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We Have No Choice but to Transform: The Future of Medical Education After the COVID-19 Pandemic

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Abstract

Medical education exists to prepare the physician workforce that our nation needs, but the COVID-19 pandemic threatened to disrupt that mission. Likewise, the national increase in awareness of social justice gaps in our country pointed out significant gaps in health care, medicine, and our medical education ecosystem. Crises in all industries often present leaders with no choice but to transform—or

to fail. In this perspective, the authors suggest that medical education is at such an inflection point and propose a transformational vision of the medical education ecosystem, followed by a 10-year, 10-point plan that focuses on building the workforce that will achieve that vision. Broad themes include adopting a national vision; enhancing medicine's role in social justice through broadened curricula and a focus on

communities; establishing equity in learning and processes related to learning, including wellness in learners, as a baseline; and realizing the promise of competency-based, time-variable training. Ultimately, 2020 can be viewed as a strategic inflection point in medical education if those who lead and regulate it analyze and apply lessons learned from the pandemic and its associated syndemics.

Medical education exists to educate the physician workforce that our nation needs: a workforce that is collectively prepared to positively impact the health of our diverse patients and communities.¹ The disruptions of the COVID-19 pandemic threatened the continuity of the workforce pipeline that graduates tens of thousands of well-trained physicians each year. Yet, collaborative work, innovative thinking, and crisis management within and across institutions enabled educational leaders to sustain the continuum of medical education. As the end of the pandemic crisis seems within reach, educators across the country are considering whether the pandemic has catalyzed a strategic inflection point for American medical education—a time when fundamentals of our work can and must change to better address the health and health care needs of our patients.^{2,3}

Crises in all industries, whether due to changes in economics, technology, politics, or social norms, often precipitate

a strategic inflection point.⁴ These crises illuminate the vulnerabilities and missing elements of current work at the same time they reinforce the value of some existing strategies. They make reliance on the status quo impossible, necessitating experimentation and innovation to survive. They overcome complacency and resistance to change by helping stakeholders realize that what was once thought to be impossible is not only feasible but also desirable. In essence, crises catalyze change because they present leaders with no choice but to transform—or to fail.

The first year of the COVID-19 pandemic, which was declared in March 2020, illustrated that there is much to celebrate about current approaches to medical education. The work done by individual and teams of physicians highlighted the effectiveness of education centered on medical education's core competencies. Physicians and other health professionals exhibited extraordinary professionalism. They volunteered to travel to communities with limited health care resources. They used their scientific knowledge to solve problems, applying epidemiologic principles to predict the pandemic; leveraging concepts in virology, immunology, and physiology to design new care strategies; and identifying new therapeutic agents and testing them in well-designed clinical trials.

They sought ethical approaches to the deployment of limited resources and used their knowledge of systems-based improvement to design new care models that enabled care of patients in their homes. Throughout, physicians employed skills in communication and interprofessional teamwork to engage in education, outreach, and problem solving for all communities.

Fault Lines in Medical Education Ecosystem

However, the initial pandemic crisis also uncovered fault lines in the ways in which the ecosystem of health care systems, medical education institutions, and professional organizations prepare the workforce our nation needs. Despite the expertise and commitment of individual physicians, the pandemic highlighted the many unsolved problems that are threatening the health of our patients. Noncommunicable epidemics of chronic diseases, such as heart disease, diabetes, obesity, and substance use disorder, contributed to pandemic morbidity and mortality. Physician geographic and specialty maldistribution left communities in inner cities, rural areas, and on Native American Land with insufficient numbers and types of physicians. The pernicious endemic state of health and health care disparities resulted in dramatically different levels of morbidity and mortality in communities of color. With clarity, this year crystallized our understanding

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that we are living in an era of syndemic conditions, where the interaction of serious health conditions with challenging social problems leads to catastrophic outcomes for many communities.^{5,6}

The pandemic occurred at the end of 2 decades of increasing calls for redesign of medical education.^{5,6} Many of these recommendations proposed strategies relevant to the pandemic response and these fault lines: a focus on greater social accountability; an expansion of the canon of basic sciences to include social, behavioral, population, and data sciences; adoption of systems improvement as a core clinical skill; implementation of competency-based, time-variable training along with more equitable and effective assessment strategies; reconsideration of core tenets of professionalism to incorporate relationships beyond the doctor-patient relationship; prioritization of interprofessional education; redesign of the transition between undergraduate and graduate medical education (UME and GME); and attainment of diversity, equity, and inclusion in all aspects of the educational program.⁷⁻¹²

However, without a clear, defined, nationally accepted urgency to change, the uptake of these recommended reform strategies has been sporadic and change in medical education has been incremental. In the absence of such a vision, the benefits of change are viewed as less compelling than the risks of change.

Urgency Catalyzes Change

The pandemic introduced elements of scarcity, risk, and uncertainty that threatened the established systems of UME and GME (see Table 1). The resulting disruptions to medical education not only validated the need for many of the incompletely adopted reforms outlined above but also demonstrated the power of urgency to transcend change resistance. Collectively, medical schools, residency programs, academic health systems, national licensing and accreditation agencies, and professional organizations recognized that, if they did not change, millions of people would die. It was this sense of urgency that catalyzed all the

stakeholders in this ecosystem to change, and together they transformed the landscape almost overnight. Leadership teams embarked on work to graduate a cohort of highly skilled physicians from each phase of medical education, without fail and without lowering standards despite the pandemic disruptions. They strategized to protect key educational elements and innovated to design novel approaches to sustain their work when established strategies were no longer available (see Table 2).¹³

The experimentation that was employed to sustain programs' ability to graduate classes of students and trainees despite the pandemic showed that success can be achieved using many different approaches to classroom and clinical education. The clarity of the need to address not only the molecular basis of disease but also the context in which patients and their communities experience health and illness illuminated the importance of an educational strategy that prepares physicians to recognize and collaborate to tackle syndemic conditions. Perhaps most importantly, a virus that wreaked

Table 1
COVID-19 Threats to Medical Education

Threat	Example	Consequence
Scarcity	<ul style="list-style-type: none"> • Personal protective equipment • Elective admissions and visits • Faculty bandwidth for supervision and assessment in clinical environments • Hospital beds • Critical equipment • Licensing exam administration centers • Visiting student rotations 	<ul style="list-style-type: none"> • Inability to conduct usual clinical experiences • Inability to rely upon time- and volume-based metrics to attest to competency of graduating trainees • Inability of trainees to apply evidence-based standards of practice • Need to design alternative strategies for advancement • Need for some schools to redesign approach to learner education in disciplines they do not offer
Risk	<ul style="list-style-type: none"> • Risk to learners of contracting a serious infectious disease as a function of engaging in education • Risk to the public health response by sustaining in-person activities • Risk to learner well-being related to isolation associated with pandemic • Risk of graduating learners without confidence that all competencies had been met 	<ul style="list-style-type: none"> • Inability to assign learners to some clinical care environments and some patients • Need to redesign admissions procedures for medical school and residency to minimize travel • Need to craft support and surveillance strategies while also managing dynamic learning environment • Need to prioritize scarce clinical experiences to learners close to graduation and devise new assessment techniques
Uncertainty	<ul style="list-style-type: none"> • Evolving nature of pandemic 	<ul style="list-style-type: none"> • Need to assemble leadership teams with the bandwidth and expertise to surveil the environment and adapt strategies as the pandemic progressed • Need to engage in continuous crisis communication with a commitment to transparency
Distributed decision making	<ul style="list-style-type: none"> • Management of work and learning environment overseen by multiple levels of public health experts • Institutional decisions about essential workers at different sites made it difficult to ensure all learners would progress as a cohort • National organizations provided guidance that at times conflicted with local decisions 	<ul style="list-style-type: none"> • Need for educators to synthesize information and create clarity when different information sources were confusing for faculty and students • Need to advocate for learners to be considered as essential on-site personnel and to identify strategies to sustain or redesign activities to maintain educational equity • Need to collaborate across institutions to agree to guiding principles for decisions and alternate strategies for institutions needing support

Table 2
An Organizing Framework for Action: Exemplars

Action	Example 1: Clinical workplace learning	Example 2: Licensing, certification, and accreditation strategies
Continue	<ul style="list-style-type: none"> Clinical rotations and experiences for learners within months of graduation 	<ul style="list-style-type: none"> Program director assessment of competency (ABMS) LCME self-study activities (LCME)
Postponed	<ul style="list-style-type: none"> Clinical aspects of core clerkships 	<ul style="list-style-type: none"> MSPE release and NRMP match date USMLE exams MOC activities (ABMS)
Adapt	<ul style="list-style-type: none"> Convert visiting student rotations to virtual activities Reassign GME trainees to alternate clinical environments based on emergency operations 	<ul style="list-style-type: none"> MCAT administration (shortened exam) Conduct of LCME site visits: virtual and targeted (LCME) Alternative administration strategies for USMLE Step 1, 2 CK, and 3 exams
Drop	<ul style="list-style-type: none"> Observational experiences for first-year students Student service-learning experiences (free clinics) In-person visiting student rotations (COPA) 	<ul style="list-style-type: none"> Step 2 CS examinations (USMLE) 2020 Milestone reporting requirements (ACGME) 2020 Volume tracking for procedural specialties (ACGME, ABMS) 2020 Accreditation and CLER activities (ACGME)
Add	<ul style="list-style-type: none"> Epidemiologic principles for outbreak predication and management Expanded infection control Telehealth competencies and experiences for all learners 	<ul style="list-style-type: none"> Early licensing strategies for near-graduates

Abbreviations: ABMS, American Board of Medical Specialties; LCME, Liaison Committee on Medical Education; MSPE, Medical Student Performance Evaluation; NRMP, National Resident Matching Program; USMLE, United States Medical Licensing Examination; MOC, maintenance of certification; GME, graduate medical education; MCAT, Medical College Admission Test; CK, clinical knowledge; CS, clinical skills; COPA, Coalition for Physician Accountability; ACGME, Accreditation Council for Graduate Medical Education; CLER, Clinical Learning Environment Review.

havoc across communities, state lines, and national borders reminded all that medical education strategies and reform must also cross institutional and program borders.

Visioning for the future of medical education could focus simply on the need to prepare the physician workforce to be ready for the next pandemic, with coursework in disaster and crisis management. But the stress test of a successful medical education strategy should not be how the workforce functions at its best, when a crisis calls for a short period of extraordinary work by individuals, institutions, and organizations. Instead, the stress test of whether medical education has produced the optimum workforce for our patients and communities is how reliably we deliver high-quality, equitable, patient-centered care every day, in every community, to every patient, regardless of power or privilege.

As the end of the pandemic looms, one might assume that the sense of urgency that drove transformational change in medical education during the pandemic is lost. That urgency can continue if we focus on the ongoing morbidity and mortality attributable to the syndemic conditions of chronic diseases, adverse

social determinants of health, health care disparities, and more. If we hope to prevent these deaths, we have no choice but to transform—throughout the ecosystem of medical education.

A Transformative Vision for Medical Education in the United States

Transformation requires a vision for the future of medical education that is aspirational and inspirational: a moonshot on behalf of personkind that can galvanize stakeholders not only in medical education but also in the profession and broader society. We propose the following vision and promise.

Our vision

In the wake of the 2020 COVID-19 pandemic, the U.S. medical education ecosystem commits to working to ensure that every person in every community has access to the physicians that they want in the systems they need so that they may live long, healthy, and fulfilling lives, free of preventable illness and death.

Our promise

We will embark on a decade of transformation of the continuum of medical education; supported by and involving all stakeholders in medical

education as well as the communities in which our programs exist; and guided by principles of excellence, social accountability, social justice, continuous improvement, and learner well-being.

A 10-Year, 10-Point Platform for Transformation

To realize this vision, we propose 10 goals for the continuum of medical education that must be accomplished in the next decade (see List 1). These goals strengthen our ability to build the workforce that will achieve the transformational vision, informed by experiments conducted by educators to respond to the pandemic and bolstered by the established literature on effective strategies for medical education. Success will require synchronized and synergistic action across the continuum of medical education, as well as coordinated efforts at control points that range from individual programs and schools to national organizations representing medical education and the medical profession. Each area of work requires a comprehensive approach, with all elements typically found in successful strategic plans: governance, accountability structures, metrics, resources, communication strategies, and stakeholder input.

List 1

A 10-Point, 10-Year Platform for Medical Education Transformation

1. Adopt a national vision of the successful workforce focused on committing to improving health and health care in all communities across the country.
2. Achieve social justice in medical education and health care across the country by actively seeking out and eliminating the consequences and manifestations of structural racism in medicine and medical education.
3. Design curricula to prepare all in the physician workforce, present and future, to embrace the breadth of roles and responsibilities needed to address syndemic causes of suffering from illness and disease.
4. Identify and address the most pressing causes of morbidity and mortality in communities across the nation by challenging medical education programs to partner with local communities and governments to focus educational programs on these issues.
5. Facilitate growth mindsets and support lifelong learning in future physicians—and promote equity in learning environments—by adopting a standard of programmatic assessment strategies across the continuum of medical education.
6. Protect patient safety while improving efficiency of training by implementing competency-based training.
7. Increase equity, affordability, effectiveness, and efficiency of selection processes by redesigning national systems and investing in national technology platforms.
8. Protect the workforce by prioritizing learner and physician well-being.
9. Address health care access issues for underserved communities across the nation through innovative partnerships.
10. Strengthen and promulgate the social contract between the medical profession, the public, and state and federal governments in support of health and well-being.

Goal 1: Adopt a national vision for the successful workforce, committed to improving health and health care in all communities across the country

Principle: The current and future physician workforces should be educated to understand that national and global health threats result from a complex interplay of biology, behavior, social systems, and environmental conditions. They must be prepared with the knowledge, dispositions, and skills needed to work collectively in support of our diverse communities to solve chronic syndemic problems as well as to respond to periodic pandemics.⁵

To make sense of, propose, and enact solutions to these complex challenges to health, the physician workforce must be prepared to use and contribute to the tremendous advances in a diverse set of scientific and scholarly disciplines. Intellectually, they must be capable not only of applying today's knowledge with fidelity and compassion but also of rapidly reasoning through emerging ambiguous problems. They must accept the imperative to seek out and address the wicked problems, like health care disparities, that have long been neglected as too complex and too large.

The ideal postpandemic workforce, from students to residents to faculty and

practicing physicians, must be diverse with regard to all identities and skilled at approaching people different than themselves with cultural humility. That workforce must be educated to cultivate specific habits of mind that enable them to engage in the needed work to improve health for people and populations (see Table 3). They must be able to work collectively within and across health professions to understand multifaceted causes as well as propose and experiment with multifaceted solutions. They must be willing to advocate for social justice; rigorous science; and the financing, design, and continuous improvement of robust and reliably equitable systems for health, health care delivery, and medical education. Finally, they must agree to accept the call to duty that exists in our everyday work and may be amplified in times of crisis.

The breadth of roles that physicians individually and collectively assumed to address the pandemic crisis and must assume to address syndemic conditions is well summarized by the CanMEDS competencies.¹⁴ Just as all physicians develop a basic competency in all medical fields and expertise in specific disciplines, all physicians must develop basic expertise in all of these roles with expertise in some. The physician–scientist pathway must be strengthened and

diversified.^{15,16} Similar translational roles could be devised for physician–public health experts, physician–community partnership experts, or physician–antiracism experts to analyze and solve problems incorporating deep understanding of nonbiomedical science disciplines that contribute to more integrative and systematic solutions to health and health care challenges.

In conjunction with this clear vision of who the physician of tomorrow should be, we are likewise called to ensure that our current physician workforce is ready to educate the next generation of physicians as part of this vision, and to do so, that they receive ongoing education and development to prepare them for this critical endeavor. In each of the remaining goals, it is imperative that we consider not simply the educational priorities of our medical education programs but also the fostering of these skills in our practicing physicians and health care systems, and the steps we must take to cultivate the skills they need to bring about the transformation needed below through education.

Goal 2: Achieve social justice in medical education and health care across the country by actively seeking out and eliminating the consequences and manifestations of structural racism in medicine and medical education

Principle: The medical profession has a moral and professional responsibility to address the structural and interpersonal racism that threatens the health and health care of marginalized communities with the same rigor and commitment that it has addressed patient safety and quality so that all patients in all communities have confidence that:

- health systems are designed to seek out and eliminate health care disparities;
- all physicians have been educated in a curriculum designed to address structural racism in medicine and medical education and are committed to engaging in doctor–patient relationships with cultural humility; and
- medical schools recognize the imperative of and are committed to diversifying all mission areas and all specialties in which physicians contribute, using strategies that

Table 3
Habits of Mind for the Physician Workforce of the 21st Century

Habits of mind: Commitments to	Core beliefs
Social justice	<ul style="list-style-type: none"> • Systems of government and of scientific thought have not been structured to provide equal access to benefits to all people. • Structural oppression has led to individual bias and disparities in social systems, including health care delivery. • Respectful engagement with others from different backgrounds requires cultural humility.
Scientific curiosity	<ul style="list-style-type: none"> • Complex problems of today require exploration through a variety of disciplinary lenses. • Current concepts must be challenged to generate new knowledge. • Investment in research in all fields is imperative.
Growth mindset and continuous improvement	<ul style="list-style-type: none"> • The purpose of assessment is to ensure that all physicians reach the expected level of competency. • Feedback and coaching from all colleagues in all professions can guide growth when combined with personal reflection. • High-quality systems are needed to protect vulnerable patients from fallible human beings. • Data on outcomes of care and education can guide improvement.
Adaptive leadership and collaborative teamwork	<ul style="list-style-type: none"> • Solving complex problems in health and health care delivery requires experts from different disciplines and professions. • Teams with demographic, lived experience, and disciplinary diversity are positioned to provide the most effective solutions. • Physicians must be prepared to know when they should step up to lead and when they are better suited to a supporting role.
Cultivating trustworthiness	<ul style="list-style-type: none"> • Trust implies a relationship in which one person or community is vulnerable and another has greater privilege. • Trustworthiness is earned through demonstration of character, caring, and competence; the least important of these is competence. • Trust propensity relates to past experiences of trust and betrayal; trustworthy individuals work to overcome trust reticence related to adverse past experiences.

increase the opportunity for diverse populations to thrive.

The literature has carefully documented the many ways in which structural racism contributes to poor health and health care outcomes and limits the opportunity for students from minority communities to enter, thrive once within, and successfully pursue the most competitive careers following medical school.^{17–19}

The comprehensiveness of the plan needed to achieve social justice is summarized by Frye et al: “To eliminate racism, nothing short of a revolution in thinking, believing, acting, and being will solve the problem.”²⁰ The profession must publicly acknowledge and commit to repairing the damage that has been done by the history of medical exploitation and experimentation on people of color, false teachings about race as a biological construct, and exclusion of people of color from the medical profession.

Achieving this goal requires a comprehensive strategy across the entirety of the medical education ecosystem with culture change as an essential element. All people who work, learn, care, and discover in the health professions must accept that our ability to serve our communities with the

best science, medicine, and education demands a diverse workforce, with all committed to achieving social justice. All policies and procedures in health care systems and medical education must be examined for differential impact on people from groups that have been historically marginalized by medicine. Admissions strategies to medical school, selection and ranking of residency candidates, and selection of faculty who set the culture and practices of U.S. medical schools must be redesigned to accelerate achievement of diversity. All assessment processes for students and residents, advancement processes for faculty, and selection processes for leadership must be similarly evaluated for bias and optimized for equity and diversity. Curricula across the education continuum must incorporate content that ensures that all physicians, not just those of color, understand the history of racism in medicine and the devastating consequences of structural racism on health and health care and are prepared with skills in structural competency and antiracism. Faculty must be educated to redesign existing lectures to incorporate the concept of syndemics, to eliminate race as a biological construct, and to employ language and cases that are respectful to all populations. At the national level, accountability strategies

must be imbedded in accreditation agencies. Furthermore, medical schools should decline to participate in any national summative ranking strategy that does not prioritize achievement of equity and inclusion as a core measure of excellence.

Goal 3: Design curricula to prepare all in the physician workforce, present and future, to embrace the breadth of roles and responsibilities needed to address syndemic causes of suffering from illness and disease

Principle: The canon of basic sciences and clinical skills that form the backbone of medical education must be redefined based on the types of problems physicians will be called upon to solve and the tools that they must be able to use.

The pandemic illustrated that all physicians must be able to understand complex mechanisms of disease that extend beyond traditional biomedical sciences. This requires schools and programs to reconceptualize the required “basic sciences” to include a broader set of scholarly disciplines (see Table 4). Shifting a focus away from teaching and assessing facts and toward a focus on threshold concepts of each of these disciplines can minimize concerns about lack of space in the curriculum. Baseline

Table 4
Foundational Science Disciplines

Discipline	Response to pandemic	Utility in syndemic responsiveness
Biological sciences	<ul style="list-style-type: none"> • Virologic etiology and mechanism of spread of pandemic • Management of physiologic derangements • Vaccine development 	<ul style="list-style-type: none"> • Investigate molecular basis of chronic metabolic disease in relationship to elements of toxic stress, specifically racism, environmental toxins, and poverty
Clinical and translational sciences	<ul style="list-style-type: none"> • Therapeutic trials of novel agents and respiratory support strategies • Clinical infection control strategies 	<ul style="list-style-type: none"> • Develop and test new therapies for chronic, severe mental illness
Social and behavioral sciences	<ul style="list-style-type: none"> • Counseling for behavioral change • Understanding the cause of differential impact of the pandemic on racial and ethnic minorities • Understanding and addressing vaccine hesitancy 	<ul style="list-style-type: none"> • Recognizing the consequences of structural racism within the profession of medicine and scientific discovery • Engaging with patients and their communities around social and behavioral change
Epidemiology and data science	<ul style="list-style-type: none"> • Pandemic tracking 	<ul style="list-style-type: none"> • Identification of health disparities by socioeconomic and other demographic strategies • Operationalizing population health
Ethics	<ul style="list-style-type: none"> • Ethical conduct of clinical trials • Ethical management of scarce resources and rationing 	<ul style="list-style-type: none"> • Ethics of limitations on reproductive health care by faith-based educational institutions • Ethics of for-profit health care strategies
Systems engineering	<ul style="list-style-type: none"> • Redesign of clinical care delivery • Continuous improvement of processes based on measured outcomes • Evaluation and investigation of differential outcomes by population 	<ul style="list-style-type: none"> • Investigate differential health care outcomes in care provided to populations that have been historically marginalized
Public health	<ul style="list-style-type: none"> • Population-level interventions (masking, quarantine) • Crisis communication 	<ul style="list-style-type: none"> • Advocacy for greater public health resources to address climate change, environmental toxins, and adverse social conditions
Education	<ul style="list-style-type: none"> • Effective continuing medical education • Mass education for laypeople 	<ul style="list-style-type: none"> • Novel methods in health professions education to address contemporary issues

competency required of all physicians can be defined as the competency needed to understand how different scientific disciplines investigate questions so that they can read and critically evaluate new discoveries relevant to their work. More advanced competencies in different areas fit with the role of translational and discovery-based physicians. National licensing exams must be prepared to redesign legacy questions with content that gives equal priority to the bodies of knowledge needed to address contemporary problems and tests mastery of concepts rather than searchable facts.

The pandemic disruptions also provided insights into how clinical skills training must evolve. The rapid uptake of telemedicine and remote electronic monitoring introduces a new set of skills that should become routine for all physicians as well as potential pitfalls in their implementation.^{21,22} The exposure of ways in which the inappropriate use of race as a biological construct can contribute to the types of health care disparities seen in the pandemic will require redesign of the way race, racism, and adverse social factors are respectfully incorporated

into clinical presentations, clinical reasoning exercises, and the patient-oriented medical record.²³ To fulfill the promise of computer-assisted diagnostic reasoning, physicians must be taught how these systems propose solutions and where and how elements of computer-generated bias may appear. Finally, the pandemic, with its “all hands on deck” needs, demonstrated the importance of interprofessional collaborative care and team-based systems improvement as core aspects of clinical skills instruction for all physicians at each stage of training.^{7,24,25}

Goal 4: Identify and address the most pressing causes of morbidity and mortality in communities across the nation by challenging medical education programs to partner with local communities and governments to focus educational programs on these issues

Principle: Each medical school and residency program should use the latitude they have in designing curricula and learning experiences to prioritize content that is relevant to the health and health care challenges in their communities, while also advancing the unique mission of their institution.

In the setting of a public health crisis that required flattening the curve of infections, academic health systems worked intensely with faculty and student volunteers and community leaders to bring health care to medically and socially underserved communities. In the new vision for medical education, individual institutions would accept the responsibility to design their curricula and student learning experiences to address the need for pandemic preparation as well as the ongoing, unsolved causes of morbidity and mortality within its community. Doing so would require redesigning medical school approaches to community service-learning experiences to move from unidirectional engagement activities to reciprocal and respectful partnerships.²⁶

Goal 5: Facilitate growth mindsets and support lifelong learning physicians—and promote equity in learning environments—by adopting a standard of programmatic assessment strategies across the continuum of medical education

Principle: Equity in assessment means that the learning environments in which our learners are assessed and the faculty

interactions that learners have are designed to foster growth rather than competitiveness; that all learners are assessed, graded, and advanced based on strategies that focus on equity; and that the opportunity to be recognized and to enter into desirable careers is based on a learner's demonstration of achievements that predict future success in the field of medicine.²⁷

Assessment is used to guide learning, coach learners to more advanced competencies, decide on when a given learner is ready for more independence in patient care and learning, and select graduates for future careers. With the movement of learners across many different institutions, equitable and growth-focused assessment strategies must transcend boundaries and thus, a national approach to assessment is essential to a transformed medical education ecosystem.

Current practices in GME, Continuing Medical Education, and maintenance of certification employ criterion-based, pass/fail assessment strategies. Despite this, UME institutions have remained adherent to normative assessment strategies (e.g., top of the class) and use more granular grades (e.g., honors, pass, fail). This grading and ranking approach has been associated with several adverse consequences: fostering a performance rather than growth mindset among learners, increasing learner stress, decreasing teamwork, and inequities in educational and career opportunities.^{28–30} The pandemic simultaneously emphasized the importance of focusing on discerning competency in all physicians rather than identifying excellence in some and presented barriers to sustaining granular grading strategies. These insights and disruptions present an opportunity to recognize the limitations of and harm caused by assessment for ranking and instead adopt programmatic assessment as the national approach for assessment of aspiring and practicing physicians.

Programmatic assessment collects qualitative and quantitative data from many sources to support criterion-based rather than normative decisions. It uses these data to provide frequent feedback to learners, enabling coaching for improvement (assessment *for* learning) before the high-stakes summative

event (assessment *of* learning).³¹ Programmatic assessment does not rely on a single faculty member to decide on competency or a single assessment tool to document that competency. Instead, it aggregates multiple snapshots of performance (e.g., input from all members of the health professions team; review of written work, exam scores, peer evaluations) and a description of the context in which the assessment took place to provide a picture of the learner's true abilities

Programmatic assessment has many benefits. Assessment strategies that provide multiple elements of formative feedback before high-stakes summative feedback increase the willingness of learners to seek and use feedback and decrease anxiety about grading. The use of multiple instances of feedback from multiple evaluators can minimize the impact of bias on individual learners from an individual or a particular assessment instrument.^{32,33} Criterion rather than normative strategies and pass/fail rather than more granular grading mitigate the inequity that results when small differences in observed performance translate into larger differences in earned rewards.³⁴ Finally, comprehensive data synthesis enables all stakeholders to have greater confidence in their assessment.³¹

The evidence on the benefits of programmatic assessment and assessment for learning and competency evaluation is clear. However, given entrenched views on the imperative for ranking medical students for ease of residency selection in competitive programs, nothing short of a national directive to redesign the ways in which assessments are conducted, and the results of those assessments are used, will be successful.

Goal 6: Protect patient safety while improving the efficiency of training by implementing competency-based training

Principle: Learners across the continuum of medical education should have the ability to advance to another educational opportunity only when, but as soon as, they have successfully demonstrated the breadth of competencies needed to succeed in that next endeavor.

Most medical education programs, licensing agencies, accreditation

organizations, and certifying boards have historically relied on some combination of time in program, on specific rotations, or case volume minimums as proxies for competence.³⁵ In the setting of pandemic-related scarcity of clinical training opportunities and as government officials requested early graduation of students to bolster the physician workforce, these traditional requirements were relaxed, allowing the physician workforce pipeline to continue unabated.

Competency-based, time-variable (CBTV) education is a strategy that can increase the flexibility of the medical education program while protecting patients from physicians with critical competency deficiencies.³⁶ CBTV describes clear criteria for advancement to the next phase or stage of education, relying on the demonstrated abilities of each individual rather than the time-bound proxies for competence. CBTV can provide the opportunity for learners who have demonstrated competency in all required domains to advance early and assume a new role within their home institution or at a designated residency, or on a pandemic response team.

Alternatively, they may choose to focus on adding new skills. CBTV allows that some learners need more time to achieve expected competency. In this circumstance, CBTV provides an important safety net for ensuring that learners do not progress until it is safe that they do so. Empiric data support that competency-based training can be highly effective. Its full benefits are constrained, however, by internal systems that rely on a certain number of residents to manage the clinical workload and external systems, such as a single transition point between medical school and residency each year. Canada has embarked on an ambitious program to move all residency programs to a competency-based approach.³⁷

CBTV can also increase efficiency in the educational environment. If one student has progressed more rapidly in one aspect of their training, they can cede valuable clinical learning experiences to peers who need more time to achieve baseline competency. CBTV can also support personal-professional balance in individuals whose training is altered because of illness or family building activities.

Goal 7: Increase equity, affordability, effectiveness, and efficiency of selection processes by redesigning national systems and investing in national technology platforms

Principle: Policies and operational procedures for admission into medical school and selection for GME training should be aligned to achieve the transformational vision and designed to support optimal outcomes, while also minimizing nonvalue-added work for students and programs.

The pandemic-related move to all-virtual medical school and residency application processes allowed learners across the continuum to explore programs and demonstrate their abilities without the thousands of dollars in travel expenses that the typical interview season demands. This not only increased affordability but also equity in the admission processes by not further advantaging those with greater wealth. However, the pandemic highlighted areas where the legacy practices of the National Residency Matching Program (NRMP), the Electronic Residency Application Process (ERAS), and program-specific selection and ranking practices merit redesign to improve the equity and efficiency of the process and decrease unnecessary learner stress.

The development and widespread adoption of a more standardized and robust performance database that could track learners across the continuum of medical education would enable programs to evaluate learner growth trajectories as well as their current performance levels in the broad set of competencies needed to succeed in residency and beyond.¹¹ Artificial intelligence strategies hold promise for streamlining admissions processes by enabling the identification of different types of learners, using a wider dataset than grade point averages and scores from high-stakes exams.³⁸ Design and adoption of criterion-based (rather than normative) standardized letters of evaluation could highlight the types of critical issues that often are discussed in surreptitious sidebar conversations between programs and school faculty. Transparent and accessible information about the type of individual who will thrive in each residency program could decrease the number of programs that

learners apply to and minimize the flood of applications that prompt programs to use arbitrary screening metrics to cut down on the number of applications they review in depth.³⁹

The impending move to a pass/fail reporting on the U.S. Medical Licensing Examination Step 1, along with the current pressures faced by programs dealing with high volumes of applications and applicants struggling with a maldistribution of interview slots, has prompted many to propose substantial redesign of the NRMP and ERAS processes. Proposals have included specialty-specific, evidence-based caps on applications; student preference ranking of programs at the time of interviews; and a multistaged match.⁴⁰⁻⁴³ More fundamental redesign of the NRMP processes might include a twice-a-year match cycle to facilitate entry into the workforce during times of pandemic need; increased flexibility for learners and programs in an environment of CBTV education; support for altered educational trajectories as often required for learners with childbearing, child-rearing, or illness-related leaves of absence; and decrease educational debt of and time to independence for populations of students, including but not limited to physician-scientists.

Goal 8: Protect the workforce by prioritizing learner and physician well-being

Principle: Aspiring and practicing physicians should be able to learn and work in environments in which their well-being is safeguarded so that they can thrive in their personal as well as professional lives.

Stories in the media showcased the extraordinary burden that individual health care providers shouldered during the pandemic, often leaving their own families to safeguard their health, while caring for the loved ones of other families. Across the nation, health systems quickly put in place new strategies to provide support to help address the physical, social, and emotional burden of providing health care during these extraordinary times.⁴⁴ Meals, novel methods of mental health support, chaplaincy services, and hotel accommodations were offered to frontline providers caring for patients with

COVID-19 by health care institutions, industries, and social organizations. However, other frontline care providers, including trainees, struggled to sustain their professional responsibilities because of the absence of elder/dependent care, childcare, and sustainable K-12 education programs.

The stresses of balancing professional and personal lives will endure following the pandemic. Ample literature suggests that those who embark on careers in medicine are more likely than peers to suffer from burnout, depression, and suicidal ideation. Women in medicine and science are more likely to leave the profession because of challenges managing caregiving responsibilities, a phenomenon exacerbated by the pandemic.⁴⁵

The ability to alter work responsibilities and provide greater social support to care for the caregivers in the midst of a pandemic provides evidence that these types of interventions are feasible when disaster strikes. To sustain the health and well-being of our current and future health care workforces, medical schools and health systems should advocate with payers to permanently remove requirements for nonvalue-added documentation work; build robust systems with easily accessible well-being and mental health support; and collaborate with other organizations to expand affordable, high-quality, and easily accessible caregiving systems to support working families. Medical schools and residency programs should embrace competency-based training to support flexible and potentially shortened training times; eliminate practices, such as arbitrary and competitive assessment strategies that increase unnecessary stress; and guarantee adequate amounts of paid childbearing and child-rearing leave for residents and fellows.⁴⁶

Goal 9: Address health care access issues for underserved communities across the nation through innovative partnerships

Principle: All patients deserve ready access to preventive and therapeutic care for acute, chronic, and life-threatening illnesses as a critical component of a healthy community.

The pandemic drew attention to the geographic maldistribution of physicians

and health care systems in communities across the nation. Visiting teams of health professionals provided desperately needed support to underresourced communities. While a critically important element of disaster response, those teams must leave at some point leaving those communities still underserved with respect to the ongoing threats to health.

Achieving a transformational vision to ensure that all communities have access to the physicians they need is a tremendously complex undertaking, requiring close collaboration not only with academic health systems but also with local, state, and federal agencies that can devise policy and procedures to fund education and health care in all communities. Strategies exist to address geographic or demographic access issues. Universities and medical schools can collaborate to establish robust pipeline programs from minority-serving institutions and with high schools and community and state colleges in underserved communities. These pipeline programs must be designed by medical education and workforce experts and resourced in a sustainable way to carefully nurture learners into and through medical school into residency programs. Medical schools across the nation could also build regional campuses in medically underserved areas to allow students to be close to their communities of origin, enabling them to put down roots that increase the likelihood of a long-term commitment to those regions. Debt cancellation for students who return to these communities, along with guarantee of an acceptable compensation for remaining in the communities would further increase the likelihood of a sustainable workforce.

More ambitious programs could quickly increase the number of physicians in geographically underserved regions and establish an expectation that all members of the medical profession have an obligation to support communities in need. For example, the federal government could require all medical school graduates to agree to a period of national service following first board certification in exchange for federal underwriting of medical school tuition, fees, and living expenses. This could take the form of dedicated years of work or

of the equivalent of the National Guard strategy, with weeks or weekends of work required each year.

Goal 10: Strengthen and promulgate the social contract between the medical profession, the public, and state and federal governments in support of health and well-being

Principle: The tenets of medical professionalism proclaim to society the work that they can expect the medical profession and individual physicians to embark upon as they care for patients and work to improve the health of our communities. That proclamation must also be clear about the work that society needs to do in partnership with physicians and the profession to achieve the best outcomes.

The social contract on which medical professionalism is based implicitly expects physicians to respond to a call to duty to care for the sick and injured, regardless of the risk to self. In exchange, the profession is afforded the right to self-regulation.⁴⁷ During the pandemic, physicians (and other health professionals) did respond to care for patients suffering from a deadly virus and, in some circumstances, did so without adequate support or protection because of failures of systems at the institutional and national level and inadequate investment in public health.

The lessons from the pandemic reinforce the soundness of the fundamental principles of primacy of patient welfare, patient autonomy, and social justice outlined in the Physician Charter on Medical Professionalism.⁴⁷ However, the lived experience endured by physicians and patients during the pandemic in contrast to decisions made by government officials and unimpacted members of the society suggests that a redesign of the social contract with clarity about mutual expectations and responsibilities is overdue.⁴⁸ A redesign of the social contract from the medical profession might include a pledge to embrace an expanded set of responsibilities for the syndemically prepared physician. Those include the set of impactful commitments outlined in this vision to forcefully and expeditiously advocate for social conditions that support public health; reverse the consequences of structural oppression

in health care and medical education; eliminate health care disparities, discrimination, and gender harassment in medicine; and build systems that foster well-being for all of those who work to provide health care.

These responsibilities move the workforce away from a professional identity as dispassionate and neutral observers in the policy realm to one of greater influence and advocacy.⁴⁹ In accepting this revised role, physicians and other members of the health professions can leverage their commitment to duty and altruism to guide governments at all levels and the broader public to make decisions that both optimize health for populations (e.g., eliminating poverty, improving access to health care, addressing climate change and environmental toxins) and eliminate unnecessary risks to health care professional (e.g., from poorly implemented public health directives, inadequate protective equipment, systems and policies that precipitate burnout and moral distress).

Conclusions

Medical education exists within a complicated ecosystem that includes universities, health systems, accrediting bodies, regulatory agencies, licensing bureaucracies, specialty organizations, and certifying boards. Academic institutions, including medical schools, are designed for innovation in science and stability in core processes such as coursework, grading, and promotion and tenure. The complexity of the ecosystem, the comfort of stability, the confidence of faculty about existing practices, and the concerns about risk and feasibility of new ideas combine to make significant change challenging and optional—until there is no option but to transform.

Consequently, seizing the urgency to transform will require collaborative and strategically engineered action. National leadership will be needed to establish governance strategies, build systems, establish metrics, and design accountability structures for, as well as troubleshoot progress toward transformation. The National Academy of Medicine has established itself as a trusted body to convene experts to establish, synthesize, and disseminate evidence on critical problems and

potential solutions to support change. The Coalition for Physician Accountability, as an organization of organizations, has demonstrated leadership during the pandemic and is currently working to improve the UME-to-GME transition. To succeed in transformation, they should be joined by the Association of American Medical Colleges Council of Deans and Council of Teaching Hospitals, as convened leaders of academic health systems, who have the necessary credibility, breadth of expertise, and scope of authority to oversee this work at the frontlines, where education and health care meet. Since health professions education is where high-quality health care begins, it is time for the National Institutes of Health to launch an institute that funds research into effective educational strategies.

The COVID-19 pandemic and associated racial unrest are once in a generation, transformational forces that should embolden us to embark upon a multiyear initiative to redesign the American health care and medical education systems to fully meet the needs of patients and society. The year 2020 will be viewed as a strategic inflection point if those who lead and regulate medical education analyze and apply lessons learned from the pandemic. Optimizing the preparation of the physician workforce to address the next pandemic as well as the unsolved health care needs of our patients and communities will require attention to the goals of medical education programs; the competencies and roles of individual physicians; the composition, deployment, and responsibilities of the physician workforce; and the design of systems that oversee the continuum of medical education. Successfully navigating this and future crises on behalf of a society that expects and deserves a robust pipeline of well-trained physicians to meet their health care needs requires a commitment from all within the ecosystem to make the choice to transform.

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