# Toward a Sound Philosophy of Premedical Education

In the seventh century CE, Isidore of Seville, one of the great scholars of the early Middle Ages, offered in his encyclopedic *Etymologiae* one of the earliest arguments justifying which courses should be completed to prepare for the study of medicine.[1] Saint Isidore argued for a broadly educated physician whose premedical education included literature, rhetoric, dialectic, arithmetic, geometry, music, and astronomy.

Since that time, various other groupings of courses (for example, see references 2–7) have been proposed as the best preparation for the study of medicine. However, a fundamental issue is whether premedical coursework should prepare one to be a better doctor or whether it should maximize one's chances of acceptance to medical school. In other words, is the primary purpose of premedical education to provide each student with a broad-based education that will serve as the foundation for a rich and varied professional career, or, instead, with material that is specifically preparatory for medical school courses and that will maximize a student's scores on the admission test? It seems that everyone agrees with the former, but current practice, both in this country and elsewhere, is most like the latter.

Why is this the case? And why is it so hard to change?

First, since premedical students are intelligent individuals, it is not unexpected to find that they make rational decisions to optimize their success on measures by which they will be judged. Thus, they choose to take courses that prepare them best for their country's medical school admission test, that satisfy medical school admission requirements, and that enable them to feel more ready for medical school coursework. And it is not surprising that premedical students are less likely to put at risk their average grade by tackling difficult courses outside the areas in which they tend to excel.

Second, premedical advisors look best when their students have a high rate of acceptance to medical school, which motivates them to encourage and support these kinds of decisions.

Third, the leaders of any given medical school are hesitant to change admission requirements at their school only. If different medical schools were to have significantly different course requirements for admission, a potential applicant would need to satisfy all of the requirements for each school to which he or she might apply. This could make premedical education unnecessarily complicated.

Fourth, it is difficult to make changes to the admission test, especially in countries where it is a nationally standardized examination. Developing, piloting, and implementing new questions for such tests is time-consuming and expensive.

And fifth, the premedical curriculum may bear the brunt of an overcrowded medical school curriculum. One report[8] suggests that it is valuable to free up time in the medical school curriculum by requiring that certain courses be taken as part of the premedical curriculum. The report characterizes this as improving "the efficiency of the educational process." While it is arguable what "efficiency" really means in the context of pursuing a high-quality premedical education, the report suggests that it is a good strategy to relieve some of the pressure of the medical school curriculum by shifting coursework to the premedical curriculum.

So, if these factors help maintain a system that deters a broad-based education and seems to focus on maximizing a student's chances of being accepted to medical school, how do we in academic medicine reform premedical education so that it encourages students to focus more on learning than on grades, and to develop a broad appreciation for the major branches of knowledge?

To begin, we must base what we do on a sound philosophy of premedical education. Such a philosophy should begin with an argument about the value of a broad-based education.[1,9] It should state that a premedical education must go beyond preparing a student to do well on an admission test and in the courses he or she will take in medical school, and must prepare the student to develop into an independent and creative thinker, with a strong moral compass and a commitment to social justice. It should call for premedical education to include courses that help students cultivate their intellects and sensibilities in ways that will help them function optimally in an environment characterized by change and uncertainty. And it should specify that the premedical experience should enable the student to demonstrate, and a medical school admission committee to assess, the student's ability to synthesize academically rigorous information; to pursue an art, craft, or skill that requires disciplined practice; to deal successfully with adversity; to demonstrate ethical behavior, particularly in a complex or difficult situation; and to serve others by volunteering one's time.

Importantly, such a philosophy should recognize that premedical students are intelligent individuals who generally make rational decisions. (We must stop complaining about the problematic choices made by premedical students and start fixing the system that is fostering such choices.) This philosophy should emphasize that medical school admission requirements and testing should help, and not deter, premedical students to make rational choices to pursue a broad-based education.

To implement such a philosophy, we need to re-examine which courses should be required for entry to medical school, and we need to re-think some of the content of the admission test. But this is clearly not enough. We also must examine the way in which grades in these courses and scores from the admission test are used to decide which applicants to accept or reject. I posit that the way admission committees use test scores and

course grades has a disproportionately large influence on how rational premedical students make choices. For example, since it is common practice to convert undergraduate course grades to numbers, compute an average to the hundredth of a grade point, and use it to compare one student to another (notwithstanding that the basis of the comparison may not be sound, and that the predictive value of these numbers may be limited for determining who will be a caring physician and/or a creative biomedical scientist), a rational student will make choices to maximize that average. This system deters students from taking courses for which they are unlikely to get an "A." These might include some of the more difficult science courses, certain courses in literature and the humanities, and courses from professors known as "hard-graders." However, it is just those courses that often provide excellent opportunities for students to reflect on first principles, deepen an understanding of the human condition, cultivate a sense of the society and culture in which professions are situated, develop an appreciation for the beauty of science and mathematics, and come face-to-face with the limits of human knowledge.

If all we do is change the content of the admission test, we will still have the problem that students focus on details (perhaps slightly different details) to maximize their chances of getting a few extra points.

If all we do is change the courses required for entry to medical school, we will still have the problem that students prematurely restrict their studies.

If all we do is add a requirement for some number of humanities courses, premedical students will bring a competitive streak to courses in, say, 18th century literature to the point that English professors will become insane and/or try to ban premedical students from their courses. (Although what would happen if medical schools required for admission two or three semesters of humanities courses, but coded grades for these courses only as "pass" or "fail" on the admission application? Would this minimize competition and optimize learning? Would this make it easier for students to take an interesting but difficult course? Would this enable students to deepen their knowledge of the human condition without worrying that it might harm their ability to compete for a spot in medical school?)

Finally, if all we do is relieve pressure on the medical school curriculum by creating requirements that shift coursework to the undergraduate curriculum, we will erode the quality of premedical education.

So, to achieve meaningful change that improves the quality of premedical education, we must pursue a multi-pronged strategy that includes modernizing undergraduate course requirements, revising the content of the admission test, and developing new ways of using course grades and test scores in admission decisions that encourage students to pursue a broad-based education. In addition, we must develop new and better ways to assess an applicant's capability for independent thinking and creativity, to judge the accuracy of his or her moral compass, and to understand that individual's potential for professionalism.

In this issue of the journal, the authors of three articles help advance our thinking about premedical education. Gross et al make an important case that the lived experience of a premedical student shapes not only his or her knowledge base but also his or her character development and moral education. Barr et al report that a negative experience with an undergraduate chemistry course was an important factor in students' decisions to abandon their intent to apply to medical school and that underrepresented minority students showed a larger decline in interest than did non-underrepresented minority students. And Gordon et al demonstrate that a simulation-based experience in medicine can be an important tool to stimulate interest in biomedical science, even at a young age.

Many challenges lie ahead for the next generation of physicians and biomedical scientists. Thus, it is critical to cultivate creative and independent thinkers who have the capability and passion to tackle the most important problems in medicine. Medical school admission requirements and the way we use course grades and admission test scores should foster intellectual risk-taking and expressions of creativity at the undergraduate level, and must be designed to encourage students to pursue a broad-based education.

Coda: I invite you to respond to the ideas presented in this editorial. You may do that formally by writing a letter to the editor (see our complete instructions for authors at www.academicmedicine.org) or informally by sending a comment to (editor@aamc.org).

**Steven L. Kanter, MD**

## References


1 Sharpe WD. Isidore of Seville: The medical writings. An English translation with an introduction and commentary. Trans Am Philos Soc. 1964;54(Part 2):64.
2 Petsko GA. Medicine man. Genome Biol. 2007; 8:114.
3 Flexner A. Medical Education in the United States and Canada. A Report to the Carnegie Foundation for the Advancement of Teaching. Bulletin No. 4. Boston: Updyke, 1910.
4 Muller S (chairman). Physicians for the twenty-first century: report of the project panel on the general professional education of the physician and college preparation for medicine. J Med Educ. 1984;59(11 Pt 2).
5 Emanuel EJ. Changing premed requirements and the medical curriculum. JAMA. 2006;296: 1128–1131.
6 American Medical Association. Initiative to transform medical education: recommendations for change in the system of medical education. June 2007. Available at: (http://www.ama-assn.org/ama1/pub/upload/mm/377/finalitme.pdf). Accessed March 10, 2008.
7 Thomas L. Notes of a biology-watcher. How to fix the premedical curriculum. NEJM. 1978;298:1180–1181.
8 Association of American Medical Colleges. Educating Doctors to Provide High-Quality Medical Care: a Vision for Medical Education in the United States. July 2004. Available at: (https://services.aamc.org/Publications/showfile.cfm?file=version27.pdf&prd_id=115&prv_id=130&pdf_id=27). Accessed March 10, 2008.
9 Brieger GH. The plight of premedical education: myths and misperceptions – Part II: Science "versus" the liberal arts. Acad Med. 1999;74:1217–1221.