllabus for a specific clerkship	42.3%	575
Meeting with a coach/advisor	15.3%	575
A "boot camp" preparation course for transition to residency	4.9%	575
Other	5.7%	575

3. Many methods have been used to teach students about the Core EPAs framework and about how to get feedback on their performance of the Core EPAs. How effective was each of the following methods in helping you understand how to identify opportunities to both perform and get feedback on the Core EPAs?

	Not applicable (method not used for me/at my school)	Ineffective	Slightly effective	Moderately effective	Effective	Count
Lecture(s)/presentation	17.3%	9.1%	31.2%	26.6%	15.8%	538
Course/clerkship syllabi	12.8%	18.1%	34.3%	22.0%	12.8%	537
Question-and-answer session on EPAs	41.1%	10.8%	19.4%	16.8%	11.9%	530
Handouts or written materials	25.0%	14.3%	32.0%	20.1%	8.6%	532
Instructional video(s)	54.4%	10.0%	15.9%	13.8%	5.9%	528
Small-group/role-play sessions	52.3%	8.3%	11.3%	17.3%	10.9%	532
An advisor or portfolio coach designated for the duration of medical school	50.8%	10.0%	15.7%	14.0%	9.5%	528
An advisor/portfolio coach designated on a clerkship-specific basis	62.5%	6.3%	13.8%	10.2%	7.2%	528
A clinical supervisor not specifically designated as an advisor/portfolio coach	54.4%	6.8%	13.5%	14.6%	10.6%	526
Simulation exercise/objective structured clinical examination	36.5%	4.9%	15.1%	20.6%	22.9%	529
Other method not described	91.0%	2.9%	2.9%	2.2%	1.0%	411

4. The term "workplace-based assessment" (WBA) refers to any assessment of your performance in the clinical setting by a supervisor (such as a resident or faculty member) who directly observed your performance and provided feedback shortly afterwards (i.e., within 24 hours or so, NOT as an end-of-rotation assessment). An example of a WBA would be a preceptor watching you take a patient history in clinic and providing you with feedback/an assessment of your performance shortly afterwards. Thinking only of clinical settings involving real patients (not simulation/standardized patients) in which you were directly observed, to what extent do you agree with each of the following statements?

	Strongly disagree	Disagree	Agree	Strongly agree	Count
I am satisfied with the quality of feedback I received from WBAs completed about my performance in Core EPAs.	14.8%	27.3%	45.5%	12.5%	528
I am satisfied with the quantity of feedback I received from WBAs completed about my performance in Core EPAs.	14.2%	30.9%	41.7%	13.2%	530
I am comfortable asking a supervisor to assess my performance in Core EPAs.	10.7%	22.9%	45.3%	21.1%	532

5. Thinking only of clinical settings involving real patients (not simulation/standardized patients), how frequently have the following occurred in your medical education so far?

	Never	Once	2 to 5 times	More than 5 times	Count
My supervisors have specifically talked about or referred to the Core EPAs.	39.9%	14.2%	25.9%	20.0%	529
My supervisors have prompted me to perform a Core EPA although they did not identify the activity as a Core EPA.	20.1%	5.1%	18.9%	55.9%	528
My supervisors have prompted me to perform a Core EPA and have identified the activity as an entrustable professional activity (such as "Let's do this EPA"; "Let me give you feedback on EPA 6"; "This task is an entrustable professional activity").	69.1%	10.8%	12.9%	7.2%	527
I have identified opportunities to perform a Core EPA and asked my supervisor to observe me and give me feedback.	14.0%	6.6%	28.4%	50.9%	528

6. You responded at least "Once" to the preceding item, "I have identified opportunities to perform a Core EPA and asked my supervisor to observe me and give me feedback." Please provide further detail for this item below. Thinking only of clinical settings involving real patients (not simulation/standardized patients), how frequently have the following occurred in your medical education?

	Never	Once	2 to 5 times	More than 5 times	Count
I have asked my supervisor to observe me and give me feedback performing a Core EPA when I am confident that I can perform the task well.	2.9%	9.4%	37.6%	50.1%	449
I have asked my supervisor to observe me and give me feedback performing a Core EPA when I am NOT confident that I can perform the task well.	23.4%	12.7%	39.6%	24.3%	449

7. At some schools, students may engage in periodic review of their progress and development in the Core EPAs with a supervising faculty member/coach/advisor. Together, the student and supervisor can then generate an individualized learning plan for the student.

	Not applicable: I do not have a supervising faculty member/advisor/coach working with me in this capacity	Strongly disagree	Disagree	Agree	Strongly agree	Count
Working with a supervising faculty member/ coach/advisor has enhanced my understanding of the Core EPAs.	30.7%	10.0%	15.3%	36.1%	7.9%	518
Working with a supervising faculty member/ coach/advisor has enhanced my performance in the Core EPAs.	29.6%	9.7%	14.7%	35.2%	10.8%	517
Working with a supervising faculty member/ coach/advisor has improved my self-reflection skills in my progress to becoming a physician.	24.8%	8.3%	13.3%	40.8%	12.8%	517

8. Please indicate the extent to which you agree with each of the following statements about the use of Core EPAs at your school.

The use of the Core EPAs at my school has:	Strongly disagree	Disagree	Agree	Strongly agree	Count
Positively contributed to my confidence in my clinical abilities	15.9%	28.9%	45.0%	10.3%	516
Helped me understand what will be expected of me at the start of residency	11.6%	22.4%	47.9%	18.1%	518
Helped me partner with my teachers/clinical supervisors to improve my preparedness for residency	17.2%	34.5%	38.0%	10.3%	516
Positively contributed to the quality of my education	17.6%	27.7%	42.6%	12.2%	517

9. At this point in your medical education, how much supervision (including supervision by residents or by faculty) would you currently need to perform the following activities?

	I have never had the opportunity to do this	I have had the opportunity to do this activity but cannot do it, even with help	I can do this with my supervisor actively helping me	I can do this with my supervisor in the room ready to step in as needed	I can do this with my supervisor immediately available (but not in the room) to check my work/findings when I am finished	Count
Gather a history and perform a physical examination	0.0%	0.0%	0.5%	4.0%	95.5%	606
Prioritize a differential diagnosis following a clinical encounter	0.0%	0.0%	4.0%	23.4%	72.6%	606
Recommend and interpret common diagnostic and screening tests	0.0%	0.5%	4.8%	34.6%	60.1%	607
Enter and discuss orders and prescriptions	11.4%	2.3%	30.5%	35.3%	20.6%	607
Document a clinical encounter in the patient record	0.2%	0.2%	1.8%	9.0%	88.9%	602
Provide an oral presentation of a clinical encounter	0.0%	0.2%	1.0%	8.6%	90.2%	605
Form clinical questions and retrieve evidence to advance patient care	0.3%	0.0%	3.5%	20.7%	75.5%	603
Give or receive a patient handover to transition care responsibility	6.3%	1.2%	11.8%	41.1%	39.7%	604
Collaborate as a member of an interprofessional team	0.2%	0.2%	2.2%	11.4%	86.1%	603
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	6.3%	1.8%	18.7%	40.3%	32.9%	605
Obtain informed consent for tests and/or procedures	20.2%	0.8%	18.1%	33.0%	27.9%	603
Perform basic cardiopulmonary resuscitation	28.6%	0.8%	11.4%	28.4%	30.7%	605
Perform bag and mask ventilation	23.2%	0.3%	14.6%	31.5%	30.3%	603
Perform sterile technique	1.2%	0.2%	6.1%	21.2%	71.3%	603
Perform venipuncture	22.7%	3.3%	19.6%	28.4%	26.0%	603
Insert an intravenous line	29.0%	2.6%	22.8%	28.8%	16.7%	604
Place a urinary catheter	5.8%	1.0%	14.9%	39.4%	38.9%	604
Report patient safety concerns using system reporting structures	33.8%	1.5%	12.1%	18.4%	34.3%	604

10. In the workplace (clinical setting), how often during medical school have supervising residents or faculty members directly observed you performing the following activity and also provided you with immediate (within 24 hours) verbal or written feedback on your performance of the activity? Include only activities involving real patients. Do NOT include activities involving standardized or simulated patients.

	Never	Once	2 to 5 times	More than 5 times	Count
Gather a history and perform a physical examination	1.0%	1.3%	15.8%	81.8%	600
Prioritize a differential diagnosis following a clinical encounter	0.5%	1.8%	10.7%	87.0%	600
Recommend and interpret common diagnostic and screening tests	1.3%	2.5%	12.2%	84.0%	600
Enter and discuss orders and prescriptions	15.7%	8.4%	34.1%	41.8%	598
Document a clinical encounter in the patient record	1.3%	1.3%	9.5%	87.8%	600
Provide an oral presentation of a clinical encounter	0.2%	0.5%	5.4%	94.0%	598
Form clinical questions and retrieve evidence to advance patient care	2.5%	3.2%	21.3%	72.9%	595
Give or receive a patient handover to transition care responsibility	15.5%	9.4%	34.2%	40.9%	594
Collaborate as a member of an interprofessional team	3.4%	1.5%	11.6%	83.5%	594
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	20.0%	13.6%	39.0%	27.4%	595
Obtain informed consent for tests and/or procedures	38.5%	15.6%	26.4%	19.5%	595
Perform basic cardiopulmonary resuscitation	71.2%	12.5%	9.9%	6.4%	594
Perform bag and mask ventilation	55.3%	14.7%	20.2%	9.8%	600
Perform sterile technique	7.4%	1.8%	13.5%	77.3%	598
Perform venipuncture	43.2%	16.4%	24.0%	16.4%	597
Insert an intravenous line	50.3%	19.7%	20.8%	9.2%	595
Place a urinary catheter	12.2%	12.0%	46.0%	29.8%	598
Report patient safety concerns using system reporting structures	73.7%	11.4%	9.2%	5.7%	598

11. In your medical school education so far, indicate how often you have received feedback about your development of each of the following daily work habits.					
	Never	Once	2 to 5 times	More than 5 times	Count
Conscientiousness (e.g., attending to and following up on important details)	13.1%	5.9%	28.5%	52.5%	594
Discernment (e.g., knowing my own limitations and appropriately seeking help)	17.8%	9.1%	28.7%	44.4%	595
Truthfulness (e.g., being honest when I have made a mistake or have not completed an assigned task)	29.5%	6.6%	21.5%	42.4%	594

Appendix 4.
AAMC Core EPAs Pilot Schools' Early Postgraduate Year One Survey (Early PGY-1 Survey) All Participating Schools Report

1. Are you currently doing a postgraduate year one (PGY-1) of training, also referred to as "internship" in some programs?	
No [Respondent will skip to #13, a write-in with the option to briefly describe their current professional and/or educational activities, and the survey will end.]	2.9%
Yes [Respondent continues with #2 below.]	97.1%
Number of respondents: 273	

2. Are you currently doing a preliminary/transitional year of training?	
No, I am in a categorical position in my training program	81.8%
Yes, preliminary surgery PGY-1	2.7%
Yes, preliminary medicine PGY-1	9.8%
Yes, transitional year	4.9%
Yes, other preliminary training year	0.8%
Number of respondents: 264	

3. Please indicate your specialty for residency training. (Select all that apply.)					
Anesthesiology	4.9%	Orthopaedic surgery	3.8%	Diagnostic radiology	3.4%
Dermatology	1.5%	Otolaryngology	1.5%	Radiation oncology	0.4%
Emergency medicine	9.8%	Pathology	1.1%	Surgery	8.0%
Family medicine	5.7%	Pediatrics	14.8%	Vascular surgery	<0.1%
Internal medicine	23.9%	Physical medicine and rehabilitation	1.5%	Thoracic surgery	0.4%
Neurological surgery	0.8%	Plastic surgery	1.9%	Urology	0.8%
Neurology	2.3%	Preventive medicine	<0.1%	Other	5.3%
Obstetrics and gynecology	7.6%	Psychiatry	4.5%		
Number of respondents: 264					

4. Please indicate your preparedness to do each of the following activities when you initially assumed your clinical responsibilities at the start of PGY-I training. A SUPERVISOR can include a more senior resident, fellow, or attending physician.

	I was not prepared to do this activity	I was prepared to do this activity under direct supervision (with a supervisor in the room, ready to step in as needed)	I was prepared to do this activity under indirect supervision (with a supervisor not in the room but immediately available — e.g., in another room or by phone)	Count
Gather a history and perform a physical examination	0.4%	2.0%	97.6%	251
Prioritize a differential diagnosis following a clinical encounter	0.4%	13.0%	86.6%	254
Recommend and interpret common diagnostic and screening tests	2.0%	33.1%	65.0%	254
Enter and discuss orders and prescriptions	8.7%	47.2%	44.1%	254
Document a clinical encounter in the patient record	0.0%	9.4%	90.6%	254
Provide an oral presentation of a clinical encounter	0.4%	8.3%	91.3%	254
Form clinical questions and retrieve evidence to advance patient care	2.8%	13.8%	83.4%	253
Give or receive a patient handover to transition care responsibility	5.5%	28.5%	66.0%	253
Collaborate as a member of an interprofessional team	2.8%	13.1%	84.1%	252
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	2.0%	46.2%	51.8%	253
Obtain informed consent for tests and/or procedures	8.7%	31.2%	60.1%	253
Perform basic cardiopulmonary resuscitation	4.4%	43.7%	52.0%	252
Perform bag and mask ventilation	4.3%	39.8%	55.9%	254
Perform sterile technique	0.8%	21.3%	77.9%	253
Perform venipuncture	19.4%	35.6%	45.1%	253
Insert an intravenous line	25.7%	41.5%	32.8%	253
Place a urinary catheter	11.5%	39.1%	49.4%	253
Report patient safety concerns using system reporting structures	14.3%	29.4%	56.3%	252

5. For these same activities, describe the level of supervision you experienced when you first did the activity as part of your clinical PGY-1 responsibilities. Include only activities involving real patients; do not include activities involving simulated patients or standardized patients.

	I have not done this activity as a PGY-1	I first did this activity under direct supervision (a supervisor was in the room, ready to step in as needed)	I first did this activity under indirect supervision (a supervisor not in the room but immediately available — e.g., in another room or by phone)	Count
Gather a history and perform a physical examination	0.8%	11.6%	87.6%	242
Prioritize a differential diagnosis following a clinical encounter	0.4%	26.7%	72.8%	243
Recommend and interpret common diagnostic and screening tests	1.6%	46.5%	51.9%	243
Enter and discuss orders and prescriptions	0.0%	61.2%	38.8%	242
Document a clinical encounter in the patient record	0.8%	21.5%	77.7%	242
Provide an oral presentation of a clinical encounter	0.0%	26.4%	73.6%	242
Form clinical questions and retrieve evidence to advance patient care	2.1%	21.8%	76.1%	243
Give or receive a patient handover to transition care responsibility	0.4%	45.9%	53.7%	242
Collaborate as a member of an interprofessional team	0.4%	24.0%	75.6%	242
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	4.1%	53.1%	42.8%	243
Obtain informed consent for tests and/or procedures	5.8%	34.9%	59.3%	241
Perform basic cardiopulmonary resuscitation	53.9%	33.2%	12.9%	241
Perform bag and mask ventilation	60.3%	28.1%	11.6%	242
Perform sterile technique	17.4%	41.3%	41.3%	242
Perform venipuncture	55.4%	21.9%	22.7%	242
Insert an intravenous line	66.0%	19.9%	14.1%	241
Place a urinary catheter	67.8%	16.5%	15.7%	242
Report patient safety concerns using system reporting structures	62.0%	8.7%	29.3%	242

6. Were you aware that the medical school you attended was implementing Core EPAs in the curriculum?	
No	28.0%
Yes	72.0%
Number of respondents: 243	

7. Please indicate the extent to which you agree with each of the following statements about the use of Core EPAs at your school. (If "yes" to item 6.)

	No opinion/not applicable to my medical school experience	Strongly disagree	Disagree	Agree	Strongly agree	Count
Positively contributed to my confidence in my clinical abilities	24.3%	3.5%	10.4%	48.6%	13.3%	**173**
Helped me understand what would be expected of me at the start of residency	19.2%	4.1%	11.6%	45.3%	19.8%	**172**
Helped me to improve my preparedness for residency	19.7%	4.0%	14.5%	45.7%	16.2%	**173**
Positively contributed to the quality of my education	22.7%	5.2%	9.9%	47.1%	15.1%	**172**

8. Did you participate in any of the following activities as part of your RESIDENT ORIENTATION (not during medical school)? (Select all that apply.)

Specialty-based "boot camp" for PGY-1 residents in my specialty	55.1%	Session(s) on work/life balance (personal health, stress management, resources for support)	81.1%
Institutional "boot camp" for PGY-1 residents in multiple specialties at my current institution	41.6%	A formal baseline assessment of my communication skills	20.6%
Training about recognition and reporting of patient safety issues	81.5%	A formal baseline assessment of my procedural skills	18.5%
Training about error avoidance	67.9%	Procedural skills education/training	61.3%
Training about error notification procedures and processes	71.6%	Communication skills education/training	32.9%
Training about informed consent	39.5%	ACLS (Advanced Cardiac Life Support) course	56.8%
Training about patient handoffs for transitions of care	69.5%	PALS (Pediatrics Advanced Life Support) course	28.4%
Training in electronic medical records	94.7%	ATLS (Advanced Trauma Life Support) course	15.2%
Training about recognizing a patient requiring urgent/emergent care and initiating evaluation management	46.9%		
Number of respondents: 243			

9. Indicate whether you agree or disagree with the following statement about starting your residency program.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Count
I had the clinical skills required to begin my residency program.	0.8%	4.6%	6.3%	47.7%	40.6%	239

10. How was your transition from medical student to PGY-1 resident regarding the responsibilities you assumed professionally?

	Much harder than I expected	Somewhat harder than I expected	Just about as I expected (not easier or harder)	Somewhat easier than I expected	Much easier than I expected	Count
The transition was:	5.4%	15.8%	49.4%	22.8%	6.6%	241

Appendix 5.
Core EPAs Pilot School Team Leaders' Reflections

As the pilot approached its end, team leaders at the 10 pilot schools jointly discussed their day-to-day experiences, over the duration of the pilot, in implementing the Core EPAs at their respective schools. The pilot schools' team leaders agreed that implementing the Core EPAs in this pilot was a substantial undertaking that was ultimately useful for pilot schools and their students but remains a work in progress requiring a significant investment to undertake and develop. Pilot team leaders noted that from their perspectives, the AAMC Core EPAs for Entering Residency provide a promising framework for medical students' clinical skills education. Since some Core EPAs were difficult to assess and some were not integrated into medical students' core clinical experiences, the team leaders suggested that changes to the initial version 1.0 set of AAMC Core EPAs for Entering Residency may be in order; such changes could include the addition of new EPAs to the initial list. Pilot leaders also suggested there may be a need for changes to UME curricular requirements and how students interact with health systems so that medical school graduates are optimally prepared to perform key tasks of interns under indirect supervision from day 1 of residency. Some of the methods to optimize the success of EPA implementation in UME include those universal to any CBME effort. Examples include the institution's willingness to innovate, to create and incorporate novel assessment instruments, to modify curricular structure, and to reimagine the role of students in the clinical learning environment.

Beyond those general approaches are opportunities more specific to the Core EPAs themselves. To illustrate these opportunities, the pilot team leaders reflected upon the guiding principles (refer to Figure 4). These nine principles were developed early in the pilot and grounded the work across the diverse schools in the pilot. Team leaders considered each of these nine guiding principles in reflecting on the current and ideal state of Core EPAs implementation.

1. **Employ a systematic approach to map educational opportunities and assessments for each EPA.** The choice of the word *systematic* was intentional to describe an approach to curriculum development that is thoughtful and integrative across a curriculum. In the process of implementation, we discovered that several Core EPAs were already universally embedded in UME curricula (e.g., EPA 1), while others (e.g., EPA 8) were rarely present. At both sides of the spectrum, this provided challenges. For EPAs well represented, it could be difficult to make significant reform efforts without a complete curriculum revision. For EPAs less represented, it was somewhat easier to institute a novel curriculum and assessment, but in the absence of a mandate, building consensus among stakeholders to take on the new activity was challenging. Steps to address these challenges in Core EPAs implementation (which are widely applicable to CBME and not unique to the Core EPAs) would include, among other things, (a) adoption of the Core EPAs as an institutional graduation requirement, (b) reform of clinical training to provide opportunities to practice all EPAs, and (c) institutional readiness to reform curricula to meet the requirements of the Core EPAs.

2. **Explicitly measure the attribute of trustworthiness in addition to the specific knowledge, skills, and attitudes required for each EPA.** As a component of professionalism, trustworthiness is implicitly measured at each institution. However, the challenge lies in the transition from implicit to explicit. Some institutions in the pilot successfully created novel instruments to measure this construct, while others incorporated it into existing instruments. Overall, this remains a work in progress for our pilot schools. Ideally, as noted by the pilot team leaders, there is a need to ensure that the measurement of trustworthiness either is independent or can be pulled out from other assessments, and we must tie trustworthiness determinations into formal advancement and promotion decisions.

3. **Create a longitudinal view of each learner's performance via, at minimum, aggregated performance evidence, and consider the added value of longitudinal relationships and formal coaching structures in informing entrustment decisions.** Pilot team leaders considered this guiding principle in two parts: first, the assessment-based lens and, second, the relationship-based lens. Overall, institutions were able to successfully create longitudinal views of learner performance. This occurred in the form of technology-enhanced solutions, formulation of entrustment committees, or both. However, the efficiency and effectiveness of the longitudinal views in informing entrustment decisions were variable and left room for improvement. Institutions that initiated or adapted longitudinal programs (e.g., coaching) to support learner development found that aligning these innovations with existing advising and progression processes required nuance. To improve upon the current

state, pilot team leaders noted that continued improvements must be made to technology platforms to support entrustment decisions. Ultimately, the specific platforms used would be transferable across institutions and ideally across the continuum to facilitate learner progression. Also, longitudinal clinical experiences should be prioritized. For example, continuous preceptorship relationships such as those found in longitudinal integrated clerkships may provide a more advantageous method for supporting learner development.[34,40]

4. **Gather multimodal performance evidence from multiple assessors about each learner for each EPA.** Many institutions developed novel workplace-based assessments (WBAs) to facilitate assessment of learner performance for individual EPAs. In some cases, these assessments were the sole form of data for the EPA, while, in others, they served as an adjunct to existing assessments. The major challenges associated with this principle involved the ability to translate these various data points into a summary of EPA-specific performance and the training of students and faculty to implement the assessments. To improve upon this guiding principle, the major next step forward involves a technology and assessment solution to allow for reconciliation of diverse data points to an interpretable format for entrustment. This requires investment in personnel with expertise in database management, predictive modeling, and data visualization.

5. **Include global professional judgments about the entrustment of each learner in the body of evidence that supports summative entrustment decisions.** To a large extent, this guiding principle was addressed through WBAs incorporated across institutions. The challenge associated with this principle involves enhancing the validity and reliability of those assessments, as well as faculty development to support their value for learners. To optimize this guiding principle, it is imperative to continue validity studies and potentially redevelop supervisory scales to best fit the Core EPAs framework. Additionally, more robust faculty training is likely required.

6. **Ensure a process for formative feedback along the trajectory to entrustment to provide opportunities for both remediation and potential acceleration of responsibilities.** The formative feedback process was incorporated either in conjunction with existing feedback mechanisms (i.e., feedback with a clinical supervisor) or through new approaches (i.e., coaching programs or WBAs). However, the linkage between feedback and progression toward entrustment was limited across institutions. In the pilot, schools agreed to convene mock entrustment committees (trained entrustment groups) to render summative entrustment decisions at a point near graduation. These summative decisions for graduating students were theoretical in nature only and did not impact decisions about students' graduation. To truly address the sentiment of this guiding principle, we would need the entrustment committees to play a more central role in progression/promotion processes, which would require substantial investment of time and resources.

7. **Create a process to render and maintain formal entrustment decisions by a trained group (entrustment committee) that reviews performance evidence for each learner.** As previously described, entrustment committees were trialed across most pilot institutions. To that end, this guiding principle was largely met. However, improvements in the process, as outlined in publications by the pilot team,[6,20,22] are still required. Most importantly, faculty will need formal training in coaching, assessment, and entrustment. Developing and sustaining a core team of clinical educators who have a shared mental model of clinical competence at various stages of UME, supporting teams of assessors who can continuously calibrate individual faculty to the institution's staged expectations, and ensuring that trained entrustment groups examine evidence of EPA readiness before, during, and after required clerkships are all foundational to fair and robust application of EPAs in UME.

8. **Ensure that each learner is an active participant in the entrustment process — aware of expectations, engaged in gathering and reviewing of performance evidence, and generating individualized learning plans to attain entrustment.** Learners were largely incorporated into the entrustment process through learner-driven requests for direct observations of performance that were tied to ad hoc entrustment decisions made on WBAs. In some programs, students were engaged in the development of individualized learning plans through discussions with coaches or otherwise to drive learning. Students were not, however, involved in the formal entrustment decision-making. To a large extent, this guiding principle was met, though students reported variable buy-in to the value in entrustment in the larger context of their MD program training.[28] Continued engagement with students and consideration of how to further promote their ongoing involvement are warranted.

9. **Align formal entrustment decisions regarding individual learners with nationally established performance expectations, as currently described in the *Core EPAs for Entering Residency Curriculum Developers' Guide*.** This curriculum developers' guide and the Core EPAs toolkits that followed were used either explicitly or implicitly in entrustment decisions. More explicit use of these schematics to guide entrustment decisions may be valuable in the future.

As medical educators contemplate the future of their training systems, we as the team leaders at the 10 schools participating in the Core EPAs pilot hope that our experiences in working together to implement CBME in real and generalizable settings offer some lessons relating to the opportunities — and risks — of these models. Our schools have each found that their implementations served to catalyze great creativity, contemplation, and collaboration within and between institutions that will have benefits long beyond the time frame of the pilot. The goal to improve patient care through high-quality, reliable educational planning for the interface between medical school and residency remains highly worthwhile, and we, the team leaders of the 10 schools that participated in the Core EPAs pilot project, are confident that it is ultimately feasible.

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