

VIEWPOINT

Medical Education Takes a Step in the Right Direction Where Does That Leave Students?

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With guidance from the Federation of State Medical Boards (FSMB) and the National Board of Medical Examiners (NBME), the United States Medical Licensing Examination (USMLE) announced on February 12, 2020, that beginning at the earliest on January 1, 2022, the Step 1 licensure examination would change from reporting the results as a 3-digit score to reporting the results as pass/fail. The potential consequences of this decision are wide ranging, and the implementation of this policy will have substantial implications for training a new generation of physicians. This modification in score reporting requires careful consideration of the options moving forward, including potential benefits and challenges this change may create. While this change is part of a concerted effort to improve student wellness and clinically focused education, this announcement, perhaps paradoxically, also will generate uncertainty and anxiety for a cohort of students caught in the transition period, and for future medical students.

The stated purpose of the Step 1 examination is to ensure eligibility for medical licensure.¹ However, given the increasing proportion of US medical schools that have transitioned toward pass/fail preclerkship grades (76.8% of Liaison Committee on Medical Education–accredited

Some students, especially those seeking more competitive residencies, have not focused on their schools' preclinical curricula and instead have focused on studying for the Step 1 examination.⁶ Combined with the pass/fail preclinical curriculum now present at many schools, it is the impression of some educators that students are incentivized to rely on Step 1 test preparation material rather than lectures and laboratory sessions to cover in-house curriculum assessments. This perspective may be valid: average Step 1 scores have increased by approximately 0.9 points per year (up from a mean score of 200 in 1992 to a score of 233 in 2018 among medical students who successfully match).⁵

The primary focus of medical education should be to obtain the knowledge and skills required to be effective, knowledgeable, and empathetic physicians, and much of this comes from the education provided by medical schools. The pursuit of a competitive Step 1 score may come at the expense of these overarching objectives, with students placing an emphasis on test preparation strategies rather than the pursuit of clinical excellence in less easily tested skills such as communication and empathy.⁶ Given these realities, the pass/fail change for Step 1 may foster a new environment in which students will learn more for the sake of becoming excellent physicians rather than performing well on a high-stakes examination.

But this change comes with challenges. The evolution of medical school curricula has led to differences in the length of preclinical training among institutions. While it is customary for students to take the Step 1 examination at the end of preclinical training (usually in year 2 of medical school), the actual timing varies significantly. This variation is amplified by numerous students who pursue additional degrees or interrupt their medical education with research years. Therefore, beginning at earliest in 2022, residency program directors will encounter the challenge of evaluating a heterogeneous applicant pool with respect to reporting results from the Step 1 examination, that is, some applicants will have 3-digit scores while others will have only pass/fail designations. Individual programs will develop internal guidelines for handling the situation, but barring external oversight, such guidelines will vary among institutions and residency programs. This ambiguity could create uncertainty with the already complex process of the NRMP. Students are likely unsure how a numerical vs a pass/fail Step 1 result will affect the relative success of their applications to residency programs. On this point, greater clarification is needed.

Eliminating Step 1 numerical scores may alleviate an immediate pressure to “test well” for competitive residencies, but it also could leave a challenge in differentiating applicants.

schools in 2018–2019, up from 61.7% of schools in 2014–2015),² many residency program directors across the country have prioritized an objective, quantitative measurement of medical knowledge in the form of the Step 1 examination to consider applicants for interview. The numerical score of the test has been used as a cutoff value for evaluating residency applicants without evidence that small differences in score provide predictive value for clinical success.³ According to the 2018 National Resident Matching Program (NRMP) Program Director Survey, an applicant's Step 1 score is the most widely cited factor in determining which candidates to interview, with 94% of programs reporting its use.⁴ Regardless of this utility, the increasing use of scores as a cutoff for residency applications is contrary to the purpose and design of the Step 1 examination.^{1,5} In the context of this increasingly competitive examination, test preparation companies have found a niche, producing “high-yield” study resources to distill a massive preclinical education to the material most likely to appear on the Step 1 examination.^{5,6}

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To understand how to prepare for residency success, it would be helpful if the NBME and FSMB announced how Step 1 scores (for examinations taken both before and after January 2022) will be reported to program directors. As a possible approach, after January 2022, the NBME could consider not issuing 3-digit scores regardless of the actual testing date. The fundamental impetus for the score change (ie, the limited utility of Step 1 as a stratifying tool) exists now and will continue to exist beyond 2022. Current students applying to residencies in the future should not be affected by these well-described limitations with examination scores.

Eliminating Step 1 numerical scores may alleviate an immediate pressure to "test well" for competitive residencies, but it also could leave a challenge in differentiating applicants. This void may be filled by a combination of factors that may create their own issues. One likely factor is the USMLE Step 2 Clinical Knowledge examination, the second board examination that medical students complete, typically in their fourth year of medical school. To ease the transition of the pass/fail change to Step 1, the USMLE has determined that Step 2 Clinical Knowledge should remain graded numerically.¹ Very likely, given its quantitative nature, Step 2 Clinical Knowledge will begin to have a more prominent role in resident selection, and more programs may potentially require the scores from this examination as part of a residency application. Although Step 2 Clinical Knowledge has a larger clinical focus, it could create the same challenges as Step 1 by assigning undue weight in application success to a numerically scored examination intended for licensure, not applicant stratification. Furthermore, there are potential adverse effects on students and medical school culture if subjective (and nonstandardized) grading criteria, such as school-specific clerkship evaluations, become more influential in the NRMP.

Most important, residency program directors may increasingly favor medical school prestige as they make their decisions about applicants. Medical students from some schools may end up applying to more programs than in the past, another major concern in medical education.⁷ This presents a worrisome scenario: when students from highly ranked academic institutions apply to residencies with a slate of "pass" grades and a "pass" Step 1 examination score, they may be seen as uniformly more qualified than students from lower-ranked academic institutions with the same denotations on their applications. Should medical school ranking become the next most important stratifying feature, this shift will only exacerbate existing concerns about how medical students are selected for residencies. The potential effects on pre-

medical students could be substantial as well. If institutional prestige becomes a determining factor in future residency options, additional stress may accompany the medical school application process. The stratifying nature of Step 1 should not transfer forward to Step 2 Clinical Knowledge, but it should also not transfer backward to the Medical College Admission Test. Despite its shortcomings, Step 1 provides an opportunity for comparison of students across medical institutions, allowing performance rather than pedigree to be an important determinant of a student's competitiveness for the match. By removing one of the few universal and objective preclinical measures without an immediate replacement, more opportunities are inevitably being introduced for disparities and biases to manifest.

The priority now should be to provide an objective and fair opportunity for medical students to distinguish themselves without relying on subjective assessments or transferring focus onto another single high-stakes examination like Step 2 Clinical Knowledge. One proposal is to use NBME Subject Examinations ("Shelf Exams"), which are administered during clerkships, as a measure of objectively assessable clinical knowledge. Developing specialty-specific standardized clerkship evaluations with national standards could also improve objectivity in evaluating medical students. Taken together, a series of standardized assessments of knowledge and objective evaluations of clinical skills could provide program directors with sufficient information to make preliminary decisions regarding possible interviews. These measures could potentially prevent any individual assessment from having a disparate effect on a candidate and also could help avoid the use of licensing examinations for something they were not designed for.

Removing numerical scoring from the USMLE Step 1 is a welcomed change to the process of residency applications. But without other concurrent changes to the system, the stress and uncertainty that may be alleviated from not having to perform well on a high-stakes Step 1 examination may simply be transferred to other aspects of medical education, and there is a risk of conflating institutional prestige with individual ability. A potential solution is providing clear guidelines and methods of evaluation that avoid transferring Step 1 anxiety to less controllable or similarly flawed evaluation metrics. One immediate helpful measure could be to change the manner of reporting for Step 1 scores after January 2022. More important, perhaps, is to recognize that current tools to assess residency candidates are limited and remain in need of improvement.

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VIEWPOINT

Change in Reporting of USMLE Step 1 Scores and Potential Implications for International Medical Graduates

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The US physician workforce includes allopathic physicians, osteopathic physicians, and international medical graduates (IMGs), who are physicians who received their medical school education outside the US or Canada. These physicians comprise both US citizens (US IMGs) and citizens from other countries (non-US IMGs) who have trained abroad. The US health care system has depended on IMGs to fill residency positions since the 1970s. Today, 1 in 4 physicians practicing in the US is an IMG.¹ One estimate from 2001 suggested that if IMGs in primary care practice were removed, 1 of every 5 “adequately served” nonmetropolitan counties may become underserved and the percentage of rural counties with physician shortages could increase to 44.4%.² This trend continues with the J-1 exchange waiver called the Conrad 30 Waiver, which enables IMGs to continue practicing in the US only if they commit to practice in a federally designated Health Professional Shortage Area, Medically Underserved Area, or Medically Underserved Population for at least 3 years.³ With a projected shortage of an estimated 125 000 physicians by 2025, IMGs will remain an important source of primary care physicians in rural and underserved areas.

In the life cycle of an IMG, scoring well on the United States Medical Licensing Examination (USMLE) Step 1 is an important accomplishment. Doing so not only indicates success on the examination but also increases the likelihood that an IMG could secure a residency position in a training program in the US. The USMLE Step 1, often considered one of the most difficult tests in medical education, assesses concepts of basic medical knowledge with special emphasis on principles and mechanisms underlying health and disease.

In 2018, a total of 42 420 students took the test, and the cumulative pass percentage was 86%.⁴ Until recently, USMLE Step 1 results were reported on a 3-digit scale with a minimum passing score of 194. On February 12, 2020, the USMLE announced that there will be a change in score reporting from a 3-digit numerical score to reporting only a pass/fail outcome, beginning sometime after January 1, 2022.⁵

Traditionally, USMLE Step 1 scores have been an important component in the residency application process and selection of candidates. According to the National Resident Matching Program 2018 Program Director Survey, across all specialties, 94% of the 1233 programs cited the USMLE Step 1 score as an important factor to select candidates for interview.⁶ Furthermore, 64% of the programs reported that they require a target score to screen applicants, whereas only 12% of programs reported that they often consider interviewing applicants who failed in the first attempt to pass Step 1. After completion of interviews, 78% of the programs still considered Step 1 scores for ranking applicants.⁶

Recently, an Invitational Conference on USMLE Scoring (InCUS) was held by the USMLE along with the Federation of State Medical Boards (FSMB) and the National Board of Medical Examiners (NBME), during which recommendations regarding the current structure of medical and residency application process were discussed.⁷ An important focus of this conference was to implement system-wide changes to improve the transition from undergraduate to graduate medical education, a matter of great concern in academic medicine. With the goal of supporting the educational engagement and overall experience of medical students, reducing the current overemphasis on Step 1 scores, and promoting student well-being, a decision was made to change the Step 1 score reporting to pass/fail.⁵

The NBME and FSMB indicate that moving to pass/fail reporting of Step 1 while retaining a scored Step 2 Clinical Knowledge (scored on a 3-digit scoring system between 1 and 300) represents a positive step toward system-wide change while limiting large-scale disruption to the overall educational and licensing environment. Furthermore, the Educational Commission of Foreign Medical Graduates (ECFMG) has supported the decision of the NBME and FSMB boards on these policy changes.⁸

While this change to pass/fail reporting of Step 1 examination scores might have an overall positive effect on educational engagement and overall experience of medical students, it might make the current scenario of residency match more complicated for both medical students and program directors. There is no doubt that some material on USMLE Step 1 is esoteric, and it is unclear how well the results on this examination are associated with “success” as a physician. If the goal is to reduce test anxiety and the content cannot be fixed, why not abolish the examination? This would also reduce the financial burden on students.

Despite their limitations, standardized tests such as the USMLE provide an objective measure of the knowledge, problem-solving skills, and resilience of an IMG. Changing the scoring system without global reform amplifies the already prevalent issues of IMGs obtaining clinical experience in the US, potentially conducting research to enhance their application, and obtaining letters of recommendation from individuals who are recognized by residency directors. The change to pass/fail may make an already uphill battle more challenging for applicants, for several reasons.

First, despite the perception that the USMLE Step 1 score was overused and overemphasized in the Electronic Residency Application Service, for IMGs it often provided a visible metric of their credibility. Traditionally, the mean Step 1 scores of matched IMGs (mean score, 228) have been higher than unmatched IMGs (mean score, 216.5), indicating that USMLE Step 1 scores play a significant role in the National Resident Matching Program match for IMGs.⁹ The scores may have served as a stamp of the strong candidacy

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of an IMG, given that some program directors may be unfamiliar with training in international medical schools. In addition, grades from international medical schools are not congruent with the grading system of US medical schools. Given this significant variation in the duration of training, curriculum, and grading systems across various countries, until recently the USMLE served as a “standardization” tool for this process. Thus, having a good Step 1 score helped to level the playing field and enable IMGs to have an opportunity for being selected for a position in competitive residency programs.

Second, this change could lead to increased emphasis on bolstering other aspects of an IMG's application for residency programs, such as competitive clinical electives, excellent letters of recommendation, a strong research profile, and networking. Despite having clinical experience in their home countries, IMGs are required to demonstrate US clinical experience and provide letters of recommendation from US faculty. Currently, a formal and uniform pathway for IMGs to obtain this experience does not exist. This process is largely dependent on and limited by contacts, Health Insurance Portability and Accountability Act restrictions, US visa sponsorship, and the financial health of applicants. These challenges in obtaining clinical electives while living abroad coupled with the uncertainty of obtaining strong letters of recommendation in a 4-week elective rotation may severely limit the competitiveness of applications from IMGs if a standardized testing score is not used.

Third, similar issues affect the process of obtaining research experience. Because of limited formal channels for gaining this experience, IMGs often accept unpaid volunteer or postdoctoral research positions that have visa restrictions that prevent them from taking additional jobs to financially support themselves. This could expose IMGs to a risk of exploitation and additional financial pressure.

Fourth, IMGs have to pass rigorous board examinations in their home countries (similar to USMLEs) and, in some countries, are required to complete a mandatory year-long internship to graduate from medical school. Also, prior to US residency program application, many IMGs take all 4 USMLE tests (Step 1, Step 2 Clinical Knowledge, Step 2 Clinical Skills, and Step 3), which require at least a few months to a year to complete. These tests, along with accumulating US clinical experience and research experience, also lead to a significant delay in time from

graduation until application to residency programs, which could affect some IMG applications negatively. Many residency programs have graduation cutoff dates and could effectively filter out applicants who have been out of medical school for more than a prespecified time.

Fifth, with increasing enrollment in US medical and osteopathic schools¹⁰ and the DO-MD single accreditation merger in 2020, IMGs are increasingly required to distinguish themselves from applicants who are not at a similar disadvantage.

It has also been suggested that “application caps” could be instituted to prevent overwhelmed program directors from using scores as a filter as opposed to performing a holistic review of the applications. However, this would require the residency programs to have up-to-date application criteria listed on their website, including their ability to sponsor the various immigrant and nonimmigrant training visas.

All IMGs applying to US residency programs need to be certified by the ECFMG to demonstrate their readiness to engage in US graduate medical education. While the USMLE has been an important component of ECFMG certification, US clinical and research experience is not. Yet US clinical experience and research experience are important metrics considered by residency programs when evaluating IMGs. An outstanding USMLE Step 1 score at least partly makes up for limited US clinical or research experience on an IMG's application. Changing USMLE Step 1 assessment to pass/fail without reforming other aspects of the application process for IMGs could amplify existing disadvantages.

Studying and working in the US is attractive for IMGs because of the promise of meritocracy and fairness. In return, IMGs provide accessible, high-quality health care to patients in the US through their talents, diversity, and international perspectives. Therefore, entities such as the ECFMG, NBME, and FSMB should endeavor to establish a fair and formal pathway for IMGs to demonstrate equivalency of medical training.

An effective, equitable, and high-quality assessment is essential for IMGs to demonstrate their qualifications, compete for US residency positions, and continue to contribute to the US health care system. Ultimately, IMGs are valuable not because of outstanding test scores but because they succeed despite the odds stacked against them. This is the “American dream” exemplified.

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VIEWPOINT

The USMLE Step 1 Decision An Opportunity for Medical Education and Training

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The announcement by the Federation of State Medical Boards (FSMB) and the National Board of Medical Examiners (NBME), on February 12, 2020, to change score reporting of Step 1 of the United States Medical Licensing Examination (USMLE) from a 3-digit numerical score to pass/fail followed years of debate; more than 2 years of active discussion; comprehensive input from various groups including medical students, international medical graduates (IMGs), residents, medical school faculty and administrators, residency program directors, state medical boards, and members of the public; and review of many direct and indirect suggestions.

Even though the change will not take effect before 2022, the decision should encourage residency applicants, medical school faculty, and those involved in selecting candidates to review processes and identify opportunities by which medical students and IMGs transition into graduate medical education (GME) training positions. The decision has already enlivened nascent discussions at the Coalition for Physician Accountability,¹ whose participating organizations that oversee the assessment, accreditation, licensure, and certification of physicians are considering processes that

school learning. Secondary uses of the Step 1 examination (eg, for residency screening and selection) have gained in importance as significant changes have occurred in both undergraduate medical education (UME) and GME. Many medical schools now only report pass/fail grades on their transcripts for the first 2 years of instruction. The Balanced Budget Act of 1997, meanwhile, instituted caps on funded GME residency positions, intensifying competition for residency training positions as the number of qualified medical students and medical schools has increased.

Score reporting on the USMLE was identified as a potential area of concern several years ago when the sponsors of the examination undertook an analysis called the Comprehensive Review of the USMLE.² Focused on advancing innovations in various aspects of the program, they agreed to defer action to better understand secondary use practices and their unintended effects, such as heightened anxiety among examinees who were making career decisions about specialty training based on Step 1 examination performance.

In 2018, the FSMB adopted a policy on physician wellness that called on organizations involved in medical education and training to “[improve] the culture of medicine and [facilitate] open conversations about illness and wellness in order to promote positive change.”³ To explore examinee wellness, the NBME created a task force called Re-Examining Exams: NBME Effort on Wellness (RENEW).⁴ Both organizations began substantive conversations to explore what was happening around them, guided by the shared commitment of the USMLE program to provide state medical boards with important measures of the competencies of a physician while trying to improve the overall climate of stress and anxiety among medical students.

In 2019, both organizations partnered with the American Medical Association, the Association of American Medical Colleges, and the Educational Commission for Foreign Medical Graduates to convene a summit in Philadelphia called InCUS (Invitational Conference on USMLE Scoring), which included examinees, medical school faculty, residency directors, and sponsor representatives.⁵ The meeting generated a broad range of opinions and fostered rich information exchange. In addition to student wellness, other issues raised included the disproportionate attention students paid to Step 1 preparation to the detriment of other curricular elements, and the influence of Step 1 scores on applicants from groups historically underrepresented in

In making this decision, the FMSB and NBME are suggesting there should be less reliance on a single point-in-time licensing assessment like Step 1, which is focused on foundational sciences, to inform the transition from medical school to residency.

meaningfully recognize and prioritize desirable factors among residency candidates and also provide candidates with better information to guide their residency search and selection.

This Viewpoint discusses the rationale for the Step 1 decision, including some of the advantages, challenges, and opportunities that may lie ahead for USMLE examinees and those who use examination results.

The USMLE was created by the FSMB and NBME in 1991 on behalf of state medical boards as a multistep assessment to determine a physician's licensure eligibility. As physicians, regulators, and educators have focused on improvements in medical education and the licensure process, concerns have gradually grown about the deleterious effects of high-stakes examinations like Step 1 on medical student well-being and the potential adverse effects of such an environment on medical

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medicine. On a website created to solicit feedback and suggestions, more than 21 500 comments were received from individuals and organizations across the country and around the world.

While there was no unanimity among the various groups about the best path forward, following an internal review of possible Step 1 score reporting options, including the possibility of no changes or the adoption of other types of scoring, the staff and governance of the FSMB and NBME aligned around one decision—reporting Step 1 results as pass/fail. The decision does not substantively change the way state medical boards make their licensure eligibility decisions (passing Step 1 remains a requirement and first step, literally, for medical licensing) and it is balanced with the concerns and input received from many groups, especially examinees. In making this decision, the FSMB and NBME are suggesting there should be less reliance on a single point-in-time licensing assessment like Step 1, which is focused on foundational sciences, to inform the transition from medical school to residency.

In the short term, it is likely that all examinees will continue their current practices in preparing for these assessments. Some have posited that after the Step 1 score reporting change goes into effect, the Step 2 Clinical Knowledge examination may gain more importance for residency selection. The Step 2 Clinical Knowledge, in contrast to Step 1, is focused on clinical sciences, and there is evidence that correlates scores with clinical and other outcomes.^{6,7} It is hoped that organizations involved with medical education and training will use the period between the announcement and implementation of the change as an opportunity to create a better transition from UME to GME so that the stress associated with Step 1 is not simply transferred to Step 2 Clinical Knowledge. Many medical students already take Step 2 Clinical Knowledge before the residency application process and others may elect to take it sooner than they do now.

Many osteopathic medical students take Step 1 and Step 2 Clinical Knowledge to compete for residency positions and, given this change, more students may be prompted to take Step 2 Clinical Knowledge. The National Board of Osteopathic Medical Examin-

ers, which produces the 3-part Comprehensive Osteopathic Medical Licensure Examination for osteopathic physician licensure, is exploring score reporting changes to its examination. With a single accreditation system for GME nearing completion this year, there may be opportunities for collaboration to ease the transition from UME to GME for all medical students.

Because many IMGs interested in GME positions in the United States have already graduated from a medical school by the time they apply for residency positions, some have examination results available for all 3 steps of the USMLE. While the USMLE program does not require taking and passing Step 1 before being able to take Step 2 Clinical Knowledge, IMGs are required to pass Step 1, Step 2 Clinical Knowledge, and the Step 2 Clinical Skills examination (which is also pass/fail) for certification by the Educational Commission for Foreign Medical Graduates. That designation enables them to enter residency or fellowship programs accredited by the Accreditation Council for Graduate Medical Education, to take Step 3 (which has a 3-digit numerical score), and to ultimately become eligible to obtain an unrestricted license to practice medicine from a state medical board. Residency programs will likely continue to look at numerical scores on Step 2 Clinical Knowledge and Step 3 for residency screening and selection. It is uncertain whether residency program directors will also value seeing passing performance on Step 1 as part of their screening and selection process.

The USMLE program will continue to work with UME and GME communities and others as they explore a process that supports a career journey for physicians that the public can trust. Thaler and Sunstein⁸ have described “nudge” as an effort by which positive reinforcement and indirect suggestions can influence behavior and decision-making. Although primarily focused on behavioral economics, their work highlights how the right types of nudges can improve health and happiness. It remains to be determined how the change to Step 1 score reporting will be perceived. The change should certainly stimulate needed conversations about what other transformations may be required.

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VIEWPOINT

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Medical Student Education in the Time of COVID-19

These are unprecedented times. Although the necessary focus has been to care for patients and communities, the emergence of severe acute respiratory syndrome coronavirus 2 has disrupted medical education and requires intense and prompt attention from medical educators. The need to prepare future physicians has never been as focused as it is now in the setting of a global emergency. The profound effects of coronavirus disease 2019 (COVID-19) may forever change how future physicians are educated.

This pandemic presents practical and logistical challenges and concerns for patient safety, recognizing that students may potentially spread the virus when asymptomatic and may acquire the virus in the course of training. This Viewpoint discusses the current status of medical education, describes how COVID-19 may affect preclerkship and clerkship learning environments, and explores potential implications of COVID-19 for the future of medical education.

Medical Student Education in 2020

For more than a decade, medical schools have been working to transform pedagogy by eliminating/reducing lectures; using technology to replace/enhance anatomy and laboratories; implementing team-facilitated, active, and self-directed learning; and promoting individualized and interprofessional education.^{1,2} The development of entrustable professional activities and competency-based learning with identified milestones for achievement have transformed assessment. Many schools have decreased the basic science curriculum to 12 or 18 months while integrating clinical medicine within this timeframe and revisiting the basic sciences later in medical school.³

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Today, in most medical schools, students convene in physical settings during the first 12 to 18 months for interactive problem-solving or discussions in small groups; their physical presence in both inpatient and outpatient settings has been an unquestioned tenet of early clinical immersion experiences and the clerkship curriculum. The last 18 months of medical school may be individualized, with students participating in advanced clinical rotations, subinternships prior to residency, or scholarly projects. COVID-19 has the potential to affect students throughout the educational process.

How COVID-19 Affects the Preclerkship Learning Environment

Social distancing is the most effective preventative strategy since the emergence of COVID-19 pending devel-

opment of a vaccine, treatment, or both.⁴ By definition, this precludes students from gathering in learning studios, lecture halls, or small-group rooms. Within the past few years, many faculty were already “flipping” the classroom to provide individualized instruction for asynchronous learning “anytime/anywhere.” However, students still convened for small-group interactions, laboratory sessions, simulations, and technology sessions (eg, learning bedside ultrasonography), as well as for clinical instruction with standardized patients and in authentic patient care environments.

In response to COVID-19, medical education faculty have quickly transitioned the entire preclerkship curriculum to online formats that include content in the basic sciences, health systems sciences, and even in behavioral sciences. Small-group formats convene online in virtual team settings, and clinical skills sessions may occur online or, in some cases, may be deferred. Examinations have also transitioned to online settings. Updating content material may be a benefit of the online format and virtual activities seem functional, but outcomes of these changes will require subsequent evaluation. The transition from the workplace or medical school setting to home results in isolation, an increased use of email, and struggles with establishing boundaries between work and home, which could affect faculty, students, and support staff.

How COVID-19 Affects the Clerkship Learning Environment

What exactly is the role of the medical student in the clinical environment? Ideally, the student is part of the team as a learner who requires supervision. Formation of students' professional identity relies on teaching and role modeling in these settings as students learn to prioritize patients and aspire to altruism. The next question then is what level of student involvement during a crisis

best represents this prioritization? In other disaster circumstances, including natural disasters, blackouts, fires, and the September 11 attacks, students were able to continue their education and help in the effort. However, with the emergence of a highly contagious pandemic, students may transmit the virus unknowingly or contract the disease. Other contributing factors that limit the role of students in this clinical environment include lack of COVID-19 testing; diminished value of education, with cancelation of surgical procedures and routine appointments and the transition to telehealth formats; and lack of adequate personal protective equipment (PPE).

With the initial emergence of COVID-19, students were not involved in the care of patients with suspected or confirmed COVID-19, especially with the shortage of PPE. As infection rates increased, schools began

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to remove students from the clerkship environment and on March 17, 2020, the Association of American Medical Colleges provided guidelines suggesting that medical schools support pausing clinical rotations for medical students.⁵ However, specific geographic differences may lead schools to make individualized decisions based on unique circumstances.

What then could educators do to create experiences for students who are usually assigned to inpatient or outpatient rotations? The options are continually evolving but may include consolidating and moving clinical didactic sessions online earlier to allow for later entry into the clinical environment; creating and using available virtual cases; modifying the academic calendar to exchange later experiences (eg, scholarly work) and defer clinical rotations; and involving students in the telehealth environment, including electives based on experiences students are pursuing to enable them to assist and learn in this critical situation.

There is uncertainty regarding how long this situation will persist and increasing recognition that there may be periods in the future after reengagement in a "new normal" environment, in which quarantines and social distancing may again be required. The challenge is in providing authentic patient experiences for medical students as a key component of medical education under these circumstances. If schools defer clinical immersion experiences, there could be 2 full cohort classes of students in the clinical environment simultaneously and education could be adversely affected by the density of learners (which is already a problem in many geographic locations). Regarding accreditation, the Liaison Committee on Medical Education has provided resources to help medical schools.⁶

What Does the Future Hold?

The medical education environment is cross-generational. The former mindset that physicians would work when they were ill was considered to be altruistic and professional, with prioritization of the patient above the physician. However, the situation that COVID-19 represents is different. Clinicians who come to work while they are ill, as well as those who may be asymptomatic and silently incubating the virus, might facilitate transmitting the virus to others. Therefore, the culture of professionalism and altruism must be redefined and take into consideration the effects of potential actions, even with good intentions. This is all the more difficult because of the lack of COVID-19 testing and limited availability of PPE.

Additional unknown academic issues will require attention, including standardized examinations when testing centers are closed, the timeline for residency applications for current third-year stu-

dents, and the ability to meet requirements for certain subspecialties prior to applying to residency (eg, away rotations).

However, learners across the continuum of education have participated in many ways to care for patients and communities in this crisis. In medical schools across the country, students are volunteering in call centers, creating patient education materials, and helping with grocery shopping, among other activities, while adhering to physical separation, safe travel (walking, biking, or personal car), and supervision.

Recognizing the possibility that the COVID-19 pandemic could result in a health care worker shortage, students may need to be engaged as part of the workforce and embedded in the clinical environment. This situation could change rapidly, and medical schools will need to be nimble and flexible in their response. Some schools are considering early graduation with preparation of fourth-year students to engage as either volunteers or as residents earlier in the clinical environment. The latter may require university flexibility with regard to the conferring of degrees as well as revised processes for licensure.

Conclusions

While in the midst of this COVID-19 crisis, it is crucial that the academic educational community learns from the experience and prioritizes a forward-thinking and scholarly approach as practical solutions are implemented. Reflection and evaluation must follow. For educators, the expression "make your work count twice" (the first time for the job you are doing and the second to get the work published and disseminated [eg, creating a curriculum that you plan to use for scholarship by publishing it]) and the plan for educational scholarship has never been more imperative. One area in which students can serve and have a positive effect is as educators to their peers, patients, and communities, using the tools available through social media and other modalities to help influence behaviors in a positive way.

The COVID-19 epidemic may represent an enduring transformation in medicine with the advancement of telehealth, adaptive research protocols, and clinical trials with flexible approaches to achieve solutions. There are many examples whereby learning from difficult experiences (eg, emergence of HIV, response to disasters) changed discovery, science, and patient care. Students and educators can help document and analyze the effects of current changes to learn and apply new principles and practices to the future. This is not only a time to contribute to the advancement of medical education in the setting of active curricular innovation and transformation, but it may be a seminal moment for many disciplines in medicine.

ARTICLE INFORMATION

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