The Minnesota Method: A Learner-Driven, Entrustable Professional Activity-Based Comprehensive Program of Assessment for Medical Students
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Abstract

Problem
Assessment has long been a challenge in medical education. Traditional assessment of medical student performance is infrequent, global, and often developmentally and clinically out of context. Students struggle to understand the progress they have made over time and the path ahead of them toward mastery. True CBME requires a program of assessment in which students know where they are going, where they are in the development of the competencies, and what the next steps are to attaining them. Achieving this goal in a feasible manner has been elusive with traditional assessment methods alone. The Education in Pediatrics Across the Continuum (EPAC) program at the University of Minnesota developed a robust program of assessment that has utility and recognizes when students are ready for the undergraduate to graduate medical education transition.

Approach
The authors developed a learner-driven program of assessment in the foundational clinical training of medical students in the EPAC program based on the Core Entrustable Professional Activities for Entering Residency (Core EPAs). Frequent workplace-based assessments, coupled with summative assessments, informed a quarterly clinical competency committee and individualized learning plans. The data were displayed on real time dashboards for the students to review.

Outcomes
Over 4 cohorts from 2015 to 2019, students (n = 13) averaged approximately 200 discrete Core EPA workplace-based assessments during their foundational clinical training year. Assessments were completed by an average of 9 different preceptors each month across 8 different specialties. The data were displayed in a way students and faculty could monitor development and inform a clinical competency committee’s ability to determine readiness to transition to advanced clinical rotations and residency.

Next Steps
The next steps include continuing to scale the program of assessment to a larger cohort of students.

Problem
The 21st century brought about a paradigm shift in medical education from a structure and process-based to a competency-based approach (competency-based medical education, or CBME).1 This shift requires 3 steps: (1) The delineation of the requisite competencies of a 21st-century physician,2,3 (2) the development of performance levels for the competencies,4 and (3) the development of curricula and assessment frameworks to ensure learners have the opportunities to reach the consensus milestones in the competencies and the assessments to document their achievements. The third step has been the Achilles heel of CBME.
Focusing on the Learner in EPA-Based Assessment

Approach

Curriculum

The foundational clinical training in the University of Minnesota EPAC program is completed in a pediatric-focused longitudinal integrated clerkship (LIC). Previous work has highlighted the potential benefits of the LIC structure in promoting high-quality, longitudinal assessments of EPAs. The LIC includes clinical clerkships in pediatric surgery and surgical subspecialties, obstetrics–gynecology, internal medicine, family medicine, pediatrics, pediatric neurology, child and adolescent psychiatry, and pediatric emergency medicine. Each student is assigned an LIC preceptor in each discipline. Students have longitudinal relationships with 8–10 faculty over a 9- to 12-month period. The students also complete 2-week inpatient bursts in internal medicine, pediatric surgery, and general pediatrics.

Faculty and learner development

The backbone of our program of assessment is a learner-driven, real-time, frequent, online workplace-based assessment of student performance on the Core EPAs. This assessment is coupled with quarterly, summative preceptor and student self-assessments on all 13 Core EPAs. We provide LIC preceptors and students with development on the Core EPA framework, with an emphasis on student development. We provide the LIC preceptors with a face-to-face, 30-minute introduction and reference tools including the Core EPAs Faculty and Learner Guide and links to the Core EPA tool kits.

The students engage in 2 face-to-face, 1-hour sessions in the LIC orientation and a follow-up session 2–3 months into their clinical experiences. Students review the Core EPAs Faculty and Learner Guide before the sessions. The first session is focused on the basic concepts of CBME and effective feedback. The second session covers the Core EPAs, the workplace-based assessment tool, and a strategic deployment of the EPA assessment. In the third session, students revisit the Core EPAs once they have had some clinical experience and practice with the assessment tool. The robust education our students receive in the assessment framework allows them to be partners in faculty development.

Workplace-based assessment tool

We developed an online survey tool for students to request and receive feedback on one or more Core EPAs for each clinical session. The tool was designed to capture observations already being made by preceptors in a way that required a brief conversation between the student and the preceptor and centered around a shared model of expected competencies. The students identify the EPA being assessed at the beginning of each clinical session and then complete the assessment tool. Students and preceptors spend less than 3 minutes in a face-to-face feedback session specific to the EPA(s) observed that day. They address strengths and next steps for improvement, and the preceptor selects the supervision level. To simplify the feedback episode, we encourage students to transcribe the verbal feedback they receive from their preceptor. This approach lends efficiency, promotes shared understanding of the verbal feedback given, and ensures that the feedback is documented in their portfolio. Students follow a similar procedure while on inpatient bursts with faculty and supervising residents and/or fellows.

The data can be seen at any time by both the student and the course director on real-time EPA assessments we obtained in our program.
a dashboard to facilitate easy review. A learning curve for each EPA is updated monthly (see Figure 2). The EPAC course director meets with the students for 20 minutes every 2–4 weeks to review attainment of assessments, confirming sufficient quantity and variety of EPAs selected for assessment. The course director and student set goals for the next interval and identify any need for additional faculty development. Quarterly, students and LIC preceptors fill out a summative EPA assessment on all 13 Core EPAs. In response to this summative feedback, the students create individualized learning plans.

**Clinical competency committees and entrustment decision making**

Quarterly, we convene a clinical competency committee (CCC) to review each student’s progress. The CCC membership includes the EPAC leadership team and the student’s LIC preceptors. The EPAC leadership team includes the pediatrics residency program director, pediatric clerkship director, and the EPAC course director. The committee reviews the formative EPA assessments as well as the summative quarterly EPA LIC preceptor and student self-assessments. The CCC assigns a supervision level for each of the 13 Core EPAs and notes the areas of strength and next steps for the student for each of the Core EPAs. Following each CCC meeting, the EPAC course director meets individually with each student for 30 minutes to debrief and co-create an individualized learning plan for the student.

Our undergraduate curriculum has 2 components, the LIC and advanced clinical rotations. To transition out of the LIC to the advanced clinical rotations, students must meet a specific entrustment level (indirect supervision with the supervisor immediately available and checking all findings) on 11 of the 13 EPAs. If a student does not meet these criteria by the end of the LIC, they complete enrichment electives until they have documented entrustment at the required level. During the advanced clinical rotations, students must demonstrate the required entrustment level on the remaining 2 EPAs (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”). After completion of the advanced clinical rotations, the final decision that the student is ready to...

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**Figure 2** Learning curves for EPAs 1 and 2 for 14 EPAC students enrolled in the EPAC program between academic years 2015–2016 and 2018–2019. The horizontal line, anchored at entrustment level 5 (i.e., 3a), indicates the threshold for graduation set for each EPA. Note that in this figure the entrustment scales in Figure 1 have been converted to numerical scores as follows: 1a = 1, 1b = 2, 2a = 3, 2b = 4, 3a = 5, 3b = 6, 3c = 7, 4 = 8, 5 = 9. Abbreviations: EPAs, entrustable professional activities; EPAC, Education in Pediatrics Across the Continuum.
transition from UME to GME includes the following elements: The CCC has determined the student is entrusted at a level of indirect supervision with the supervisor checking all findings on all 13 Core EPAs and the student has successfully completed all the requirements of the medical school for graduation.

Outcomes

Using this program of assessment, the average number of discrete episodes of Core EPA–based written and verbal feedback completed for each student rose gradually across each of the first 4 EPAC cohorts from 180 in academic year (AY) 2015–2016 to 228 in AY 2018–2019 (range 139–259) (see Table 1). There was an average of 15–22 assessments for each student each month across all students in the 4 cohorts (range 1–46, with interquartile ranges values of 7.25, 11.75, 7, and 13) completed by an average of 6–9 different preceptors (range 1–15) (see Table 1). The EPA assessments were done by faculty from 8 different specialties, with good spread across the specialties, as seen in Table 1. We plotted a learning curve for each Core EPA for every student using the average monthly supervision level. Examples of these are shown for all of the students in our first 4 cohorts for Core EPAs 1 and 2 (see Figure 2).

In the first cohort, there were notable discrepancies in the number of observations for different EPAs (see Figure 3). After cohort 1, we adopted a more proactive approach, which included more explicitly identifying opportunities for assessment of specific EPAs and having core faculty and the preceding cohort(s) of students serve as resources for student and faculty development. In cohorts 2 through 4, we saw an increase in the overall number of observations (see Table 1) and an improved spread of the observations over the 13 Core EPAs (see Figure 3).

Our program of assessment has yielded high numbers of real-time, workplace-based Core EPA assessments, now on average exceeding 20 per month for each student. This number of assessments represents a 10-fold increase when compared with our medical school’s traditional approach to assessment, which has 1–2 direct observation experiences with feedback per month. In addition, the data were represented in a way in which learners and faculty could continuously monitor development. This approach also facilitated the CCC’s determination of supervision levels and, ultimately, transition decisions to advanced clinical experiences and residency.

Over the first 4 cohorts, 13 students achieved the level of “trusted to perform the activity with indirect supervision with the supervisor immediately available and checking all findings” on all 13 Core EPAs on average 12.2 months (median 12 months, range 10–20 months) after starting the LIC. Four students did not meet the supervision level expected to transition into advanced clinical experiences by 12 months. As the maximum usual duration of the LIC is 12 months, these 4 students participated in enrichment electives to continue their development in Core EPAs where they had not yet met the supervision level expected to transition into advanced clinical experiences or residency. For example, for a student needing additional work in “developing a prioritized differential diagnosis” and “recommending and interpreting diagnostic tests” (Core EPAs 2 and 3), additional time was spent in the emergency department focusing on these

Table 1
Descriptive Information for EPAC Program of Assessment

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<tbody>
<tr>
<td>Number of assessments completed on each student per montha</td>
<td>15.6</td>
<td>6</td>
<td>35</td>
<td>18.7</td>
<td>2</td>
<td>38</td>
<td>19.4</td>
<td>6</td>
<td>29</td>
<td>22.1</td>
<td>5</td>
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<td>Number of assessments completed on each student per year</td>
<td>179.8</td>
<td>139–259</td>
<td>204.8</td>
<td>184–236</td>
<td>226.3</td>
<td>195–249</td>
<td>228.0</td>
<td>208–251</td>
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<td>Number of faculty members completing at least one assessment on each student per montha</td>
<td>6.1</td>
<td>1</td>
<td>9</td>
<td>7.2</td>
<td>1</td>
<td>10</td>
<td>8.1</td>
<td>3</td>
<td>12</td>
<td>8.9</td>
<td>4</td>
<td>15</td>
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Abbreviations: EPAC, Education in Pediatrics Across the Continuum; AY, academic year; LIC, longitudinal integrated clerkship.

a The mean number of assessments completed on each student per month and the mean number of faculty members completing at least one assessment on each student per month are weighted averages computed using the actual number of months spent by each student in the LIC.

b Pediatrics clinic occurs weekly, while all other disciplines occur every other week.
2 areas. All students completed advanced clinical experiences and took USMLE Step 2 CK and Step 2 CS.

The EPAC students transitioned to pediatric residency on average 16.7 months (median 17 months, range 14–22 months) after starting the LIC. This duration compares with 24 months for traditional students at our medical school. Of note, no students required longer than the usual expected duration of 24 months.

**Next Steps**

We developed a program of assessment that is feasible, learner driven, transparent, and able to capture the achievement of competence. We believe 5 key factors have contributed to the success of our program of assessment: (1) Clear, defined outcomes that make sense to the learners and faculty (the Core EPAs), (2) An online, simple, workplace-based assessment tool that quickly captures high-frequency, low-stakes assessments and that can present the data in meaningful graphics, (3) Learner-focused development on the assessment tool and framework with only modest faculty development requirements, (4) Learner-driven assessment program with accountability (requiring at least one assessment per clinical session), and (5) CCCs with easy access to actionable data that can be used to monitor progress and make entrustment decisions.

Our program is a feasibility pilot and does have limitations. The cohort of students (n = 3–4 per year) is small, and all of the University of Minnesota EPAC students complete their core clinical immersion experiences in an LIC, which may represent an ideal structure for EPA assessment. Additionally, the LIC is pass/fail and all of the students in the EPAC program have a guaranteed residency, lending the program to a growth, rather than achievement-oriented, mindset. Therefore, the major next step is to scale the program of assessment. We have begun to do so with other LIC programs at the University of Minnesota and have been able to overcome the barriers of grades. We are poised to attempt to scale the program next in our traditional block rotation clerkships.

Based on our EPAC experience, it is certain that breaking down the barriers to a competency-based and learner-driven program of assessment is possible and well worth the effort. With this learner-driven, EPA-based program of assessment, we are understanding

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**Figure 3** Cumulative number of assessments completed for each EPA, for each EPAC cohort, for academic years 2015–2016 to 2018–2019. Abbreviations: EPA, entrustable professional activity; EPAC, Education in Pediatrics Across the Continuum; AY, academic year.
medical student performance like never before. This improved understanding helps us take an important step down the path of broader implementation of an EPA-based assessment framework for medical students and beyond.

Acknowledgments: The authors wish to acknowledge the students and preceptors who participated in the Education in Pediatrics Across the Continuum at the University of Minnesota Medical School, Deborah Powell, MD, John Andrews, MD, and the staff of the office of undergraduate medical education at the University of Minnesota Medical School.

Funding/Support: The authors would like to acknowledge the Association of American Medical Colleges (AAMC) for its support for EPAC throughout the past decade of planning, design, and implementation and the Josiah Macy Jr Foundation for its grant support from 2013–2016.

Other disclosures: None reported.

Ethical approval: The University of Minnesota institutional review board reviewed the program and determined it did not fit the definition of human subjects research.

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