

Envisioning Graduate Medical Education in 2030

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June 17, 2030. “Happy Father’s Day,” I say, greeting my dad as we meet for breakfast. He smiles and our conversation drifts to our shared passion for medical education, even though he last taught as a clinician educator in January 2020. He turns to me, pensive. “What is the most significant transformation in graduate medical education you have seen since 2020?”

Graduate medical education (GME) leaders continuously engage in discussions that envision the future outlook for GME and its sponsoring organizations.^{1,2} For example, the GME community is now expected to explicitly link education and training to anticipated societal health care needs,³ as articulated in the 2019 Accreditation Council for Graduate Medical Education Common Program Requirements.⁴ In celebration of the *Journal of Graduate Medical Education*’s 10th anniversary, this issue’s future-oriented editorial explores what GME will look like when our journal celebrates its 20th anniversary. This editorial was finalized just as the COVID-19 pandemic took hold around the world, prompting GME leaders to take actions for the safety and continued education of learners. Although this pandemic highlighted gaps in our health care and medical education systems, it also provided a glimpse of a future that requires more rapid innovation and adaptations when challenged in uncertain times.

As the only journal exclusively focused on providing educational scholarship targeting the GME community, we sought to imagine the future of GME by interviewing thought leaders in medical education. Interviews explored: (1) the most significant transformation in GME over the next decade; (2) how it would impact their role(s) in GME; and (3) what they hope is true in 2030 that is not true today. Their visions lay out—in practical terms—how GME will likely evolve over the next 10 years and also illuminate how these changes might affect trainees, educators, and scholars. Although perspectives varied, we found crosscutting

themes that have important implications for medical education scholarship, GME educators’ daily work, and program and sponsoring institution future-oriented aims and actions.

Our methods for this project included individual interviews by the authors with 40 thought leaders in GME. Interviewees’ responses addressed questions relevant to our community, including the following:

- Will GME be fully immersed in competency-based medical education in 2030?
- Will it adapt to a time-variable model with residents matriculating and graduating asynchronously throughout the year as they demonstrate competence?
- Will it respond to the economic forces shaping medicine and to shifts in the GME payer system by shifting how, where, and when GME occurs and whom it trains?

The leaders’ answers were obtained through an independent analysis of interviewer notes by 2 authors (D.S. and L.M.Y.) to identify themes related to each question. A full description of our methods is provided as online supplemental material. As interviewees described their visions of the future of GME, it was clear that the impact of external forces on medicine and medical education dramatically shaped their views. Four main drivers of change emerged: (1) economic forces; (2) big data, artificial intelligence, and technology; (3) competency-based, time-variable medical education (CBME); and (4) teaching, learning, and assessment. The TABLE describes our findings for each of these. With these findings in mind, we describe our conclusions, incorporating the voices of our interviewees.

In 2030 GME Educators Are Physician Workforce Development Leaders

Our respondents noted that as medicine has evolved, some core values have remained constant: “The values of [our] profession are clear . . . it’s a sacred trust we have as physicians with our patients.” As an

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Editor’s Note: The online version of this article contains a full description of the methods for this project.

TABLE

Thought Leaders on Graduate Medical Education (GME) in 2020, External Forces Affecting GME, and GME in 2030
Note: Respondent quotes are italicized.

Focus	GME in 2020	External Forces Impacting GME	GME in 2030
Economics	- Recognition that health care business model is not sustainable; <i>crisis looming</i> - Hospital-based GME reimbursements	- Outcomes-based payments - Cutting/discontinuation of GME public funding - Specialization aligned with needs of health care organization to address health needs of population - Sites of care shift from hospitals to community and virtual	- GME funded privately by corporations/health care systems for workforce pipeline - Reduction in individual's ability to choose specialty - Team-based, interprofessional care to optimize scope of work
<i>GME is in the crosshairs from a collision course between biologics (eg, advances in biomed, clinical, and systems sciences) and cost containment.</i>			
Technology and big data	- Recognition that AI, big data with machine learning, and predictive analytics will change assessment <i>Wearables</i> emerging as data source for clinical performance	- Patient and learner data is digital and accessible for machine analysis, leading to individualized learning plans - Patients active and responsible for own health and care - Assessment, diagnosis, and management increasingly provided by machines, resulting in improved outcomes	- Anything digitized equals machine, and it becomes integral member of health care and education team - New specialties emerge; old evolve/disappear - Physicians trained to interpret data dashboards and treatment algorithms
<i>In 2030 we will be adept at using AI—seamlessly embedded throughout health care (quality, burnout)—no longer disintegrating the patient-physician trust relationship.</i>			
<i>In 2020 we had to wait until something happens (to the patient). In 2030 we know ahead of time how they will respond to specific meds; we can detect it before someone goes through it.</i>			
<i>The existential threat to GME is devolving from professional education to vocation training . . . Must retain an attitude toward learning and creating knowledge—asking what's the evidence beyond the algorithm.</i>			
<i>Key question: What are physician grads going to do? Will medical care, medical knowledge be subsumed by AI?</i>			
Competency-based, time-variable medical education (CBME)	- Competency-based education pilots - Tension between learner and teacher as gatekeeper - Milestone-based assessments	- Learner assessment uses direct measures (EHR data, digital analysis of virtual visits) for communication and professionalism assessment - Performance-based big data yields personalized CBME dashboard	- True CBME and continuum of medical education realized - Assessment uncoupled from teacher role - Match to residencies and independent practice rolling throughout the year
<i>Digital technologies will allow us to produce a comprehensive, personalized learner profile for each trainee.</i>			
Teaching and learning	- Interactive, including game-based learning and simulation - Core lectures by local faculty	- Performance outcomes defined for each needed task - Education corporatized leads to national modular, CBME curriculum - Training linked to competency gaps across continuum and professions	- Learner accountable for progress; faculty serves as coach and role model for professionalism - Core faculty prepared and compensated for role (coach, PD, DIO) - Training is interprofessional
<i>In 2020, I see little change in curricular design and delivery of GME from my training days > 30 years ago . . . We have more than enough good educational science to know what we need to do to improve GME; we are simply not doing it fast enough.</i>			
<i>In 2030 GME has evolved to focus on developing cognitive capacity and data management skills . . . There may be less emphasis on the communications and personal relationships that have been so essential to the success of our profession for the past decades.</i>			

Abbreviations: AI, artificial intelligence; EHR, electronic health record; CBME, competency-based, time-variable medical education; PD, program director; DIO, designated institutional official.

outcomes-based framework that seeks to meet societal needs, our community predicted that the CBME movement will refocus attention on these values and augment the role GME has always played in preparing the physician workforce to provide care for patients. Framing GME through the lens of a workforce partnership will sustain and further grow funding and program leaders for 2030. Respondents noted that this partnership presents both an opportunity and a responsibility for GME educators to assume key roles in future workforce development. “Failure to lead,” one respondent noted, will result in “needed changes being forced upon GME by external forces and agencies.”

The Right Number and Type of Physicians Trained

By 2030, outcomes-based payments and the anticipated reduction or elimination of GME federal funding makes it likely that GME will be more closely aligned with and funded by health care systems and private corporations to meet physician workforce needs. As GME leaders, we must be responsive to these economic drivers in order to proactively shape the roles and expectations of physicians in 2030. Working closely with their sponsoring institution’s executive leaders, GME leaders will identify physician workforce needs for 2030 to ensure that the right mix of specialists and the right number of training slots within each specialty exist. With the recognition that specialty types and numbers will change, interviewees believe that new training programs for specialists must be created. These will involve roles that are not currently central but are emerging in GME, such as a medical virtualist, cancer immunologist, clinical informaticist, lifestyle medicine physician, and complexist.^{5,6}

Where and How Graduates Will Practice

In 2030 patient and population health care will occur primarily in teams. These teams will see patients in virtual or physical settings beyond the academic medical center. Interviewees report that these teams will include engineers (for robots and co-bots), data analysts, and informaticists, as technology and use of big data suggest a patient’s likely diagnosis. These advances will continue to enhance clinicians’ ability to target management options to each patient and context by considering their unique genetic footprint.

GME Part of the Continuum of Time-Variable CBME

GME leaders emphasize that the boundaries between medical student, resident, and practicing physician

are already blurring and will become more porous by 2030. True competency-based assessment, with longitudinal performance dashboards⁷ populated from public⁸ and clinical learning environment data warehouses, will drive learning and assessment.^{9–11} Software will automate assessment analytics. By 2030, our current health care education management platforms will be relics. Attribution algorithms will link individual residents to patients and outcome data.^{12,13} In interviewee judgments, the 2030 assessment systems guiding competency decisions will incorporate an artificial intelligence and natural language-processing infrastructure to gather audio, video (eg, patient interactions, virtual team meetings), text, and image files (embedded in the electronic health record). This system will abstract and analyze the data using predetermined predictive metrics to yield trainee performance data. Using predictive analytics, an interactive, personalized performance profile will then display performance tasks along with performance progression dashboards and associated resources available to the trainee (and faculty) for learning.

A true time-variable, competency-based approach¹⁴—where time in training flexes with the learner’s achievement of desired competency¹⁵—will require seamless competency-based assessment portfolios that span the continuum of medical education. Residency programs will become the “academic home” for alumni to continue learning, independent of practice location. Interviewees said that competency certifications and badges that cross medical specialty and health professions boundaries will continue to expand and link to who can provide care for a specific patient, in a specific context.

Impact of 2030 Transformations on GME Leaders, Teachers, and Trainees

When asked how GME transformations would personally affect GME stakeholders, excitement was a dominant theme, although respondents anticipate that there is a lot of work to be done. The transformation to competency-based, time-variable assessments and use of direct data and learning dashboards open a “Pandora’s box of potential innovations, opportunities to advance teaching and learning, and evolving roles for educators” that are consistent with prior findings.¹⁶ In 2030 faculty roles will shift from a content expert focused on teaching *what to think* to a learning choreographer with a focus on *how to think*.¹⁶ These transformations bring a potential for the return of joy and meaning to medical education. Participants’ quotes highlight these opportunities and challenges:

Managing portfolios of learning competencies—with trajectories and vectors of learning relevant to a trainee's future and specialty—is more work, but the individualized approach is rewarding.

Much more satisfying careers for educators—competency-based approach avoids all the career transitions for learners and [provides] opportunities for relationships and dialogues with learners on challenging concepts. It brings to the forefront meaning in work.

As an educationalist, even more exciting is the potential for improving individual, population, and global health . . . realized at scale.

I think that the way I educate, which is ultimately the same way that I coached track, relies on the fact that people are more apt to and desire to improve, heed your advice, make (or attempt to make) the changes that you are suggesting when it comes with a certain level of fervor and care for them.

These evolving educator roles will require retooling and training around digital health, artificial intelligence, coaching, and mentoring skills. Respondents anticipated that educators would be compensated based on prespecified tasks and roles explicitly linked to the funds they receive. In turn, interviewees predict that medical education research will be transformed by big data and outcomes, which will require dedicated funding for a limited group of individuals. Coordinated multicenter trials will be increasingly common. Medical education research teams will expand to include computer and data science experts and new corporate partners (eg, Amazon Web Services,¹⁷ EPIC,¹⁸ and Apple¹⁹), which may limit individual faculty scope and involvement.

Hopes for GME in 2030

Our final interview question was “What’s one thing that you hope is true in 2030 that is not true now?” Recapturing the joy of medicine and a return to the heart and humanity of being a physician was a common hope: “The charade of education being a core mission gets called out . . . (with) only those programs/organizations who are truly committed to education remaining.” Another hope was that diversity would be present in all aspects of medicine: “It’s normalcy and is not seen as an anomaly to be a black doctor or medical student. I’d like to see that.” In addition, interviewees wished that medical education research would reconnect with its purpose: “My hope

is that by 2030 the medical education research community (and more broadly GME) recommits and deepens its connection with what should be its main purpose and *raison d’être*—improving the lives of other humans.”

Medical education leaders’ hopes for GME in 2030 reiterated elements highlighted in prior sections and identified new aspirations, including:

- Implementation of holistic GME admissions processes;
- Educator role differentiation between assessors and coaches;
- Seamless transitions in training;
- Time uncoupled from duration of training;
- Harnessing artificial intelligence and digital technologies to produce a comprehensive personalized learning profile for each trainee using multiple types of performance data;
- New training sites and models for training; and
- Reaffirmation of the importance of longitudinal relationships with patients, teams, and attendings.

Conclusions

Across the world, health care team members and their organizations have shown commitment, integrity, ingenuity, agility, and resolve to sustain safety and quality for patient care and medical education during the COVID-19 pandemic. The best of medicine as a profession has emerged: compassion, empathy, collaboration, and innovation with an enduring commitment to safe, high-quality care for all patients despite a resource-constrained environment.

When we achieve the new normal, will the best of medicine as a profession still be visible as the economic, technological, big data, and other drivers return? Respondents repeatedly emphasized the importance of retaining medicine as a profession.²⁰ Some wondered, “Will [we in] medicine lose our unique identity as a profession, becoming engineered technicians, relinquishing our long-term relationships with patients for the sake of efficiency?” The answer to that question lies within each of us and our steadfast resolve to shape GME’s future.

“Much of the science and evidence to make these changes is available,” said one respondent. “While a full understanding of the barriers facing CBME and the best solutions are still unclear, a lack of knowledge is unlikely to be our biggest limiter.”

“Do we have the will and courage?” pondered an executive leader in academic medicine with significant experience in GME.

Our answer is “Yes!” As stated by another GME leader, our focus as leaders must “be driven from our social contract to educate a workforce that meets needs of our community—if not, then what are we doing?” The *Journal of Graduate Medical Education* is committed to supporting our readers as they lead GME toward 2030.

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