Proposed Performance-Based Metrics for the Future Funding of Graduate Medical Education: Starting the Conversation

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Abstract

Graduate medical education (GME) in the United States is financed by contributions from both federal and state entities that total over $15 billion annually. Within institutions, these funds are distributed with limited transparency to achieve ill-defined outcomes. To address this, the Institute of Medicine convened a committee on the governance and financing of GME to recommend finance reform that would promote a physician training system that meets society's current and future needs. The resulting report provided several recommendations regarding the oversight and mechanisms of GME funding, including implementation of performance-based GME payments, but did not provide specific details about the content and development of metrics for these payments. To initiate a national conversation about performance-based GME funding, the authors asked: What should GME be held accountable for in exchange for public funding? In answer to this question, the authors propose 17 potential performance-based metrics for GME funding that could inform future funding decisions. Eight of the metrics are described as exemplars to add context and to help readers obtain a deeper understanding of the inherent complexities of performance-based GME funding. The authors also describe considerations and precautions for metric implementation.

Significant attention is currently focused on graduate medical education (GME) financing in the United States. Despite representing just 0.55% of the annual health care expenditure,[1] the investment of over $15 billion annually from federal and state entities, including $9.7 billion from Medicare,[2] is significant. Key stakeholders in GME, including state and federal policy makers, perceive a lack of accountability and transparency for GME funding and express concern that the GME system has not kept pace with changing societal needs.[3–10] Given its sizable investment, the public's interest in GME funding is justified.

Background

Congress first explicitly stated its intent to fund GME as part of Medicare in 1965.[11] Since the 1980s, teaching institutions have received funds in two forms: direct GME reimbursement and indirect medical education (IME) payments. Within institutions, monies are distributed with limited transparency to achieve ill-defined outcomes. Evidence suggests the existence of geographic and specialty-specific maldistribution of physicians,[12–15] while, at the same time, residency graduates lack the skills needed for today's practice environment (e.g., care coordination, quality improvement).[16,17] The cost of training residents approximates the total public expenditure on GME,[18,19] but there is wide variation in how GME funding is used across institutions and regions.

To address these concerns, in 2012, the Institute of Medicine (IOM, now the National Academy of Medicine) convened a committee on the governance and financing of GME to recommend finance reform that would promote a physician training system that meets society's current and future needs. The resulting report[2] provided recommendations for oversight and mechanisms of GME funding, with performance-based GME payment being a "key requirement" to achieving transparency and accountability, but did not provide specific details about the content and development of metrics for these payments. In this Article, we (see below) propose potential metrics in the hopes of starting a national conversation about performance-based funding for GME. Our intention is not to propose a GME funding mechanism but, rather, to offer possible metrics that could inform future funding decisions.

The IOM committee, however, was not the first to recommend performance-based GME payment. In 2010, the Medicare Payment Advisory Commission (MedPAC) recommended to Congress that 50% of IME payments be diverted into a performance-based GME fund.[20] MedPAC proposed targeted metrics in five areas (quality improvement, evidence-based medicine, multidisciplinary teamwork, care coordination, and health information technology) that had been previously identified by a RAND Corporation study,[21] but stopped short of proposing specific performance-based metrics. To our knowledge, we are the first to propose such metrics for GME funding.

This work complements a collaborative policy project on GME funding and workforce issues between the Alliance for Academic Internal Medicine (AAIM) and the American College of Physicians.[22] We (internal medicine or medicine–pediatrics

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physicians) believe that sound metrics, developed and debated within the entire profession, will enhance the value of the public investment in GME. Given the limitation inherent in a specialty-specific group, we propose the GME performance metrics detailed below as a "conversation starter" for all stakeholders in academic medicine.

This Article outlines the process by which we created a set of 17 potential metrics to start the conversation on performance-based funding for GME. Eight of the metrics are described below as exemplars to add context and to help readers obtain a deeper understanding of the complexities of performance-based GME funding. We also describe considerations and precautions for metric implementation.

Process

We are current and former volunteer members of the AAIM Education and AAIM Health Policy Committees, from university- and community-based programs of various sizes and locations across the United States, with backgrounds in GME advocacy. We conducted three in-person meetings, multiple conference calls, and numerous e-mail communications over the course of 25 months (from January 2015 to January 2017) to accomplish this work.

To establish potential meaningful performance-based metrics for GME funding, we considered the question: What should GME be held accountable[23] for in exchange for public funding? We challenged ourselves to identify what should be measured as opposed to what can be readily measured. We explicitly strove to be provocative yet pragmatic and to build on existing reporting processes to develop a novel set of metrics to drive innovation in GME training and demonstrate the added value of GME to justify public funding.

To start, we systematically reviewed seminal articles and reports highlighting expectations of GME from a variety of stakeholder groups, including the IOM,[2] MedPAC,[20] Josiah Macy Jr. Foundation,[24,25] Council on Graduate Medical Education,[26] and physician professional organizations. We used an iterative process to categorize expectations and establish a framework for our metric development process. We selected the Institute for Healthcare Improvement (IHI) Triple Aim[27] as an organizing principle because it describes the ideal health care system that GME should support. List 1 provides the eight categories we identified as the foundation of our metric development process.

Despite the prominent and controversial debate over physician workforce, we elected to limit the role of workforce outcomes in our proposed metrics. Many external factors that exceed the influence of the GME community contribute to the makeup and distribution of the physician workforce (e.g., educational debt, physician reimbursement, practice environment). Addressing these factors will require broader strategies[22] that consider local and regional variations in workforce requirements, shifts in populations over time, and the role of advanced practice providers. For this, we favor a process by which local, state, and national bodies first determine physician workforce needs and then use dynamic GME funding to incentivize training in needed specialties and locations. We also elected to exclude metrics pertaining to individual competence and procedural experience because these domains are best addressed through existing professional self-regulation mechanisms (i.e., accreditation and board certification) and should be separate from any conversation about programmatic or institutional funding.

To ensure that we captured the breadth of viewpoints related to measurement and accountability, we added four perspectives through which to consider the categories—the GME community-at-large (collective GME), GME sponsoring institution (institutional), GME training program (program), and trainee/graduate of a program (trainee/graduate)—to our process. This approach broadened the opportunities for measurement of GME performance.

Working in pairs, we identified potential performance metrics for each perspective for an assigned category. This work was done using a simple matrix for each of the eight categories that included each of the four perspectives as well as some prompting questions. Chart 1 provides an example matrix for the category value, benefit, and cost. We modified each matrix slightly prior to use by the pairs to allow for contextual variations between each category.

List 1
Foundational Categories for Performance-Based Graduate Medical Education Metrics[a]

1. Value, benefit, and cost
2. Access to care
3. Attention to the care of the underserved
4. Patient safety
5. Patient- and family-centered care
6. Communication, teamwork, and transitions of care
7. Educational environments
8. Physician well-being

[a]As identified by the authors.

Pairs reviewed existing performance-based metrics used in health care (e.g., National Quality Forum metrics[28]) with specific attention to collected and reported metrics that could be repurposed for the value-added measurement of GME performance. The pairs iteratively narrowed their lists of metrics on the basis of feasibility, perceived validity, potential for adverse or unintentional consequences, and alignment with the IHI Triple Aim to arrive at a maximum of 12 potential metrics for their category (3 metrics for each of the 4 perspectives). Pairs wrote narratives describing the background considerations, application, and risks for each metric. The entire group then discussed the proposed metrics and narratives for continued editing and clarification. Some proposed metrics were eliminated from consideration because they did not align with our identified goals of being pragmatic, aligning with current data collection mechanisms, or advancing the pursuit of the IHI Triple Aim. We also eliminated those metrics that could not be related to the entire GME continuum and/or other specialties.

To finalize the list of potential metrics, each pair was asked to identify up to 5 final metrics, regardless of perspective, for their category on the basis of feedback from the entire group and alignment with our goals. The entire group then reviewed the 33 proposed final metrics and eliminated 16 more from consideration choosing only

Chart 1

Example of the Matrixes Used When Considering Graduate Medical Education (GME) Performance Metrics

Category	**Value, benefit, and cost**			
Perspective	**Collective GME**	**Institutional**	**Program**	**Trainee/graduate**
Context	In the context of education, is the nation's GME system producing a workforce that …	In the context of education, does the institution sponsoring one or more GME programs …	In the context of education, does the GME training program …	In the context of education, do graduates of a training program …
Descriptor	Provides value to populations of patients and those that pay for health care services?	Provide value to one or more patient populations?	Support value in the education of the trainee by ensuring that trainees have the data, knowledge, skills, and attitudes necessary to practice in the evolving health delivery system?	Provide high-value care in their future training or practice site?
Parameters	• Does this metric support the Triple Aim (i.e., is it meaningful)? • Is this metric measurable with current systems, or will it require collection of new data? • Can this metric be applied differently in varying contexts (e.g., geographic, variable missions)? • Does this metric link with other perspectives? Does this metric link with other categories? • Is this a process or outcome metric?			

those that were felt to have the greatest potential for implementation.

Proposed Metrics

The resultant 17 metrics covering 8 categories are listed in Table 1 (exemplars) and Table 2 (nonexemplars). The 8 exemplar metrics, one for each category, are described in detail below to illustrate the metrics' variety, complexity, and potential uses. Each metric includes a background describing our justification for inclusion, potential mechanisms for measurement (i.e., for collecting and interpreting data), and key considerations for application. While this was not done for the nonexemplars metrics, many of the same mechanisms of measurement and considerations apply.

Of note, several proposed metrics mention the use of data related to the Accreditation Council for Graduate Medical Education (ACGME) Clinical Learning Environment Review (CLER) program. The CLER program provides formative assessment to teaching hospitals in six defined pathways pertinent to learning environments conducive to professional growth and development.[29] Institutions measure and track their performance within each pathway to improve GME processes and outcomes. We believe that national, aggregated CLER data, written as a performance metric, may be appropriate for global GME funding determinations. However, we strongly oppose the direct use of institution-specific CLER performance data, as this would unintentionally undermine competence-based training[22] and the stated intent of the CLER program.[29] Because we predict institutions will prioritize data collection to document growth for CLER pathways, we aligned several of our proposed metrics with them to minimize the administrative burden of collecting additional data.

Metric: Value of care provided
Category: Value, benefit, and cost
Perspective: Institutional

Background. U.S. health care costs are unsustainably high, with an estimated $750 billion attributed annually to wasteful and unnecessary care.[30] While it is impossible to know how much waste is directly attributable to GME hospitals, evidence suggests that these hospitals play a key role in their graduates' practice regarding care intensity, spending patterns, and certain patient outcomes,[31–34] an effect that lasts at least 15 years after graduation.[32,33] GME has taken significant steps to improve learners' understanding and provision of high-value care (HVC),[35] including the jointly created AAIM-American College of Physicians HVC curriculum[36] and the Choosing Wisely campaign,[37] which houses over 400 recommendations from over 70 national societies. Evidence suggests that HVC education can change behaviors and attitudes among students, trainees, and practicing physicians.[38–40] Thus, the value of care provided at teaching hospitals should serve as a predictor of the future practice patterns of graduates.

Measurement. A ratio consisting of institutional measurement of the total adjusted costs plus the costs from harm (e.g., excess readmissions, excess length of stay, hospital-acquired infections) for patients treated for the top five diagnosis-related groups, divided by the number of patient cases treated for those groups. The first report would establish a baseline to assess the change in the value-based ratio over time. High-performing institutions, when compared with similar teaching hospitals, would meet this metric even if performance did not improve from baseline.

Considerations. The feasibility of collecting this information is reasonable as most GME hospitals already collect and report this information but do not use it to measure the value of care provided. One barrier is that this metric measures only the costs of care without directly measuring benefit as defined by outcomes of care. However, when combined with other institutional metrics that compare outcomes across institutions, we believe the relative value of care can be determined. In developing this metric, there may need to be some adjustment for acuity, perhaps based on the case mix index. When applying this

Table 1

Exemplar GME Performance Metrics[a]

Category	Metric	Perspective	Measurement	Parameters used to impact funding	Data source	Limitations	Potential unintended consequences
Value, benefit, and cost	Value of care provided	Institutional	A ratio of institutional measurement of the total adjusted costs plus the costs from harm (e.g., excess readmissions, excess length of stay, hospital-acquired infections) for the top five DRGs, divided by the number of patient cases treated for these DRGs.	Initial report to create a baseline of costs of harm for institution and then measure change over time	Repurposing of existing data	Measures costs as opposed to outcomes of care (i.e., benefit)	Risk of financial "double jeopardy"[b]
Access to care	Care management processes for populations of patients	Institutional	The presence of care management programs that reach across a broad institutional catchment area to target defined populations (e.g., high-risk or high-utilizing patients), and the impact those programs have on defined outcomes related to access to care for those populations.	(1) Presence/absence of program and (2) change in defined outcomes over time for defined populations	Institutional self-report and/or available databases or registries		
Attention to the care of the underserved	Reducing health disparities	Institutional	Institutional improvement in two specific patient outcomes (e.g., colorectal cancer screening) that evidence suggests are influenced by disparities (e.g., race, geography) at that institution.	(1) Percentage of institutions with defined strategies and (2) percentage of institutions with improvement in defined strategies (year over year)	Aggregate CLER data; metrics collected by national organizations	Data may be influenced by multiple external factors	Institutional accountability for societal problem
Patient safety	Performance on patient safety metrics	Institutional	Institutional improvement on a composite score of self-identified PSIs in which residents have actively engaged in the improvement process.	(1) Improvement in composite self-identified institutional metrics and (2) percentage or proportion of trainees actively participating in patient safety initiatives	Institutional self-report; existing national data sources (e.g., AHRQ, Leapfrog); ACGME surveys; aggregate CLER data	Accuracy in measurement of PSIs	Risk of financial "double jeopardy"[b]
Patient- and family-centered care	Survey of patient experience	Collective GME	Collective GME community improvement over time on a composite score of focused elements regarding patient experience or patient self-management using existing or adapted surveys or measurement tools (e.g., the CG CAHPS, the C-I-CARE framework) and assessments of the educational experience for residents and faculty (e.g., ACGME program surveys).	(1) Change in composite score of patient experience and self-management and (2) aggregate resident experience over time	Existing or adapted surveys and data sources (e.g., CG CAHPS, C-I-CARE); ACGME aggregate survey data	Attribution in measurement of patient experience	
Communication, teamwork, and transitions of care	Hospital readmission rate	Institutional	Hospital 30-day readmission rates for target diagnoses tracked and reported by the CMS with the opportunity for a "readmission bonus" for hospitals with rates in the lowest quintile or that have made significant improvements over the prior year.	Changes in the risk-adjusted 30-day readmission rates over time (or stability in high performers)	Existing CMS data sources	Many factors related to readmission are beyond an institution's control	Risk of financial "double jeopardy"[b]

(*Table continues*)

Table 1
(Continued)

Category	Metric	Perspective	Measurement	Parameters used to impact funding	Data source	Limitations	Potential unintended consequences
Educational environments	Educational portfolios	Program and/or trainee/graduate	Percentage of completed portfolios per program. (A completed portfolio documents participation in scholarly activities, clinical performance data review, and engagement in quality improvement activities.)	Presence/absence of educational portfolios that contain expected elements	Institutional self-report; ACGME surveys; WebADS	Current structures of medical education do not support the collection and longitudinal reporting of portfolio data	Unfunded infrastructure, data collection, and faculty resources; worsening job satisfaction with increased reporting requirements
Physician well-being	Institutional system for physician well-being	Institutional	Presence of a proactive institutionally based system that promotes physician well-being and monitors physician well-being and burnout while providing confidential treatment to affected physicians.	Presence/absence of system	Institutional self-report; ACGME resident and faculty surveys	Best practices for optimizing physician wellness are currently being researched and implemented	

Abbreviations: GME indicates graduate medical education; DRG, diagnosis-related group; CLER, Clinical Learning Environment Review; PSI, patient safety indicator; AHRQ, Agency for Healthcare Research and Quality; ACGME, Accreditation Council for Graduate Medical Education; CG CAHPS, Clinician and Group Consumer Assessment of Healthcare Providers and Systems; CMS, Centers for Medicare & Medicaid Services; WebADS, Web Accreditation Data System.
[a]As proposed by the authors.
[b]In which teaching hospitals (especially critical access hospitals) would lose direct care payment via new performance-based reimbursement structures in addition to losing funding from a future performance-based GME funding system.

metric, caution should be taken to avoid creating financial "double jeopardy," in which teaching hospitals (especially critical access hospitals) would lose direct care payment via new performance-based reimbursement structures in addition to losing funding from a future performance-based GME funding system.

Metric: Care management processes for populations of patients
Category: Access to care
Perspective: Institutional

Background. The clinical training environment of an institution significantly impacts the outcomes of care provided by the graduates of that institution.[31–33] Accordingly, residents who train in institutions that emphasize fair and equitable access to care through the presence of population management care processes and services will promote population-based care in the future. Metrics for institutions should target the presence of care management processes within the health delivery system as well as the formal education of residents and faculty in this area.

Measurement. The presence of care management programs that reach across a broad institutional catchment area to target defined populations (e.g., high-risk or high-utilizing patients), and the impact those programs have on defined outcomes related to access to care for those populations.

Considerations. Data for this metric could be obtained through self-report of institutions and/or by accessing available databases or registries. To maximize impact, we recommend flexibility for GME institutions to choose care management programs that address local or regional needs and to engage learners in the development and execution of these programs. In the early use of this metric, institutions should be rewarded for improving their defined outcomes as opposed to being penalized for having suboptimal performance at baseline.

Metric: Reducing health disparities
Category: Attention to the care of the underserved
Perspective: Institutional

Background. Underserved populations are disproportionately poor, undereducated, and nonwhite. These socioeconomic factors, coupled with

Table 2

Nonexemplar GME Performance Metrics[a]

Category	Metric	Perspective	Measurement	Parameters used to impact funding	Data source	Limitations	Potential unintended consequences
Value, benefit, and cost	Graduate adherence to evidence-based guidelines	Program and/or trainee/graduate	The rolling percentage or proportion of programs' graduates that make clinical decisions consistent with evidence-based recommendations for their specialty.	(1) Program performance on obtaining data and (2) composite score of the performance of graduates	EHR reporting of utilization data for graduates	Not all graduates stay in the United States or practice clinical medicine; EHR efficiency in collecting data; limited EHR interoperability	Use of individual physician composite scores in adverse manner
Value, benefit, and cost	Institutional adherence to patient-centered quality metrics	Institutional	Composite score of five institutionally identified patient-centered quality metrics.	Change over time for adherence rate for the institutionally chosen metrics	Existing data sources	Identification of metrics that are impactful to multiple specialties	Disengagement of learners and faculty who do not directly impact the chosen quality metrics
Value, benefit, and cost	Institutional adherence to evidence-based guidelines	Institutional	The rolling percentage or proportion of institutions' faculty and trainees that make clinical decisions consistent with select evidence-based recommendations chosen by that institution.	Change over time for composite score of the institutionally chosen metrics	Repurposing of existing data	Requires implementation of new collection processes	Disengagement of learners and faculty who do not directly impact the chosen quality metrics
Access to care	Curriculum for learners	Program	Percentage of programs within an institution that include formal curricular learning experiences, assessments, and faculty development in topics, such as maximizing patient access to care, population health management, engaging high-risk populations, shared decision making, and team-based coordination of care, which are aligned between educational and clinical units.	Percentage of programs at institution fulfilling established criteria	Self-report in WebADS; CLER data; ACGME and other surveys	Curricular mandate; costs of curricular experiences	May leave less time for residents to learn critical discipline-specific clinical skills
Access to care	Graduates impacting access to care	Trainee/graduate	The rolling percentage or proportion of institutions' and/or programs' graduates practicing in defined workforce shortage areas or specialties of need.	Recognize high performers and also look at change over time for number or proportion of graduates meeting metric	Institutional self-report of graduates; future national and regional workforce data projections	Specialty choice is partially determined by educational debt; evolving physician payment reform; need for better national and regional workforce data projections	Lagging applicability of metric if workforce projections are not updated regularly
Attention to the care of the underserved	Charity care by teaching hospitals	Collective GME	The rolling percentage or proportion of charity care days provided by GME institutions in relation to overall number of patient days for those institutions.	Achieving certain predefined thresholds established using historical data	Existing CMS and other (e.g., COTH) data sources	Only 40% of teaching hospitals are COTH members	Institutions may target or avoid providing charity care to meet threshold

(*Table continues*)

Table 2
(Continued)

Category	Metric	Perspective	Measurement	Parameters used to impact funding	Data source	Limitations	Potential unintended consequences
Communications, teamwork, and transitions of care	HCAHPS doctor communication star rating	Collective GME	The rolling percentage or proportion of all teaching institutions' (i.e., the collective GME community's) performance on HCAHPS doctor communication star rating or other similar metric over time.	Change over time for collective performance by GME teaching institutions	HCAHPS or other related survey	Accuracy in measurement of patient experience	
Communications, teamwork, and transitions of care	Composite metric for transitions of care	Institutional	Composite score measuring program use of key aspects related to safe transitions of care: (1) process (use of standardized process); (2) education (participation in simulated or real-time training); (3) supervision (formal assessment using direct faculty supervision); (4) interprofessionalism (includes structured interprofessional teams).	Change over time in composite score	Institutional self-report	Empirically establishing threshold scores for measurement for each component of the metric; this is a novel metric	Institutions would need to standardize transitions of care across many different training programs and provide resources for simulation and faculty training in observation and assessment
Educational environments	Educational innovation	Program	Presence of data-driven innovations and improvements to existing GME training programs.	(1) Presence/absence of mechanisms to obtain program-specific data and (2) presence/absence of efforts designed to improve program performance	Program evaluation committee; ACGME survey; ACGME self-study and Annual Program Evaluation	Program improvement efforts may not align with institutional priorities	Unfunded infrastructure, data collection, and faculty resources

Abbreviations: GME indicates graduate medical education; EHR, electronic health record; WebADS, Web Accreditation Data System; CLER, Clinical Learning Environment Review; ACGME, Accreditation Council for Graduate Medical Education; CMS, Centers for Medicare & Medicaid Services; COTH, Council of Teaching Hospitals; HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems.
[a]As proposed by the authors.

reduced access to care, contribute to health disparities.[41] Care for underserved populations is an undeniable component of GME's social contract, though not an explicit expectation of GME funding. Teaching hospitals have historically provided a disproportionate share of charity care,[42] and residents who train in institutions that care for underserved patients tend to work in similar settings after graduation.[43] Therefore, resident education should occur in institutions that are actively working to reduce health disparities and should be included in any future GME performance-based funding model.

Measurement. Institutional improvement in two specific patient outcomes (e.g., colorectal cancer screening) that evidence suggests are influenced by disparities (e.g., race, geography) at that institution. Efforts may be confined to a specific specialty or clinic.

Considerations. Significant complexity exists in attributing responsibility for health disparities, with local and regional factors contributing to an institution's health disparities profile. For example, health insurance status is the major determinant of access to care and, therefore, a major contributor to health disparities, yet the availability of non-employer-based insurance differs widely from state to state. This and similar factors are often beyond an institution's direct influence. The early use of this metric should focus on efforts to reduce disparities while allowing institutions to identify how their respective unique contexts influence broader local and regional goals.

Metric: Performance on patient safety metrics
Category: Patient safety
Perspective: Institutional
Background. Patient safety indicators (PSIs) are statistical performance measures monitored by hospitals, payers, regulators, and others to identify potential adverse events (e.g., in-hospital falls, decubitus ulcer formation).[44] PSIs play a crucial role in hospitals' monitoring of safe patient care and increasingly affect reimbursement for patient care activities. We recommend that institutions be held accountable for resident engagement in improving safety

for identified institutional priorities meant to impact PSIs.

Measurement. Institutional improvement on a composite score of self-identified PSIs in which residents have actively engaged in the improvement process. A percentage or proportion of trainees actively participating in patient safety initiatives could also be reported.

Considerations. We believe there is significant opportunity to implement this metric. Data for many PSIs are already collected by GME institutions (e.g., the Agency for Healthcare Research and Quality, Leapfrog) and could also be collected via institutional self-report. Additionally, resident engagement is encouraged as part of an optimal learning environment.[29] Existing institutional ACGME program surveys and aggregate, national CLER data could be used to measure resident engagement in patient safety activities. Limitations with regard to this metric are the growing concern that the measurement of PSIs may be flawed and biased[45,46] and the risk of financial double jeopardy (see above). In the future, it would be useful to develop specific PSIs for use by GME programs or allow institutions to adapt existing PSIs to meet local needs.

Metric: Survey of patient experience
Category: Patient- and family-centered care
Perspective: Collective GME
Background. Patient and family engagement in personal care decisions is increasingly valued and measured in health care. Evidence shows that patient experience and doctor–patient communication are key to clinical outcomes,[47–49] including psychological and functional status and symptom recovery.[50,51] Linking institutional and program performance via metrics associated with patient experience is important for future GME performance-based funding.

Measurement. Collective GME community improvement over time on a composite score of focused elements regarding patient experience or patient self-management using existing or adapted surveys or measurement tools (e.g., the Clinical and Group Consumer Assessment of Healthcare Providers and Systems survey, the C-I-CARE framework) and assessments of the educational experience for residents and faculty (e.g., ACGME program surveys).

Considerations. Many aspects of patient- and family-centered care are already measured in clinical and educational settings; however, data are very contextual. Extenuating circumstances outside the control of a program or institution make attribution and, therefore, GME funding, to a specific program or institution problematic. However, it is appropriate for the entire GME enterprise to be held accountable for improving patient experience at teaching hospitals by requiring the purposeful inclusion of curriculum, assessments, or novel interventions designed to positively impact patient experience or engagement. As assessment tools improve, focus could be placed on institution- or program-level performance.

Metric: Hospital readmission rate
Category: Communication, teamwork, and transitions of care
Perspective: Institutional
Background. There is widespread agreement that 21st-century patient care requires the participation of professionals from numerous disciplines, all practicing at the top of their abilities. Interprofessional team-based care demands a level of interpersonal communication that is not traditionally a focus of physician training.[52,53] For almost 10 years, the Centers for Medicare & Medicaid Services (CMS) has tracked and reported elements of the quality of care provided by hospitals for high-volume admitting diagnoses (e.g., pneumonia), including each hospital's 30-day readmission rates.[54] More recently, the CMS has strengthened penalties regarding reimbursement for readmission rates in excess of those expected for each diagnosis.[55] The stable transition from hospital to home, as assessed by short-term readmission rates, is an attractive metric for GME institutions because it can be a proxy for elements of resident communication and teamwork.

Measurement. Hospital 30-day readmission rates for target diagnoses tracked and reported by the CMS with the opportunity for a "readmission bonus" for hospitals with rates in the lowest quintile or that have made significant improvements over the prior year.

Considerations. Hospitals have a responsibility to ensure safe and appropriate discharges. Structured multidisciplinary programs have effectively reduced readmission rates in GME hospitals.[56] While readmission rates are not under the sole control of GME institutions, it is reasonable to assume that trainees participating in effective discharge planning practices will incorporate these principles and priorities into their future practice. Tying readmission rates to GME funding underscores the importance of transitions of care training in medical education. Given the significant difficulties with attributing the reasons for readmission, institutions should be accountable for risk-adjusted improvement in the rate of readmission.

Metric: Educational portfolios
Category: Educational environments
Perspective: Program and/or trainee/graduate
Background. The worldwide movement toward competency-based medical education and measurement of educational outcomes[57] has led to redesigned assessments throughout physician training. The educational portfolio has been shown to be useful in certain areas of undergraduate medical education (UME)[58,59] and postgraduate medical education,[60] with successful implementation being described in internal medicine,[61] family medicine,[62] and surgery[63] in the United States as well as in the United Kingdom.[64] Portfolios can be used to document individual participation and performance in many of the activities and metrics proposed in this Article (e.g., engagement in patient safety activities,[65] team-based care, high-value patient-centered care) and to encourage the development of reflective practice.[66] We propose the robust use of educational portfolios as a performance-based metric, recognizing that the format, content, and use of portfolios are evolving.

Measurement. Percentage of completed portfolios per program. (A completed portfolio documents participation in scholarly activities, clinical performance data review, and engagement in quality improvement activities.) Optimal content of portfolios may vary by specialty.

Considerations. This metric will require an institutionally maintained portfolio management system for

GME; appropriate infrastructure, including trained educators to facilitate completion, which is currently lacking for most institutions; and provision of data for use in reflection and quality improvement activities. Of note, many of these data correspond to those collected for the previously described metrics (i.e., institutional self-reports, ACGME surveys) but might also include Web Accreditation Data System data. Ultimately, however, this metric would require new data-reporting mechanisms by programs and institutions and the sharing of data across the continuum of medical education. Caution must be taken to avoid increased job dissatisfaction as a result. Opportunity lies in linking GME educational portfolios to UME educational portfolios and the outcomes of practicing physicians as a future performance-based GME metric.

Metric: Institutional system for physician well-being
Category: Physician well-being
Perspective: Institutional

Background. Physician burnout in the United States is reaching epidemic proportions and continuing to grow,[67] with as many as 75% of residents manifesting difficulties with burnout or mood disorders.[68–74] Burnout and depression in physicians adversely affect clinical and educational performance, undermining the profession's commitment to quality and safety in patient care.[75–81] This impact on quality is so profound that provider wellness has been proposed as a potential fourth arm of the IHI Triple Aim.[82] To positively impact the desired patient outcomes of our other metrics, we recommend one designed to promote the well-being of medical students, trainees, and practicing physicians at GME institutions.[83]

Measurement. Presence of a proactive institutionally based system that promotes physician well-being and monitors physician well-being and burnout while providing confidential treatment to affected physicians.

Considerations. Data for this metric could be collected by the ACGME via surveys of residents and faculty and institutional self-reporting. A recent meta-analysis suggests that individual-focused and organizational interventions (e.g., mindfulness, stress management, small-group discussions) can reduce burnout.[83] Combining these types of approaches may improve physician well-being. At this time, it is not clear which interventions are most impactful; further studies are needed. Implementation of this metric would need to align with evolving evidence and the ongoing activities of the ACGME, which has made physician wellness a priority.

Discussion

In 2013, federal and state governments contributed over $15 billion to GME.[2] Expecting greater transparency and accountability for the outcomes of this sizable taxpayer investment is reasonable. The IOM report noted that the current system "does not yield useful data on program outcomes and performance" and recommended "modernizing GME payment methods based on performance, to ensure program oversight and accountability, and to incentivize innovation in the content and financing of GME."[2] In this Article, we have proposed broad-ranging performance-based metrics that can be used, along with others that evolve over time, in a redesigned GME funding system. Collectively, these metrics can be used to leverage GME and achieve our common objective of a physician workforce that provides high-quality, patient-centered, affordable health care to patients and populations.

In developing our proposed metrics, we aimed to use existing data sets and registries or capitalize on data collection processes that were either already planned or already in place. We also endeavored to identify novel metrics with new or unmeasured data points by asking, "What should GME be held accountable for?" We believe that collectively our proposed metrics provide measurable and impactful opportunities for all specialties, locations, and training settings.

To enhance their applicability, we suggest that data for multiple metrics, selected from those provided in the exemplar and nonexemplar tables, be collected and reported as a formal composite measure. By obtaining data from many sources, GME funding will not be overly reliant on any singular data set or point. Ideally, there would be a larger menu of metrics, including those presented in this report, that align with institutional priorities and specialties from which institutions would choose. The use of such a menu approach and a focus on change in performance from baseline could help to mitigate unintended consequences, particularly at safety net institutions.

Given the wide variety of GME training institutions and programs, we believe that the reporting of performance-based data must account for local variations in institutional mission, geographical location, and population served while continuing to promote national standards. In this manner, GME could be used to leverage local health systems improvement as opposed to simply justifying continued public funding for GME. For example, internal medicine residency programs' curricula improved after the ACGME changed program rules in response to areas found to be deficient (e.g., information technology use).[84] So, too, could performance metrics be used to improve national and local GME.

Ultimately, we anticipate that performance-based metrics will inform the extent and distribution of publicly funded GME dollars. As with any performance-based program, the threshold can either trigger an incentive (carrot) or penalty (stick) for future funding. We recommend building an incentive-based system that facilitates ongoing efforts to improve GME and avoid unintentional harms. Whether the basis for incentives or penalties, ultimately, GME performance-based metrics should be evidenced-based; dynamic; tied to improved outcomes of care; and, most important, transparent to teaching hospitals, health care payers, medical education accrediting organizations, and the public.

There are multiple limitations to the recommendations presented in this report. We are internal medicine and medicine–pediatric physicians and do not represent the perspectives of all physician specialties. To the extent possible, we designed these metrics with broad applicability and adaptability across specialties. Many of the exemplar metrics presented are from the institutional perspective and attributed to the sponsoring institution, even if they are applicable to a subset of residency programs. We recognize that

current data sets do not capture relevant performance metrics attributable to a program or trainee. This presents an opportunity for the GME community to develop mechanisms for collecting relevant metrics that inform quality of care at these levels. Our proposed metrics differ from the metrics historically used in UME (e.g., board exam scores, Match rate), which may lead to a lack of synergy across the continuum. As mentioned previously, GME imprints meaningful habits that endure throughout careers,[31–33] resulting in the opportunity to leverage GME funding for health systems improvement. We anticipate medical schools and UME moving in this direction over time. Finally, our process for determining metrics was iterative and did not use a formal consensus-building process (e.g., Delphi), nor did we seek feedback from external experts. Incorporation of these steps was time- and resource-prohibitive. We anticipate, and in fact hope, that other medical organizations and experts will engage in this conversation.

It is critical to develop pilot projects to study the effect and unintended consequences of performance-based GME metrics prior to full-scale implementation of any new performance-based funding model. In accordance with the IOM report recommendations,[2] we believe these pilots should be supported via new or existing GME funding mechanisms. We recommend establishing stable, reasonable GME performance metrics to allow programs and teaching hospitals to adapt their learning environment to achieve them. Additionally, we recognize that the health care system is dynamic, with rapidly changing technologies, patient demographics, and delivery systems. Any performance-based model will need continuous oversight and curation so that the metrics remain relevant over time.

We recognize the inherent difficulty in measuring these, or any, proposed performance-based metrics and the implications that performance-based GME funding has for teaching institutions and programs. Our proposal is intended to be provocative and start a meaningful conversation within the profession and among stakeholder organizations. We feel that GME stakeholders and medical educators must work together to incentivize and support change, as accountability and transparency of GME funding is a critical first step to building a strong and sustainable GME system for decades to come.

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