

THE INTERNAL CHALLENGES TO MEDICAL EDUCATION

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ABSTRACT

This presentation shall discuss the major “internal” challenges to medical education—that is, challenges to achieving effective medical teaching that have arisen from the evolution of the science and practice of medicine. These issues are defined as “internal” in that they reflect the internal evolution of the profession and of academic medical centers, independent of the perturbations in medical education we are presently experiencing as a result of the hostile external environment of health care. Examples of these internal challenges include the growing “bench-bedside gap,” the traditional tensions at medical schools between teaching and research, and the need to adjust medical education to meet the challenges imposed by chronic diseases. The need for “internal” leadership from within the profession to help solve some of the “external” problems of medical education shall also be discussed.

Introduction

In the past few years, prompted in part by my recent book, *Time to Heal* (1), medical educators and other concerned individuals have paid much greater attention to the “external” challenges that medical education faces at the present moment. By “external,” I mean threats to medical education and academic medical centers that have arisen from recent changes in American society and the health care delivery system. However, as important as these challenges are, they should not blind us to the fact that there exist important “internal” challenges to medical education as well. By this I refer to the obstacles to effective medical teaching that have arisen from the internal intellectual development of medical knowledge and practice and the institutional evolution of academic medical centers independently of the health care delivery environment. These are important issues for medical educators to consider because theoretically they are much more under our

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control and influence. The focus of my presentation today shall be on some of the major “internal” challenges to medical education.

The Growing “Bench-Bedside Gap”

The first internal issue pertains to the challenges to medical teaching posed by the molecular revolution in biomedical science. For most of the twentieth century, a distinctive feature of medical education in the United States was the integration of research with teaching and patient care. The cohesiveness between teaching and research was made possible because instructors taught students what they themselves were investigating. However, as biomedical research after 1970 became increasingly molecular in its intellectual orientation, teachers found it increasingly difficult to be cutting-edge researchers, and vice versa. Accordingly, the identification of teachers, both in the scientific and clinical disciplines, became a difficult task.

Before World War II, a notable characteristic of medical research was the relatively short distance from the standard student courses to the forefront of medical research. In every department, a congruence existed between the required teaching of the medical school courses and the specific research problems faculty were pursuing when not teaching. This observation helps explain the continued enthusiasm for student teaching that was regularly found at that time. Faculty members experienced the joy and excitement of teaching medical students the knowledge, techniques, and problems they were encountering in their own original work. Instructors regularly noted with pleasure the facility with which medical students were mastering difficult research techniques as part of the standard laboratory instruction (2). Probably no medical student of the era better excelled in research than Charles Best, who played a critical role in the discovery of insulin (3). For students also, being close to the forefront of knowledge was beneficial, for it allowed them to see the faculty in their natural habitats. In the preclinical laboratories, students learned to appreciate the day-to-day life of an experimental scientist. In the clinical subjects, students would regularly encounter their professors at the bedside examining patients or in the hospital record room reviewing charts, as the patient-focused nature of clinical research kept professors continually in view.

Perhaps no faculty member of the era better illustrated the interdependence of teaching, research, and (in the clinical departments) patient care than the Harvard hematologist George R. Minot. It was from careful observations of his patients—spending countless hours listen-

ing to their stories, extracting their dietary histories, and thinking “ever more about food”—that he began his pioneering inquiries that ultimately led to the discovery that liver feedings could cure pernicious anemia, a previously fatal disease. He shared the Nobel Prize for this discovery in 1934. Yet, even as he found great joy poring for hours at a time at blood smears under a microscope, he would continually remind students that “studying his [a patient’s] blood does not study the patient,” and throughout his career he remained an outstanding clinical teacher and bedside doctor. He continued to see private patients until his retirement, and he warned about letting research interfere with one’s view of medicine as a whole. To this Nobel laureate it was “essential that every doctor, regardless of his field of interest, should keep his hands on patients” (4).

After World War II, however, as both basic and clinical research matured, the intellectual distance between conventional medical student teaching and the forefront of research began to grow. In addition, as research in all fields became more scientifically sophisticated, it was no longer reasonable to assume, as had been done before the war, that research scientists could be produced as a by-product of the education of physicians. James Shannon, director of the National Institutes of Health, remarked in 1957, “Unlike the university-trained Ph.D. candidate, these individuals [M.D.s] have little or no training in research methodology, procedure, and theory, and so they are handicapped in proceeding effectively to advanced research” (5). Biomedical research acquired an independent quality, no longer requiring the presence and stimulation of medical students. For many faculty, the joy and excitement that was once associated with teaching medical students began to migrate upward along the training path to graduate students, fellows, and postdoctoral students who could more fully appreciate the nuances of their projects. Decade by decade thereafter, as the molecular revolution transformed medical research in both the scientific and clinical departments, teaching and research grew further and further apart, raising profound new questions about who should teach medical students and the interrelationship of teaching and research.

Today, this difficulty is especially clear in the basic science fields, where the research interests of most faculty no longer directly relate to much of the subject matter still taught to medical students. Professors in these fields are in the awkward position of studying fundamental molecular and cellular biology, for which they are rewarded, while teaching clinically necessary subjects they do not particularly value, such as gross and microscopic anatomy, fluid and electrolyte metabolism, and classic organ physiology. In some fields, it has become diffi-

cult to find faculty who can still teach the classical subject matter. Gross anatomy is the prime example. Anatomy departments now depend heavily on surgeons, radiologists, anthropologists, and dentists for help in teaching, since the field is virtually dead as an area of active investigation among anatomy faculty (most of whom now work in cell biology). To a lesser extent, this problem affects instruction in the other basic science departments as well. "Who will teach the basic medical sciences?" one medical school dean asked as early as 1964 (6). At the dawn of the twenty-first century, officials at some schools are acknowledging the possibility that the basic science departments might be forced to split into separate research and teaching faculties.

Similar developments have occurred in the clinical departments, where the traditional cohesiveness among research, patient care, and education has substantially eroded. Until around 1970, the defining characteristic of clinical research was its focus upon patients. This meant that clinical research went hand-in-hand with patient care and clinical instruction. In the molecular era, patients have been increasingly bypassed in clinical research. The results of this approach have been gratifying in terms of medical discovery. However, for the first time, a conspicuous separation of functions has occurred between clinical research and clinical teaching. As one reflection of this change, more and more clinical research has come to be undertaken by Ph.D.s. By 1990, over 8,000 nonphysician Ph.D.s held full-time academic positions in the clinical departments of U.S. medical schools (7). Physician-scientists engaged in clinical research now find themselves at the center of the highly competitive universe of biomedical science, where they need to spend at least 90 to 95 percent of their professional time in the laboratory in order to remain scientifically competitive. As one prominent investigator explained, "The physician-scientist trained in both medicine and basic research is going to find it increasingly hard to stay at the forefront of such basic research if he or she continues to care for patients more than a minimum of time" (8).

Clinical departments at many schools have responded by establishing two faculty tracks: a "clinician-teacher" track for faculty concentrating on education and patient care, and an "academic track" for laboratory investigators. Most faculty members specializing in "evidence-based medicine" have joined the clinical track because of their familiarity with the clinical literature and their expertise in delivering medical care. However, such an approach merely highlights the fundamental problem it was meant to solve: the growing estrangement between teaching and research. Experts in evidence-based medicine seldom possess the clinical investigator's knowledge of the molecular

mechanisms of disease and therapeutics, while today's clinical investigators are much more removed from day-to-day patient care and clinical teaching than clinical professors in the past. In the clinical departments, as in the basic science departments, no one has yet found a good answer to the vexing question, "Who are the teachers?"

The Devaluation of Teaching

A second internal obstacle to creating a rich educational environment is the traditional tension at U.S. medical schools between teaching and research. The American medical school, like the American research university, was created by scholars for scholars. This has resulted in an institutional culture that rewards research accomplishments far more than educational effectiveness. Medical schools have long uttered much lip service about the importance of the educational mission. However, their actions have not confirmed their words, as all century long they have granted promotions and other institutional rewards mainly for research, not teaching. Indeed, the folklore of academic medicine has long held that the sure way for an instructor *not* to be promoted is to win an award for good teaching.

What is notable about American medical schools is how long this emphasis on research has existed, and how it has pervaded the value system of almost all schools. Even before World War II, an emphasis on research was found not just at elite institutions but at almost all medical schools. For instance, Hahnemann and the University of Arkansas, schools with distinct teaching missions, hoped to develop a much stronger presence in research. Their faculty frequently expressed the importance of research to a medical school (9). Howard College of Medicine, continually struggling to remain solvent, also encouraged its faculty to spend as much time as possible doing research. Some teachers at the school believed that Howard had actually developed an "over emphasis in attempting to make the College of Medicine a research institution rather than a school" (10). The majority of schools, then as today, lacked the resources to compete with the research elite, but they typically dreamed of doing so.

The emphasis on research was not intrinsically harmful to medical education. Indeed, throughout the twentieth century educators commonly maintained that research invigorated teaching by enabling a scholarly atmosphere for the study of medicine. Students were exposed to the reasoning skills of the finest medical minds, and they became aware of the tentative nature of even the seemingly most secure pieces of medical knowledge. The presence of research kept medical education

from going overboard teaching practical details instead of fundamental principles and reminded educators that students needed time to think, digest, and wonder.

Nevertheless, there was also an intrinsic conflict between teaching and research: they competed for a faculty member's time. Teaching, when done well, was time-consuming and labor-intensive, requiring close personal contact with students. Even Abraham Flexner on one occasion acknowledged that teaching and research "encroach on a common fund of time and energy" and hence are "more or less antagonistic" (11). In addition, good teaching required a generalist and synthetic orientation that in an era of increasing specialization took greater and greater effort to provide.

Herein lay the primary obstacle medical schools encountered in trying to improve their educational programs: time spent teaching meant less time for research, and the institutional value system usually gave much more priority to research than to teaching. It was difficult to entice faculty members to give much attention to students when they were seldom rewarded by the institution for doing so. At medical schools, as throughout the research university, academic reputations of faculty were national or international and presumed to depend on universal criteria. In contrast, teaching reputations were primarily local. Hence the frequent neglect of teaching, whether at the medical school or at the liberal arts campus of the research university (12).

As a result, for the past century medical schools have evolved in a faculty-centered, not a student-centered, manner. In the basic science subjects, the domination of the curriculum by lectures and the de-emphasis of laboratories and individualized instruction represented a much more efficient use of faculty time. In the clinical subjects, the use of house officers as teaching assistants served a similar purpose, freeing the faculty to pursue their other interests, particularly research. One study in the 1980s estimated that 60 percent of full-time faculty spent less than five hours a week in undergraduate teaching (13). Students, as learners, needed a large amount of time and personal contact with their instructors. However, in a medical school environment driven primarily by the needs of faculty, students often did not receive enough of those opportunities.

By their actions, medical schools everywhere demonstrated that student teaching was a low priority to them. Medical school records from prestigious and nonprestigious schools alike demonstrated a widespread lack of concern for student matters: the difficulty in recruiting faculty to serve on admissions committees or to help with

interviews, repeated complaints from students that they were neglected, reports of the unavailability of faculty advisers, the behavior of faculty who resented their lecture duties (for instance, delivering their lectures without introducing themselves to the class), the refusal of departmental chairpersons to sit on curriculum committees, the conversion of student teaching laboratories into faculty research laboratories, the unwillingness of some faculty to write letters of recommendations for students, and poor faculty turnouts at commencement exercises. This deeply ingrained subordination of teaching to research in the value system of U.S. medical schools has presented a formidable obstacle to medical education all century long (14).

These remarks are not to deny that good—indeed, inspired—teaching regularly occurred, or that the ranks of every faculty contained dedicated, gifted teachers. Rather, these observations are to suggest that good teaching in the modern medical school, as in the proprietary school so harshly criticized by Abraham Flexner (15), was frequently by accident rather than design. A senior professor at Harvard Medical School once pointed out that “teaching as a whole has improved” at his institution. However, “The importance attached to it by many staff members appears to have waned appreciably” (16). In the American medical school, as in the American university, a faculty-determined definition of institutional mission prevailed. Accordingly, accomplishment was measured primarily by research productivity rather than by excellence in teaching, not to mention caring for patients or addressing the broader health needs of society. Despite a century-long tradition of curricular reform, the larger educational goals of creating a truly learner-centered course of study has not occurred. Sociologist Samuel Bloom has referred to this phenomenon as “reform without change” (17).

The Challenge of Chronic Diseases

A third internal issue is the relative lack of preparation of today’s students for the management of patients with chronic diseases. Medical educators created the hospital clerkship, the mainstay of clinical education, in the late nineteenth century, when life expectancy in the U.S. was barely 40 years and when acute illnesses (infections, injuries, and acute manifestations of chronic diseases) dominated medical practice (18). Today, as a result of the success of public health and modern medicine, life expectancy in the U.S. is approaching 80 years, and chronic and degenerative diseases dominate the practices of most physicians.

The diagnosis and management of chronic diseases, unlike that of many acute illnesses, is largely an outpatient activity. Yet, few medical faculties have systematically taken advantage of outpatient facilities for clinical teaching. During the past two decades, there have been many calls for medical schools to provide more and better ambulatory experiences so that students might obtain greater exposure to patients with chronic illnesses. The Association of American Medical College's "GPEP" Report in 1984 was the most prominent of these calls (19). Nevertheless, on balance, medical schools continue to rely on inpatient hospital clerkships for the great majority of clinical instruction. How students are to acquire the knowledge, skills, and attitudes required for the care of patients with chronic diseases is a conspicuous deficiency in medical education today. It remains uncertain whether current students will be fully prepared for many of the most important challenges they are likely to face when they begin the practice of medicine.

Conclusion

In a turbulent health care environment, with academic medical centers under increasing stress from financial, regulatory, and bureaucratic pressures, it is easy to understand why so much discussion of medical education has focused upon the relationships of our academic medical centers with the external health care environment. Medical education depends upon society and the health care delivery system for financial, moral, and political support, and when this environment is not friendly, the quality of education, research, and patient care can easily deteriorate. This explains the present concern of so many leaders of academic medicine with increasing the funding and decreasing the regulatory burdens of our medical schools and teaching hospitals.

Yet, as the present paper has attempted to show, many of the most significant problems we face in medical education have arisen from the evolution of medical knowledge, the culture of academic medical centers, and the changing demography of disease in America. The issues of the growing "bench-bedside gap," the devaluation of teaching excellence, and the rise of chronic diseases represent trends from within medicine that are independent of the changing character of the health care delivery system. Were managed care and regulatory burdens to disappear tomorrow, and were academic medical centers to be funded to levels that exceed our fondest wishes, these internal problems would still persist. How we as medical educators respond to these internal

challenges will have great bearing on the quality of medical education and practice in the twenty-first century.

As a concluding observation, it is worth noting that many apparent “external” problems of medical education also have solutions that are at least in part “internal.” Many of the present financial and political difficulties of medical education can be explained by the fact that in the past generation academic medical centers have lost their way. Medical schools and teaching hospitals have always existed for the community’s well being, and not vice versa. Yet somehow since the 1970s, many medical faculties have forgotten this fact (20). If medical educators are to succeed in preserving the financial vitality of academic medical centers, they need to remember the admonition of Charles Eliot, a former president of Harvard University who helped transform Harvard into a modern medical school, that “the first step toward getting an endowment is to deserve one” (21). How the medical profession behaves in the period immediately ahead—whether the profession and its leaders are seen as placing the interests of patients and the public first, or whether they are perceived as concerned mainly with their own income maximization—will greatly affect the outcome of our current health care debates. There are many constructive steps medical leaders can take to show that academic medical centers are serving the needs of the public and hence deserving of public support (22). Whether we choose to behave in this fashion and place the interests of the public first is an internal challenge whose outcome will reflect the values and conscience of the profession.

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DISCUSSION

Thibault, Boston: Ken thank you for a wonderful presentation and for your contributions to our understanding of medical education historically and culturally. I agree entirely with the importance of the three areas you have highlighted, and that these are

separate from the external environment and issues. I wonder if you could share observations with us about some things that you have seen in your travels that might be addressing these issues: the reductionism that has taken science farther away from our clinical teaching, the diminished status of educators in our academic medical centers and the need to change our locus of clinical educators.

Ludmerer, St. Louis: The first issue, that of bridging the bench bedside gap, is especially difficult. I have yet to see any good solutions advanced. More progress has been made on the second issue, changing the culture of the medical school to make it more appreciative of good teaching. For instance, I think what you have done at Harvard by creating an Academy of Medical Educators, the program that you now head, is an important step in this direction. This is the first effort since modern medicinal schools were created to fund education (as opposed to research), and I would commend you for your leadership in that area. Other schools are starting to follow your model.

I would like to add that the challenge of creating an internal medical school culture that respects teaching is a matter of values, not money alone. The real test will be how many of the outstanding educators and teachers at Harvard and other schools are promoted, receive tenure, and are granted other institutional awards.

Regarding outpatient teaching, a few places have started to do a good job of that. For instance, the Internal Medicine Clinic of the Massachusetts General Hospital has reproduced the rich learning environment of the inpatient setting in the ambulatory setting. At the MGH, students in clinic have the time to workup patients carefully and then review their findings thoroughly with an attending physician. They also have a conference at the end of the day. Most places however, just make ambulatory clinical teaching an add-on to a clinical encounter; few institutions have yet created a learner-centered environment in the ambulatory setting.

Gill, La Jolla: Just an observation, and you may want to comment on this. We've talked a great deal about the decline of physician scientists. I suspect that if we look at this from a historical standpoint, this paralleled the way science was done. In other words, the things that you quoted weren't physiology which was directly applicable to patients. We then had a period in science, which extends into the present time that was reductionist biology. We had to learn the genome, we had to learn the molecules, we had to learn the pathways like Ron Kahn explained, and all of that was reductionist and was not applicable directly to patients until it became available now to be synthesized. I would cautiously suggest that we are entering an era now where we have the tools to go back to man. We have the genome, we've heard people comment on the estrogen study, that perhaps we should have stratified patients based on pharmacogenomics or clotting factor or risk factors. All of this I think will now will enter medicine and our students will have to know it and we will have to know it. So I think that the human now becomes an object for study again, because we have the database, and we're moving from a reductionist to a synthetic phase. We are beginning to put things back together, and I suspect that's the challenge to integrate into our medical centers over the next decade.

Ludmerer: I agree with that. Thank you for that comment.

Lawley, Atlanta: Ken I really don't have question, but really just a comment, I want to congratulate you on your scholarship, on your book *A Time for Healing*. I think what you've done is crystallize a problem a number of us were thinking about, but you have done it in a way and put it into a historical context that is incredibly important for us. You showed us where we came from, where we are now, and where we are going to. As I mentioned to you earlier, I made your book a holiday gift to members of our Board of Trustees at Emory. Apparently it was read, and I must say it received very favorable comments. I think helping those boards that we all end reporting to at some level or

another, understand the dilemma is critical. Money is important, but it's really not the only key to solving this, and I want to congratulate you. Thanks Ken.

Wasserman, LaJolla: I think that Dr. Gill has hit upon a very important transition that we are about to enter. The problem is that it used to be that clinically trained "triple threat" researchers took care of patients and were therefore ideally suited for translating and making pertinent the richness of research for patient care. Those triple threats are still triple threats: A threat at the podium, a threat at the bench and a threat in the clinic. The solution does require money, because as we have heard at this meeting money is time and respect. We're going to have to figure out a way to reward teaching, not only through promotion, but also financially. The mother of all battles that must be fought by Deans is to move money that is ostensibly intended for education (Medicare money for Resident education, and state or tuition money for student education) and actually spend it for that purpose. Currently such funds are used, all too frequently, to reward pre-clinical faculty and scientific starts. Future clinical education will require teams to balance clinical excellence (which requires commitment to patient care) and academic/scientific excellence (which requires commitment to the bench that makes clinical skills atrophy). Currently faculty are, of necessity, required to devote nearly all their time to their primary endeavor so as to be expert at it. We must find a way to bring the various expertises together as a team if we are going to get anywhere.

Ludmerer: I agree with those comments. Certainly we have a need for synthesis, as you and as Gordon Gill point out. I think this will be a tough job intellectually, but the need for synthesis is great. I also agree with you that the era of the classic triple threat, I would also agree with you is over, even though exceptions can still be found. As a result, clinical departments today wisely try to divide the work among different types of faculty, particularly clinician-teachers and researchers. It's not necessary that faculty members excel in each of these three activities as long as a department contains excellent people in all of the areas.

Regarding financing, of course academic health centers need to be funded adequately. However, I believe medical schools also have the responsibility to be candid and accountable in how we use the money. Between 1965 and the present, medical school budgets have increased approximately 40-fold. We have to be able to provide Congress, state legislatures, and private donors with responsible answers as to what we are doing with all that money. What has happened is that the education of the undergraduate medical school a century ago to literally no more than a by-product of what academic health centers are doing today. I believe we have to ask ourselves thorny questions, such as: What is the right size as opposed to the largest size we can be? What is the right balance among education, research, and clinical care? These questions involve value issues. We have lots of money, but we take the money and use it for many things other than teaching. I worry that we could get twice our present funding from Congress and use all the new money for activities other than education. Thus, in my view, the struggle is internal as well as external.

Palmer, New York: It strikes me that there are two components of the bench to bedside gap. One is content, which you can recognize easily, the other is more process. I think that one of the reasons that the physician scientist of earlier days was so important was because it was through the exposure to science that the discipline of critical analysis and thinking was nurtured. And even if we have a big gap between the content of the bedside and the bench we still have an enormous need for physicians to be able to understand how to analyze data that come out of big outcomes studies for examples, the process of clinical trials and those kinds of things.

Ludmerer: Thank you for that thoughtful and important point. We have never fully lived up to our own ideals. We've done a good job teaching scientific facts, but not as good

a job as we might in terms of teaching scientific process and reasoning. I believe this issue has important policy implications today. What is the difference between a doctor and a nurse practitioner? Are the outcomes of patients cared for by one group or the other different? I believe medical education is under greater pressure today to justify its existence. The inculcation of scientific reasoning is one important function of medical education—and one way it might continue to distinguish itself from the training of nurse practitioners and physician assistants.