Questioning the Premedical Paradigm

Barr, Donald A.

Published by Johns Hopkins University Press

Barr, Donald A.
Questioning the Premedical Paradigm: Enhancing Diversity in the Medical Profession a Century after the Flexner Report.

For additional information about this book
https://muse.jhu.edu/book/462

For content related to this chapter
https://muse.jhu.edu/related_content?type=book&id=8606
I first began advising undergraduate students at Stanford in the fall of 1994. Early in my teaching career, one of the first of these students came to my office to ask me to be her faculty adviser. As one of the most popular majors at Stanford, the Human Biology program asks students to submit a written proposal describing the classes they will take and then to present that proposal to the faculty member they would like to work with as their adviser. This student had completed the initial prerequisites and proposed a series of classes focusing on issues surrounding the health care system. As she handed her proposal to me to review, she added a qualifier. “I’d like you to be my adviser, but only if you won’t try to talk me into going to medical school.”

Her admonition both puzzled and intrigued me. I was relatively new to undergraduate advising. I had interrupted my career as a practicing physician to return for graduate study in health policy and sociology. After completing my Ph.D., I applied and was selected for a faculty position at one of the leading public health schools in the country and was asked to develop a program of research and teaching for both medical students and graduate students in public health. The same week that I received written confirmation of the faculty position, I also received a court order informing me that if I accepted the offered position (thus moving out of state), I would be required to relinquish custody of my 13-year-old son. I declined the job offer, deciding instead to return to the practice of medicine and abandon my aspirations for an academic career.

A month or so later, I learned that the undergraduate Program in Human Biology at Stanford needed someone to teach a course about the health care system. Having organized just such a course intended for medical students, I agreed to offer it to Human Biology students instead. The course was listed too late to appear in the printed course catalogue, so I was told not to expect more than 25 or 30 students. Instead, I got 80 students, one of whom was now asking me to be her adviser. Feeling no personal stake in the student’s career trajectory, I readily agreed to her request, reviewing and signing her forms. After handing them back to her, I asked out of curiosity, “Why did you want me not to try and talk you into going to medical school?”
“I used to be premed,” she explained, “but then I got into the chemistry classroom, and I couldn’t stand being around all those other premeds. They’re much too competitive. I’m more of a fuzzy.”

To understand her explanation one needs to appreciate the “techy/fuzzy” dichotomy many students at Stanford have come to live by. As I understand it, a “techy” is someone who excels at math, science, or engineering. He or she is focused, driven, and competitive, perhaps also lacking in certain social sensibilities. A “fuzzy” on the other hand is a “people person,” —someone who prefers studying the humanities or social sciences, someone who sees the world in broad contextual terms. While I easily recognize these stereotypic characteristics, I suspect “techy/fuzzy” is more accurately seen as a continuum. We all contain a certain amount of “techyness” and of “fuzzy-ness.” For the sake of discussion, however, I accepted her dichotomy.

“Let me see if I understand what you’re saying,” I asked. “Suppose you or someone close to you had a brain aneurysm, and if the neurosurgeon didn’t operate just right, you could end up with permanent brain damage. Would you rather have a techy neurosurgeon or a fuzzy neurosurgeon?”

“I’d rather have a techy neurosurgeon,” she readily replied.

“Me too. But suppose instead someone close to you had a chronic illness for which there was no cure, and over a period of years the illness would lead to progressive weakness and eventually to the person’s death. Would you rather have a techy doctor or a fuzzy doctor working with this person?”

Again she readily replied, “I’d rather have a fuzzy doctor.”

“So would I,” I mused, “but if all the fuzzies drop out of premed, where are all the fuzzy doctors going to come from?”

I certainly had not intended to be flip. I had come to appreciate the profound change that health care in America was beginning to experience. Following the scientific revolution in medical education and medical practice that had taken place at its opening, the twentieth century had seen tremendous advances in medical science and medical care technology. The twenty-first century, on the other hand, would be a century of learning to cope with chronic illness for which there typically would be no cure and having to do so under the increasing pressure of constrained economic resources. From my two decades of medical practice I knew that well-trained, committed, and compassionate doctors—fuzzies—were what would be needed in the coming decades of American health care.

Here was a self-described fuzzy whom I intuitively sensed could make a superb physician. The irony was that the hypercompetitive atmosphere of the freshman chemistry classroom had resulted in this student’s losing interest in a career as a
physician. This despite the fact that she was no stranger to competition—she was a world-class athlete, already in possession of multiple Olympic medals. She could cope with the competition of athletics; what she couldn’t cope with was the competition of premedical studies, what has often been referred to as the “premedical syndrome.”

Those who have followed the story of Harry Potter are familiar with the “sorting hat.” Those who have not will need to know that this magical hat is used at the Hogwarts School of Witchcraft and Wizardry to assign first-year students to a specific residential house, and in so doing also assigning them to a specific career trajectory as a wizard or a witch. A young student stands in front of the assembled students and faculty and places the hat over his or her head. With its magical powers the hat is able to sense the student’s true nature, and based on that nature announces its decision. For Harry, the hat (fortunately) announced “Gryffindor!” For Draco Malfoy, it announced “Slytherin.” And thus the die was cast.

For the student sitting across from me, it was as if her freshman class in introductory chemistry had acted as a sorting hat. Entering the classroom and looking around her, she had slipped the hat over her head. For some of her fellow students the hat announced, “Premed!” For her, the hat had instead whispered in her ear, “You’re not premed.” She was more of a fuzzy and thus would not be going to medical school.

That was the last conversation she and I had about medical school. I kept in touch with her over the following years and learned, somewhat to my surprise, that after graduating from Stanford she had re-thought her decision and decided to go to medical school after all. To complete her required premedical classes she had enrolled in a well-known women’s college that has a program targeted at women such as her—a program that not only welcomed but sought out fuzzies who wanted to become physicians. She did superbly in her science prerequisites and was easily accepted into one of the top medical schools in the country. She is now a physician.

Over time, my teaching in Human Biology became more and more successful, the classes I offered more and more popular. It wasn’t long before I had hundreds of students taking my classes and scores of students coming to my office hours, asking me to be their faculty adviser. With each of these advisees, after reviewing and approving their proposal for their Human Biology major, I took a moment to ask what his or her career plans were. A striking pattern emerged. While many of the students said, “I’m premed; I plan to go to medical school,” just as many said, “I used to be premed, but . . .” Each would fill in the space after the “but . . .” with a slightly different story, but each said essentially the same thing. As an incoming freshman, they had had aspirations of becoming a physician. Now, however, after weath-
ering the first year or two of premedical sciences, they had abandoned that aspiration and were instead looking at a different career trajectory. They each had put on the premed sorting hat and had heard “You’re not premed.” Now, nearly halfway through their college experience, each was coming to me for career advice.

I began to notice within this overall pattern of diverging career trajectories a second, more disturbing pattern. It seemed that nearly all the students who explained, “I used to be premed, but . . .” were women, and many of these were from underrepresented racial or ethnic groups. The premedical sorting hat appeared to be giving a different message to women, especially women of color, than it did to men and students not in an underrepresented minority (URM) group. Despite a growing national urgency to increase the diversity of the medical profession by encouraging more URM students to go to medical school, substantial numbers of highly talented URM students coming to my office had heard from the sorting hat that medicine was not for them.

I began to take more of an interest in what these students did after graduating from Stanford. Several anecdotal descriptions illustrate my growing sense of discomfort with the way early experiences in the science classroom at Stanford appeared to direct otherwise highly talented students away from a career in medicine. These students are typical of the many students with whom I have had the privilege of working.

The first student was Latina, one of the first in her family to pursue higher education. She had experienced a very difficult first two years in the science classroom at Stanford, earning mostly grades of C+ and B−. (Her grades in her non-science classes were considerably higher.) Despite her early difficulties in her science classes, she had not given up the intention of becoming a physician and had applied to a range of medical schools. Each school had rejected her, presumably based on her low grades in the premedical sciences. After she graduated, I hired her to work on a project I had developed to expand opportunities for undergraduates to complete an internship working with a community-based medical clinic that provided care to mostly low-income and uninsured patients. Based largely on her efforts in establishing working relationships with these clinics, the program grew to be a substantial success. Sensing her undiminished commitment to a medical career, I encouraged her to apply for a program at the University of California offering post-baccalaureate premedical education to URM students who had unsuccessfully applied to medical school. She was readily accepted to the “post-bac” program and experienced substantial academic success. When she applied to medical school a second time, she was accepted to a program at a top national medical school that offered students training in both medicine and public health. She was elected president of her freshman med-
ical school class, completed her professional education, and is now a successful physi-
cian. In her case, the sorting hat got it wrong.

The next two students came to my office a year or so later. Each was female, each was African American. Each had entered Stanford as premed but had experienced substantial difficulty in the science classroom (mostly in chemistry), earning a series of C’s and B’s, some gained only after repeating a class. Each decided to apply to graduate school in public health rather than medical school.

The first student had worked with me for two years on an undergraduate research project of her own design. Using a large statewide database, she had shown that African American patients in California were less likely to be offered a potentially life-saving therapy than white patients with the same disease and same insurance. She graduated from Stanford with academic honors and attended a top school of public health. She did as well with her graduate studies as she had done in her coursework and research with me. Her advisers in public health urged her to ignore the message of the sorting hat and to apply to medical school after earning her graduate degree. She was accepted into a top medical school, receiving a highly competitive scholarship.

The second student had chosen to spend three months of her undergraduate career in a special program Stanford offers in Washington, D.C. As part of this program she completed a 10-week internship in the Office of Minority Health in the U.S. Department of Health and Human Services, participating in a project examining the sources of health disparities among African Americans in the United States. I received glowing evaluations from her internship supervisor. Like her colleague before her, she applied to the same school of public health. Despite her relatively low grades in chemistry at Stanford, she completed her graduate studies with a grade point average of 4.07, earning straight A’s, except for three grades of A-. She applied to fourteen medical schools and was accepted at all fourteen. I guess the sorting hat was wrong again.

The last student, also an African American female, entered Stanford with the hope of becoming a physician but experienced difficulty in her early science classes, principally in chemistry. She became my advisee as a junior, showing a keen interest in and talent for issues of health care policy and health inequality. Rather than attending medical school, she chose to focus her career on advocating for better health care and improved health status for disadvantaged patients. She was accepted jointly to the Harvard Law School and the Harvard School of Public Health, enrolling in a joint J.D.-M.P.H. program, and will undoubtedly be a successful health advocate. While I have no doubt that she could have succeeded in becoming a physician had she wanted to, I fully support her decision to take a different tack.
The more students I talked with, the more I learned about what it was like to be premed at Stanford. As an undergraduate at Oberlin College, I had largely escaped the culture of premed, deciding relatively late in my college career to attend medical school. Initially, I wanted to be a professor of mathematics, having earned straight A’s in an accelerated high school math program. After my freshman year of college, however, I had relinquished my aspirations toward a career in math: *I got a C+ in freshman calculus.* Not knowing that I could easily have overcome that dark stain (I got a B+ in second-year math), I assumed that a career in math was not for me.

My college adviser sat me down at the end of my sophomore year and asked, “Well, if you’re not going to be a math major, what’s your major going to be?” I had done well in my science courses, earning high grades in chemistry. I was enjoying my current biology course much more than I had enjoyed my freshman chemistry, so I replied, “I guess I’ll be a biology major,” to which he replied, “Straight biology or premed biology?” There it was, the sorting hat, although I did not recognize it. (It would be three decades before J. K. Rowling would name it.)

I hesitated, then rather impulsively replied, “Premed.” The die was cast. I went to medical school, became a successful physician, and somehow gravitated back to academics. Despite having initially assumed that by turning down the proffered faculty position I was walking away from an academic career, the popularity of my teaching and my advising grew continuously. Before I knew it, I was a full-time academic and only a part-time physician, with dozens of premed and formerly premed advisees.

Stanford University asks all of its incoming freshmen the following question: “If you are considering a career after you complete Stanford, what is that career?” Each year between 350 and 400 of the 1,600 or so incoming freshmen answer that question by stating that they hope to become physicians. Based on their answers, Stanford’s undergraduate advising system assigns each of these students a special “preadviser”—an adviser specifically versed in premedical requirements and the process of preparing for medical school. Even though the university specifically disavows having a specific premedical major, each of these incoming students receives the preliminary label as premed.

It is not the university’s preliminary labeling that carries the most force, however. Somehow the new students rapidly come to know that, if you are premed at Stanford, you have to take chemistry your freshman year, followed by biology your sophomore year, and also fitting in a year of physics somewhere along the way. Student after student has explained to me, unprompted, that they felt it was nearly compulsory to take the first course in the undergraduate chemistry sequence during their first academic quarter at Stanford. To wait and start your chemistry in the second quarter of your freshman year meant that you were already “off-track.” It seemed al-
most as if their very existence as a premedical student depended on following this
pre-set path, starting at the chemistry classroom.

Several years after I started teaching in Human Biology I had occasion to read
*Arrowsmith*, Sinclair Lewis’s Nobel Prize–winning novel about Martin Arrowsmith,
a young college student at the University of Winnemac, a fictional Midwestern uni-
versity. As Lewis describes it, “In 1904, Martin Arrowsmith was an Arts and Sciences
Junior preparing for medical school. . . . Martin’s father and mother were dead, leaving
him only enough money for his arts and medical courses. The purpose of
life was chemistry and physics and the prospect of biology next year.”

Lewis wrote these words in 1924. As we will see, his description of the preme-
dical experience more accurately reflects the period of the 1920s, for in 1904, few med-
ical schools expected students to have a college degree before entering. One of the
few Midwestern universities to have both a rigorous premedical curriculum and an
affiliated school of medicine was the University of Michigan. However, in 1904
Michigan did not require courses in chemistry, physics, and biology as prerequisites
to matriculation to medical school.

Two momentous reports were issued in the interval between Martin’s fictional
experience in 1904 and Lewis’s describing it in 1924. The first was the publication
of the Flexner Report, authored by Abraham Flexner and published in 1910 by the
Carnegie Foundation for the Advancement of Teaching. In the report, Flexner is-
sued a scathing indictment of the state of medical education in the United States,
using the model of medical education in Europe as his standard for comparison.
Flexner urged adoption of laws mandating that medical schools be part of larger
universities and offer a four-year curriculum rather than the traditional two-year
curriculum. Of these four years of medical school, the first two must be devoted to
the study of science. To prepare for this new and more rigorous type of medical ed-
ucation, Flexner also suggested that the only proper undergraduate preparation for
medical school is an equally rigorous undergraduate course in the sciences: “The
normal rhythm of physiologic function must remain a riddle to students who can-
not think and speak in biological, chemical, and physical language.”

In 1914, the American Medical Association’s Council on Medical Education,
originally founded in 1905, issued a major report on the occasion of its tenth an-
niversary. This report called on all medical schools to adopt Flexner’s recommenda-
tions regarding university affiliation, curriculum, and premedical preparation,
specifically identifying two years of chemistry, one year of physics, and one year of
biology as the minimum college preparation adequate for entering medical school.
(The report also mandated a reading knowledge of French and German.) By the
time Lewis wrote *Arrowsmith*, more than 85 percent of medical schools in the
United States had adopted Flexner’s model of premedical education, with most mandating a minimum of two years of college while preferring four years and a bachelor’s degree. In 1924, the “purpose of life” for most American premedical students had become “chemistry and physics, and the prospect of biology next year.”

By the 1950s this expectation had become a deeply held cultural norm among premedical students as well as colleges and universities. The surge in the number of students entering college in the decades after World War II began to put a severe strain on the medical school application process. There were between two and three times as many college students hoping to become physicians as there were available slots in medical schools. For most of these premedical students, the “purpose of life” had become excelling in the required courses in chemistry, physics, and biology, and by so doing securing a coveted place in the entering class of a medical school. If more than half of the aspiring premedical students would fail in their effort to enter medical school, success in the premedical sciences described in 1910 by Flexner was crucial. A less-than-stellar performance in the triad of premedical sciences would likely result in failure to gain admission to medical school. Premedical studies had become a pressure cooker. Reports of the behavioral and psychological price students paid to enter premed described a “premedical syndrome.” In 1955, Funkenstein described the pressures premedical students at Harvard faced: “Seeking council from his colleagues, premedical advisers, doctors and friends, he becomes more and more anxiety ridden as he contemplates the almost super-human test before him of securing entrance to medical school. With great trepidation he . . . enters what the Harvard Crimson calls the ‘rat race.’”

For premedical students entering Stanford in the 1990s, the pressure of premedical expectations seemed just as severe as that experienced by young Martin Arrowsmith earlier in the century and by Harvard students in the 1950s. If you wanted to become a physician, it was common knowledge that you had to begin chemistry during your first semester or quarter of college and that you must do well. After mastering chemistry, the next hurdles were biology and physics. Failure to attain early success in these subjects meant failure as a premedical student. As described in 1953 by Aura Severinghaus of Columbia University, a college or university was doing its job by “weeding out” those students not fit to study medicine.

In making his recommendation in 1910 that “the normal rhythm of physiologic function must remain a riddle to students who cannot think and speak in biological, chemical, and physical language,” Flexner asks us to take this association on faith. Without offering any scientific support for his assertion, he asks us to believe that a lack of success in the premedical sciences implies lack of future success in medical school and as a physician. Similarly, he seems to suggest that success
in the premedical sciences logically implies success in medical school and as a physician.

These relationships seem intuitive. It seems to make sense that to succeed in medicine one must first succeed in the premedical sciences. However, can we take it on faith that these relationships are accurate—that they are supported by scientific evidence?

During the period from 1920 to 1940, it was typical for 25 percent or more of entering medical students to be dismissed from medical school after the first year due to academic failure. It seemed that one way to decrease the likelihood of academic failure in medical school was to select only those students who had demonstrated success in the premedical sciences. Using success in these sciences as a predictor of future success in the early years medical school, many colleges and universities adopted the explicit goal of “weeding out” students who were weak in the sciences, especially chemistry. As described in 1953 in a major national report, “Some chemistry teachers claim with pride that only students of good ability who work very hard can get through their chemistry course.” From reports of students’ personal experiences, this certainly seems still to be the case at Stanford. Many of my advisees have described hearing their chemistry professor explicitly state that those who could not succeed in chemistry should drop their goal of attending medical school.

If it were true that lack of success in chemistry were consistently linked with lack of success in medical school, it would be difficult to argue with the logic of this screening process, whether it is applied explicitly or implicitly. The same is true of undergraduate success in biology. If it were true that difficulty in biology is consistently associated with difficulty passing courses in medical school, it would be reasonable to discourage those students who experience early difficulty in science courses from continuing to pursue premedical studies. But are these associations accurate?

The clear success of the URM students described above, each of whom experienced early difficulty in chemistry or other premedical sciences, calls into question the association between success in premedical sciences and success as a physician. Each of those who chose to go to medical school has been successful, and each will, I am confident, be a superb physician. Might it be that Flexner was wrong?

We will see in chapter 4 that there is ample evidence that academic success or demonstrated knowledge in the premedical sciences is strongly associated with success in the preclinical sciences. We will also see, however, that Flexner’s second assumption—that a relative lack of success in the premedical sciences implies that a student will not be able to succeed in medical school and as a physician—is not supported by scientific data. While students who perform less well in the premedical
sciences than their classmates do have an increased chance of experiencing difficulty in the preclinical phase of medical school, the vast majority (as many as 98%) will succeed in their preclinical studies. Furthermore, the data will show that success in the preclinical sciences encountered early in medical school has little relationship to eventual success as a clinician. In study after study, students who enter medical school despite a relatively weak background in the premedical sciences enjoy success as clinicians that is comparable to their more scientifically inclined classmates.

If the premedical experience is only a weak predictor of success as a clinician, why do we continue to use the premedical sciences as the “sorting hat” for medical school? What are the historical origins of the widely held belief that chemistry, biology, and physics are the necessary precursors of a successful medical school experience? This is one of the principal questions I address in this book.

However, before attempting to answer this question I must first be sure that the impressions I have gained through my years of teaching and advising Human Biology students at Stanford are supported by data. Is it true that the premedical sciences, in particular chemistry, have the effect of “weeding out” many women and URM students who otherwise possess academic strengths and personal characteristics that are well suited to a career as a physician? In the following chapter I present data from my study of premedical students at Stanford University and at the University of California, Berkeley. As we will see, the sorting hat is alive and well at both universities. For better or for worse, early experiences in the chemistry classroom continue to have a disproportionate impact on students’ decision of whether to remain in premedical studies or to drop their aspirations for a medical career. Isn’t it time we tried a different way to select and train students for medicine?

Mine is not the only voice asking these types of questions. There is a growing sense among many medical and premedical educators that the model of premedical education defined in 1905 by the CME and promulgated in 1910 by Flexner—the premedical paradigm—may be overdue for a major shift. Whether that shift is evolutionary or revolutionary remains to be determined. I hope the analyses and discussions contained in this book will contribute to this process.