

One Small Step for Step 1

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Abstract

Step 1 of the United States Medical Licensing Examination (USMLE) is a multiple-choice exam primarily measuring knowledge about foundational sciences and organ systems. The test was psychometrically designed as pass/fail for licensing boards to decide whether physician candidates meet minimum standards they deem necessary to obtain the medical licensure necessary to practice. With an increasing number of applicants to review, Step 1 scores are commonly used by residency program directors to screen applicants, even though the exam was not intended for this purpose.

Elsewhere in this issue, Chen and colleagues describe the “Step 1 climate” that has evolved in undergraduate medical education, affecting learning, diversity, and well-being.

Addressing issues related to Step 1 is a challenge. Various stakeholders frequently spend more time demonizing one another rather than listening, addressing what lies under their respective control, and working collaboratively toward better long-term solutions. In this Invited Commentary, the author suggests how different constituencies can act now to improve

this situation while aspirational future solutions are developed.

One suggestion is to report Step 1 and Step 2 Clinical Knowledge scores as pass/fail and Step 2 Clinical Skills scores numerically. Any changes must be carefully implemented in a way that is mindful of the kind of unintended consequences that have befallen Step 1. The upcoming invitational conference on USMLE scoring (InCUS) will bring together representatives from all stakeholders. Until there is large-scale reform, all stakeholders should commit to taking (at least) one small step toward fixing Step 1 today.

Editor's Note: This is an Invited Commentary on Chen DR, Priest KC, Batten JN, Fragoso LE, Reinfeld BI, Laitman BM. Student perspectives on the “Step 1 climate” in preclinical medical education. Acad Med. 2019;94:302–304.

The United States Medical Licensing Examination (USMLE) is a four-step test designed to assess physicians for licensure. Cosponsored by the Federation of State Medical Boards (FSMB) and the National Board of Medical Examiners (NBME), it was developed in the late 1980s and implemented in the early 1990s, replacing the prior NBME and FLEX examinations. Step 1, the first of the steps, primarily measures knowledge about foundational sciences and organ systems. The test was psychometrically designed as pass/fail for licensing boards to decide whether physician candidates meet minimum standards to obtain the medical licensure necessary to practice.

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Results are reported as a three-digit number. Since its inception, Step 1 has been increasingly used, and some would argue misused, by medical schools to promote or graduate students and evaluate curricula. Residency program directors (PDs) use Step 1 scores to “screen” residency applicants to select which candidates to interview. Applicants judge the competitiveness of specialties by the average Step 1 scores of residents in that discipline. However, the test correlates best with performance on subsequent multiple-choice tests, such as residency in-service training and specialty board examinations, and less well with the clinical performance of residents.

Chen and colleagues¹ are the latest contributors to a debate that began in the early 1990s when the USMLE Step 1's role in residency selection was contested even before the exam was implemented.² As current and recent medical students, Chen and colleagues¹ poignant perspective adds thoughtful learner voices to the debate. They characterize a new facet of our learning environments, the “Step 1 climate”: the collective attitudes, processes, and behaviors situated within medical education that adversely impact “education, diversity, and student well-being.” They note the cottage industry of Step 1 test prep, which has hijacked, and frequently replaced, the individual curricula of medical schools. Even as

student debt escalates, students spend an additional \$50 to \$825 on proprietary resources, many of which fail to provide any feedback.

Many of these arguments are well known. Step 1 assesses only one of six core competencies recognized by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties (ABMS). Its silence on the others devalues them. Step 1 is psychometrically designed to discriminate a passing grade from a failing one for use in medical licensure. It does not differentiate “better” from “less better” performance and fails to correlate with clinical skills,³ residency progress,⁴ or faculty evaluations.⁵

But Step 1 does discriminate against people—by race, gender, and means. Performance differs by gender and race.⁶ Women,⁷ those historically underrepresented in medicine,⁸ nontraditional students, and students with financial need perform less well.^{9,10}

At the extremes, higher Step 1 scores predict higher scores on future multiple-choice tests. Yet, over 90% of residency graduates in pediatrics, obstetrics, orthopedics, anesthesia, and internal medicine pass board exams if their Step 1 scores are 200 to 227,¹¹ levels some PDs routinely “screen out.”

Tackling these well-documented issues is challenging. Various stakeholders frequently spend more time demonizing one another rather than listening, addressing what lies under their respective control, and working collaboratively toward better long-term solutions. We know, for example, that medical students do not feel their course work alone prepares them for Step 1, “prep” has become the de facto preclinical curriculum, and faculty do not like to teach to a test. One solution would be for Step 1 to become an eligibility requirement for medical school, as the Medical College Admission Test (MCAT) is now. Alternatively, medical students could matriculate and spend the first several months preparing for and taking it, using resources from their school, as well as supplemental proprietary and freely available resources. Khan Academy MCAT prep could be a model for future free Step 1 resources. With Step 1 completed, students could then focus on the curriculum the school provides. These solutions, however, do not address the lack of an evidence-based process to support PDs in residency selection. So, what actions can we take to meet the needs of all stakeholders? Each of our constituencies can act now to improve this situation while we await aspirational future solutions.

Considerations for Stakeholders

Schools of medicine

Step 1 anxiety is at least partially rooted in students’ concern that they will fail to match. Schools can ease this anxiety by (1) repaying tuition of any unmatched student or (2) guaranteeing (and funding) an intern position either directly or through an affiliation with another medical school or teaching hospital.

Medical schools and PD communities must move beyond the linguistic and cultural divides between ACGME milestones and Association of American Medical Colleges (AAMC) Core Entrustable Professional Activities for Entering Residency. We need a shared mental model of what last-day medical students/day 1 residents “look like,” and we need better tools to measure student achievement. The validity and credibility of assessments should be improved, and the learner “handoff” between undergraduate medical education (UME) and graduate medical education

(GME) must be honest and transparent. Several assessment methods could be optimized and embedded into the medical student performance evaluation. Medical student peer assessments correlate with later PD ratings. Peer assessments could be standardized across UME and GME settings.¹² Longer-duration experiences with the same faculty, such as in a longitudinal integrated clerkship, improve the faculty’s formative and summative assessments of students.¹³ Learners who have greater continuity with faculty and patients have improved clinical skills, and clinical schedules could be adapted to maximize these opportunities.¹⁴ “Machine learning” and artificial intelligence have already been used to assess interpersonal and communication skills and professionalism.¹⁵ “Progress testing” intermittently assesses all necessary competencies.¹⁶ Strategically employing these types of curricular and assessment methods and reporting students’ performance in an honest, transparent, and standardized way would enable a smoother transition between UME and GME.

To begin mitigating Step 1 anxiety even earlier in the pipeline, more students could be admitted to medical school with conditional acceptance to residencies, avoiding the Match altogether and potentially reducing tuition if transitions could be accelerated.¹⁷ Deliberate curation of the curriculum could allow the student aspiring to pediatrics, for example, to spend required clerkships in pediatric surgery, adolescent medicine, and child psychiatry. We must be sufficiently agile to optimize learning for students who know their specialty preference at school entry as well as those who discover or change their specialty preferences later.

NBME

The NBME could allow students to repeat Step 1 if they passed but were not pleased with their score. Unlike the SAT or MCAT, students who pass Step 1 are not allowed a “do-over.” By contrast, 24% of medical students took the MCAT twice, and 9% took it three or more times. Ninety-one percent improved their scores.¹⁸ Admittedly, a retake adds cost and time. However, knowing a retake is possible may lessen anxiety.

Substituting pass/fail scoring for Step 1’s numeric score may be desirable, but PDs

who currently use Step 1 scores to screen residency applicants would doubtless substitute a different screening method. Pass/fail scoring may have other benefits, though. The performance of women and men on the Step 2 Clinical Knowledge (CK) exam are essentially the same, and racial/ethnic differences on this exam are attenuated.⁶ Reporting Step 1 scores as pass/fail and numerically reporting a different portion of the USMLE—the Step 2 CK—would enhance “fairness.” An even better option might be to report Step 2 Clinical Skills (CS) scores numerically and to score Step 1 and Step 2 CK pass/fail. Step 2 CS is the only opportunity for all medical students to be directly observed in a standardized simulated clinical environment, similar to the “selection tests” used successfully in other countries.^{19,20} Step 2 CS predicts first-year resident history-taking and physical exam skills.²¹ It is far closer to the skills PDs expect at GME entry. Step 2 CS is the most expensive “step” because of registration costs and the need for most students to travel, yet it has limited value to students or PDs. Students receive no feedback except whether they pass or fail. PDs don’t value it because 96% of students pass. Step 2 CS could be repurposed, its psychometric properties enhanced, and relevant basic science content added. PD associations could contribute by collaboratively developing some specialty-specific “stations.” Applicants could consent to have a video of their performance on some of these stations sent to the residency programs to which they applied, similar to the current emergency medicine video interview pilot. If CS became a truly competency-based standardized exam, it might help level the playing field for diverse applicants and contribute to holistic review in GME. Underrepresented minority interns have been shown to perform similarly to majority counterparts on simulated clinical performance examinations (similar in style to Step 2 CS) despite statistically significantly lower Step 1 scores.²²

If PDs need a numeric score to use in screening applicants, assessments of new areas of essential scientific knowledge (health inequities, cultural humility, communication, ethics, data science, patient safety, interprofessional care), which are currently not well assessed in Step 1, could be included. Alternatively, structured interviews might be included

in the application process: Structured interview scores outperformed Step 1 and Step 2 CK in predicting intern performance.²³ A situational judgment test (SJT), using work-based scenarios to assess noncognitive professional attributes such as empathy, integrity, teamwork, and resilience, is another option.^{24–26} Measures of personality^{27,28} or “grit”²⁹ may provide even greater value.

The NBME could also consider eliminating Step 1 entirely and integrating more basic sciences into the other USMLE Steps, better representing how physicians apply basic science concepts in practice and supporting greater integration of clinical and basic sciences throughout the curriculum. Step 2 CS should be sunsetted if it cannot be enhanced to provide greater value.³⁰

FSMB

The FSMB should reexamine the need for USMLE examinations to support state licensing decisions regarding a physician’s readiness for supervised and unsupervised practice.³¹ Residency programs assess the former on a daily basis, and PDs of accredited programs assess the latter at GME completion. Because nearly all physicians are board certified, board certification and maintenance of certification may be a better substitute for the USMLE exams in supporting licensing decisions. NBME’s expertise might be better tapped in constructing a multicomponent test that is intentionally, intelligently, and psychometrically designed for residency selection.³²

PDs

Rather than allowing Step 1 preparation to be the de facto preclinical curriculum, PDs should collaborate with UME colleagues to create a UME curriculum that ensures that residency applicants have the knowledge, attitudes, and skills required to be successful residents. PDs could collaborate with NBME to develop decision support specifically designed for resident selection. PDs could begin by making the ACGME-required description of their program’s unique attributes available to applicants along with the explicit criteria they use to evaluate them.³³ In this spirit, one Canadian medical school specifically recommends, among other things, that selection of applicants should reflect the

residency program’s goals, emphasize all competencies equally, and promote diversity.³⁴

In the 2018 National Resident Matching Program PD survey, the Step 1 score ranked first out of 33 factors in deciding which applicants to interview, with 94% of respondents citing it as a factor.³⁵ Forty years ago, PDs ranked Part 1 of the NBME exam, Step 1’s predecessor, 23rd of 31 factors.³⁶ Yet, PDs reported that 8 factors were more *important* than Step 1 in deciding which applicants who passed the exam to interview. These factors were no prior Match violation; professionalism and ethics; perceived commitment to the specialty; grades in the specialty’s clerkship; specialty-specific letters of recommendation (LoRs); personal knowledge of the applicant; audition rotations; and Step 2 CS! Required clerkship grades, leadership, and perceived interest in the program were tied in importance with Step 1 scores.

If PDs truly need a “number” by which to screen applicants, perhaps an algorithm could generate one by capturing these elements. A multicomponent “test” to predict resident performance could integrate these factors.³⁷ A well-constructed SJT could assess professionalism, ethics, and leadership.

Emergency medicine PDs have modeled the improved reliability of specialty LoRs by implementing standardized letters of evaluation (SLOEs). They now rank SLOEs as the single most important factor in deciding which applicants to interview; Step 1 ranks 10th.³⁸ PD associations could design their own SLOE templates and create a standardized grading rubric for their specialty’s clerkship, committing to being accountable to one another in accurately portraying student performance.

ACGME

ACGME’s new common program requirements change the threshold for program graduates’ first-time board passage rates to higher than the bottom fifth percentile of programs in that specialty.³⁹ This should make PDs more comfortable in selecting an otherwise highly desirable candidate with slightly lower Step 1 scores if they are concerned about the impact of a graduate failing to pass the board examination on the first attempt.

Applicants

Applicants are split on whether they prefer Step 1 to be pass/fail. Not unexpectedly, those with higher scores prefer numeric grading, and those with lower scores prefer pass/fail.⁴⁰ Applicants should work with advisors to plan appropriate residency application strategies. They can use tools such as the AAMC’s Apply Smart for Residency,⁴¹ which includes data on how many applications it takes, given a particular Step 1 score, to maximize the chance of a match and reach the point of diminishing returns. For example, at a given Step 1 score, an applicant in pediatrics needs to apply to 19 to 29 programs for a 71% to 81% chance of matching, whereas an otolaryngology applicant must apply to 38 to 40 programs for a 61% to 82% chance of matching. Students can use these data to make better informed decisions about their residency application strategy and avoid the arms race of ever-increasing numbers of applications.

ABMS

Board exams should be criterion referenced. Specialty boards should provide greater transparency regarding correlation between USMLE Step exams and board exams. Doing so might demonstrate that many of these correlations are at best modest, and highlight the many other factors that influence board performance which are under the PD’s ability to control, such as structured reading assignments.^{42,43} These may enhance PDs’ confidence in recruiting candidates with skills beyond test taking.

Conclusion

If Step 1 were a diagnostic test, we would all educate learners and faculty to apply evidence-based principles in interpreting the results. Step 1 was not designed to, nor does it, predict success as a physician. Its misuse has created a “Step 1 climate”¹ inimical to learning, diversity, and well-being. We are collectively responsible for and must collaboratively solve this problem. The quickest solution would be to report Step 1 and Step 2 CK scores as pass/fail and Step 2 CS scores numerically. Existing data could be analyzed to determine how women, underrepresented minorities, and low-income students fare compared

with majority candidates. Obviously, any changes must be carefully implemented in a way that is mindful of the kind of unintended consequences that have befallen Step 1. There is a huge opportunity for improvement in the upcoming invitational conference on USMLE scoring (InCUS) which will convene stakeholders (AAMC, American Medical Association, Educational Commission for Foreign Medical Graduates, FSMB, and NBME) to explore options for addressing some of the challenges related to Step 1.⁴⁴ In addition to InCUS's important work, I have outlined ways in which we can all take (at least) one small step toward fixing Step 1 today.

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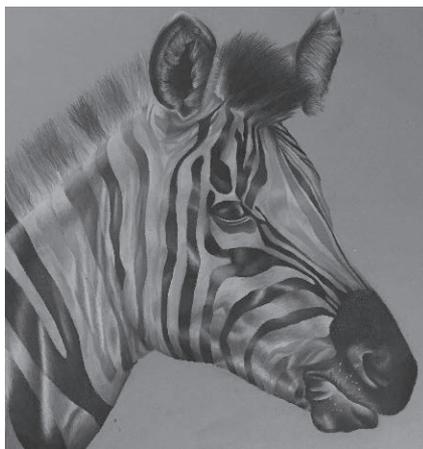
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Cover Art

Artist's Statement: Think Zebras

Most of the general population is familiar with the “horses” of medicine. These are the common diagnoses, such as a virus, pneumonia, anxiety, or a urinary tract infection. In the medical field, however, we as doctors are stretched to learn about the “zebras.” What if the 10th patient with a cough you see today doesn't have a virus but, rather, has an inhaled foreign body? What if the patient who appears anxious really has a pheochromocytoma (a tumor in the adrenal glands)? How do we tell the difference?

Medical education teaches us how to do this. During my pediatrics clerkship, I helped take care of a patient who was admitted to the hospital for mild dehydration after experiencing several months of heartburn, nausea, and vomiting. At first glance, my patient's symptoms seemed most consistent with gastroesophageal reflux, perhaps with a component of anxiety. However, when a physician on my team carefully took our patient's history, characterizing the duration and nature of our patient's symptoms, we pursued a barium swallow test, which revealed an impressive—and rare—swallowing disorder called



Think Zebras

achalasia. A case which seemed so simple and straightforward suddenly ended up being incredibly interesting. This experience showed me that common things aren't always the correct answer. Attention to detail and consideration of all options are of paramount importance when gathering information about what a patient is experiencing.

Like my patient with achalasia, my drawing *Think Zebras*, on the cover

of this issue, reminds me that there is always something more curious out there and something more to learn. I've always thought zebras were aesthetically beautiful creatures, and their significance as a concept in medicine made them even more interesting. When preparing to draw this zebra, I decided to make the image especially eye-catching by using Prismacolor pencils to incorporate splashes of color. I found that translating the zebra's monochrome stripes into colored stripes was technically tricky. To accomplish this, I created one colored stripe at a time, drawing the lightest and darkest portions of each stripe first and then filling in the intermediate shades of color. This was a fair bit more abstract than my typical, figurative style. However, I'm glad I took the risk, as my drawing had the unique effect I was hoping to achieve. I hope my piece reminds us all to think, or at least consider, the “zebras” in medicine.

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