


ested laboratories, in both academia and industry, will be needed if such efforts are to spread beyond a single teaching service.

The number of physicians conducting research has declined since 2003.⁵ There is little doubt that medical training and practice are busier and more constrained than ever. Some observers

 An audio interview with Dr. Armstrong is available at NEJM.org

might even argue that erosion of the scientific mission on the wards is inevitable as the efficiency of patient care increasingly takes precedence. But accepting this shift as inevitable risks the loss of one of

the primary social goods produced by a university teaching hospital: the linkage of scientific inquiry with actual medical problems that drive the questions to be investigated. Our early experience with the Pathways Service suggests that sowing these seeds during residency training may be feasible, rewarding, and a critical part of the effort to foster careers steeped in patient-driven scientific inquiry.

Disclosure forms provided by the authors are available at NEJM.org.

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BECOMING A PHYSICIAN

Toward Competency-Based Medical Education

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Competency-based medical education (CBME) reconceives medical training by recognizing that not all students or trainees master all necessary skills at the same pace. Rather than insisting that a medical school or residency class proceed through medical education en masse, CBME focuses on all trainees demonstrating the competencies required for caring for a population by means of time-variable transitions from training to practice.¹

The ideas behind CBME aren't new. A 1978 monograph written for the World Health Organization explained how a medical education system based on achievement of competence might help focus medical education on a country's specific health care needs. It stated that "the intended output of a competency-based programme is a health professional who can practice medicine at a defined level of proficiency,

in accord with local conditions, to meet local needs."²

An attempt to implement CBME in the 1980s failed, probably because of difficulty in determining how to assess competence. In 1999, the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties (ABMS) responded to public concerns about health care quality by resurrecting CBME. They mandated a shift to outcomes-based graduate medical education (GME), which broadened the requirements for graduating residents beyond appropriate patient care skills and medical knowledge to include competencies in practice-based learning and improvement, communication, professionalism, and systems-based practice.

For the next decade, GME programs again struggled with assessing competence, which, according to the International Com-

petency-Based Medical Education Collaborators, requires frontline faculty willing to serve as assessors, evidence-based assessment tools, and direct observation in the workplace over time. Evidence-based tools addressing the broad, diverse domains of competence are limited at best, and extended periods of direct observation are precluded by brief rotations for trainees and service assignments for faculty. Also key to assessment in CBME is a partnership between the learner and the assessor based on the sharing of formative feedback, which allows learners to gauge their progress toward competence.

The first major breakthrough in assessment came with the ACGME and ABMS Milestone Project, which called on each specialty and subspecialty to describe levels of performance for each of its competencies (see table). This project took assessment out

Definitions of Educational Constructs.*	
Term	Definition
Competency	An observable ability of a health professional related to a specific activity that integrates knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development.
Milestone	A defined, observable marker of a trainee's ability along a developmental continuum.
Entrustable professional activity	An essential task of a discipline (profession, specialty, or subspecialty) that a learner can be trusted to perform without direct supervision and a clinician entering practice can perform unsupervised in a given health care context, once sufficient competence has been demonstrated.

* From Englander et al.¹

of the realm of scales ranging from poor to excellent and introduced brief narratives that created shared mental images of performance at each level along a developmental continuum. Assessment requires context, however, and the competencies (e.g., “gather essential and accurate information about a patient”) were context-independent. The introduction of the concept of entrustable professional activities — tasks that physicians entering practice should be able to perform unsupervised — provided the necessary context.³ These activities can be linked to the competencies necessary for making entrustment decisions. They also provided a new assessment strategy focused on the level of supervision needed to safely and effectively perform a given activity.

Soon after members of the GME community began identifying the entrustable professional activities for their specialties, the Association of American Medical Colleges (AAMC) started defining its own entrustable activities for graduating medical students, setting the stage for a more seamless transition from undergraduate medical education (UME) to GME. The possibility of creating

a true continuum from medical school to independent practice forced medical educators to face CBME's greatest challenge: how to implement a system of fixed outcomes and time-variable training, especially within the GME domain, in which education is tied to service.

In 2009, the University of Toronto adopted a competency-based modular track within its orthopedic-surgery residency program in parallel with its conventional training program. In 3 years, this track enrolled 14 residents. Trainees reported being highly satisfied with the program, and two of the initial cohort of three trainees completed training in 4 years, rather than the 5 years that had previously been required. Two of 14 residents took longer than 5 years to complete training, and the modular approach allowed faculty to structure an educational plan to address their skill gaps.⁴ In light of this success, some administrators involved in the program have launched a time-variable CBME approach in all GME programs at Queen's University in Canada.

In the United States, the AAMC and the American Board of Pediatrics have partnered with

four medical schools to test a CBME model across the continuum from UME to clinical practice, known as the Education in Pediatrics Across the Continuum (EPAC) project.⁵ Three or four students interested in careers in pediatrics apply for and are matched to a residency position within their institution, usually before their first clinical year. Now in its eighth year, the project has used entrustable professional activities from the AAMC for entering residency and from the American Board of Pediatrics for general pediatrics as the framework for assessment. Leaders at all sites agreed on standardized qualitative and quantitative assessments for all schools and on criteria for assigning levels of supervision to provide consistency in decisions regarding readiness to transition to GME. Of the 12 students in the first cohort, 8 were ready to advance to GME during the first semester of their 4th year of medical school. The remaining 4 students were ready by the middle of the second semester of that year. Three additional cohorts are at various stages of UME. The next step will be to follow these students in their GME programs and compare their progress to that of their non-EPAC peers from their own and other undergraduate institutions.

Medical education is strictly regulated in the United States, and many obstacles must be overcome if programs like EPAC are to succeed. For example, both the Liaison Committee on Medical Education and individual medical schools will need to allow learners to advance in a time-independent fashion. State licensing boards will need to adapt to the idea that medical school may be completed in less than 4 years. ACGME requirements for duration

of training will need to be flexible, and specialty boards will need to allow trainees to take certification exams when they are deemed competent, rather than at a fixed time.

Challenges exist for entities such as the National Resident Matching Program, which relies on a fixed schedule to match students to residency positions. Residency programs will have to adapt their curricula to trainees who enter and complete training when they are ready to do so. Training experiences will have to focus on predefined outcomes for learners, not the requirements of staffing a clinical service. Faculty and learners will have to be educated in various ways of giving and receiving focused, constructive feedback and working as educational partners. New models for funding innovative residency training will also be required. In the meantime, program leaders could consider establishing more flexible residency-to-fellowship tracks within their institutions or developing creative partnerships with community practices for transitioning trainees into independent practice.

The EPAC model has demonstrated that appropriate socialization allows students to make

early decisions about career choice. This possibility opens the door for “mini-rotations” early in medical school to expose students to various specialties, followed by longitudinal tracks leading directly to residency and replacing conventional clerkships. A key element of EPAC is the partnership in curricular design between clerkship and residency program directors, which prepares students for the transition to residency.

We believe that UME’s long-standing goal of producing undifferentiated physicians ready to pursue specialty training requires reexamination. The alarming costs of UME and associated student debt, the increasing volume and complexity of the knowledge and skills expected from trainees, and concerns among GME program directors that students are unprepared for residency suggest that change is needed. CBME holds the promise of producing a better-trained workforce — and for many physicians, this training could be accomplished within a shorter time frame.

A key challenge for CBME has been assessing competence. With a framework of competencies, milestones, and entrustable professional activities developed for

both UME and GME and the emerging availability of valid assessment methods, we are on the verge of creating a true continuum of education, training, and practice. CBME now appears to be not only possible, but is also an innovative model that could create a learner-centric education system that, in turn, helps bring about a patient-centric care system.

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Removing ERISA’s Impediment to State Health Reform

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States are assuming an increasingly important role in driving U.S. health care policy. Hyperpartisanship has made it difficult for Congress to enact reform — and what action is possible is likely to reduce federal involvement in health care. Despite the growing importance of states in

this arena, however, many state-led health care reforms have been thwarted by the Employee Retirement Income Security Act (ERISA), a 1974 federal law that established minimum standards for private employer-sponsored benefit plans known as ERISA plans.

Chief among the health care

issues that states have sought to address are prescription-drug costs and surprise medical bills — excess charges resulting from the involuntary use of out-of-network services. Both problems warrant urgent attention. Between 2014 and 2016, gross spending on retail prescription drugs rose by