American Handbook of Psychiatry

Trends in Medical Education

Fredrick C. Redlich
Howard Levitin

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TRENDS IN MEDICAL EDUCATION

Introduction

In this chapter we describe medical education, its past development, its current practices, future trends and its problems. We ask what type of physician is needed and how this expert is produced. Although we take a global point of view, we concentrate on the American scene, because of the *Handbook* reader's dominant interest and because we are most familiar with it. We emphasize the education of the future physician and the physician of the future, but we recognize trends to educate other old and some new types of health personnel to cope with the ever-increasing tasks of health care.

A Short History of Medical Education

The wish to help the sick and alleviate their suffering is a rather general characteristic of the human species and activities to care for the sick have been known since the dawn of human history. There have been notable exceptions—in history and in some primitive living societies (such as infanticides among Eskimos)—and even in some industrialized societies, such as the mass murder of mentally and physically ill under National Socialism; yet the tendency to care for the sick and to develop and teach the art and science of health care are age old. In ancient societies, the nature of illness was assumed to be caused by supernatural and magic forces. In those

societies, but also in large parts of the world today, disease was thought to be punishment from the gods. Only gradually, and in relatively recent times, have scientific points of view begun to prevail.

Antiquity

In ancient India, priest-doctors taught both the theoretical and practical knowledge of healing; their curriculum was extracts read aloud from medical writings, which their students memorized. Models of the human body made from wood or clay were some of the teaching tools for instruction in surgery, although knowledge of anatomy and physiology was limited since dissection of the human body was forbidden. In Egypt, all educated persons from doctors to mathematicians were trained in schools associated with the temples where priest-doctors lived, taught, and practiced. Moses was a pupil at one of the priest schools and brought his knowledge to his people, which also formed a priest-doctor class.

In Greece, Apollo and his son Aesculapius were the supreme medical deities. The healing arts were taught to one or two students through the personal supervision of a preceptor. Temples dedicated to Aesculapius became medical centers where medicine was practiced exclusively by families claiming direct descent from this god. During this period of psychotherapeutic temple medicine, a Greek philosophy based on a world of

reason developed, and medical thought slowly sloughed off magical concepts and priestly dogmatism and became established with its base of observation. One empirical-rational school of medicine evolved on the island of Cos where Hippocrates lived in the fifth century B.C. He taught for the first time that disease is a natural process, not a result of sin or punishment of the gods. Physicians from all over the Mediterranean world came to the school at Cos to learn from Hippocrates, who stressed qualities of human compassion and high ethical standards as well as biological theory based on detailed observation. The written compilation of his teachings forms the basis for subsequent medical training.

After the founding of Alexandria in 333 B.C., the school and library there fostered an advance of science and mathematics. Dissection was practiced openly for the first time, with commensurate advances in anatomical knowledge. The medical schools at Alexandria maintained their prominent position under Roman rule. Until the importation of Greek physicians about 200 B.C., however, the Romans had no medical profession nor medical schools. The most prominent Roman physician, Galen, worked in the second century after Christ. He lectured on the structure and functions of the human body, and succeeded in building a prestigious medical practice. His skillful diagnoses enlarged knowledge of anatomy and physiology, and his writings became a basic medical text.

The Middle Ages and Renaissance

With the division of the Roman empire into Eastern and Western at the end of the fourth century and the beginning of the Dark Ages in Europe, Byzantium—later Constantinople— became a major center of civilization until the fifteenth century. Even under Byzantine rule, theoretical scientific teaching made little progress, as practitioners and teachers were slavishly devoted to the dogma of Galen and any interest in the temporal body was against their religious beliefs. When St. Benedict established a monastery in 529 at Monte Cassino, monks became the scholars responsible for maintaining the knowledge of medicine by translating and copying the ancient literature.

During the seventh century the followers of Mohammed conquered half of the then known world and established important medical centers. In Persia, the University at Jundi Shapur became the greatest center of medical learning in the Islamic world, offering bedside clinical instruction at its teaching hospital. Baghdad was another Arabic intellectual and medical center and it was there in 931 that a board of examination for medical practitioners was established for the first time. Outstanding physicians practiced and taught in both cities. Many prominent Jewish physicians thrived under Moorish rule; at that time no antagonism between Jews and Mohammedans existed. Avicenna, who lived from 980 to 1037, was the

greatest single contributor to Arabic medicine and his *Canon of Medicine* codified all existing knowledge about medicine. His writings joined those of Hippocrates and Galen as the foundation for medical learning during the Middle Ages.

By the tenth century the medical school in Salerno, Italy, began to attract students from all over Europe. Salerno was the first school to institute an organized curriculum—three years of preparation and five years of medical studies, followed by a public examination and a year of apprenticeship. Other schools developed in Italy, France and Germany; particularly well known were the French schools in Paris and Montpellier.

With the Renaissance came renewed interest in anatomical knowledge, with emphasis on observation in diagnosis and treatment. Printing made less expensive texts of new translations of the Greek and Roman medical scholars available to students. The University of Padua Medical School, the leading school of its time, attracted many German and English students who had little medical training available in their own countries. The school standardized a four-year curriculum leading to a bachelor-of-medicine degree followed by a doctoral degree after some years of practice. Although empirical training had been available only outside the university, the sixteenth century saw a new interest in bedside teaching. Vesalius in 1537 began doing his own dissections as he taught anatomy and lectured to the students from the body, using large

and natural-looking colored illustrations to provide the first extensions in anatomical knowledge since Galen.

As discoveries in anatomy distinguished the sixteenth century, so experiments in physiology created a science based on facts in the seventeenth century. William Harvey's discovery of the circulation of the blood in 1620 became the foundation on which the structure of physiology was built. Careful experimental methodology and reasoning brought medicine into the realm of science—the beginnings of "basic research." Scientists now began to explore, through experimentation, the how and the why of natural cause and effect. The microscope aided greatly in biological research. There was, however, little change in the way medicine was taught during the seventeenth century, although there was more recognition of the importance of the clinical demonstrations.

The Age of Enlightenment and Modern Times

It was not until 1630 that the Infirmary at Leiden offered instruction at the bedside. There, at the beginning of the eighteenth century, Hermann Boerhaave promulgated the outline of the modern medical curriculum: ". . . the propaedeutics of mathematics and natural science, the study of normal anatomy and physiology, and finally the study of pathology and therapy." Boerhaave's perception of the necessity for basing medical education on

scientific principles and his gifted bedside instruction brought medical education to a high point during his tenure, and his pupils extended his work throughout the world. The medical school at Edinburgh, for example, which trained many doctors from the American colonies, was founded by Alexander Monro and other pupils of Boerhaave; and Gerard van Swieten and Anton de Haen, other students of this master teacher, were responsible for the success of the Vienna Medical School in the later part of the seventeenth and eighteenth centuries. Vienna established the first professorial chair in clinical medicine and originated the concept of the modern clinic in 1753 to attract an international complement of students who learned on clinical rounds made daily with the professor in charge, setting the pattern for future clinical training in academic centers.

During the first half of the nineteenth century, Paris was the unquestioned center of medicine in the world, fostering important research, including that of Pasteur, whose studies of bacteriology greatly influenced health and medical care. Then German and Austrian centers of medical education supplanted the French centers. One factor for the decline of the French system was the use of essay type competitive examinations that determined appointments in the university. At one time this constituted progress, but ultimately it turned into a stifling obstacle. Another reason was that in Germany and Austria, and in the Netherlands, Switzerland, and the Scandinavian countries, medical education and medical research became part

of the higher education system under the umbrella of the universities, and a responsibility of the university faculty. This new approach was eloquently presented in a revolutionary book on medical education by the eminent surgeon

Theodor von Billroth. In time this new method was introduced in Russia and Japan. Young American doctors were particularly interested in training in specialties organized in universities of the German-speaking countries, and these university centers became the model for twentieth-century American schools. In contrast, the Latin countries of Europe and South and Central America remained more or less under the French influence.

Medical training in England developed its own unique pattern. The bulk of clinical training was totally separate from the university schools at Oxford and Cambridge, which only provided theoretical training for physicians who came almost exclusively from the upper classes. Guy's hospital, founded in 1725, was particularly well known, with many important clinical teachers in its school. Some hospital schools developed into centers of excellence and had a profound impact on the development of medical education in many colonies of the British Empire. As in Europe, surgeons were trained in separate schools supported by the Guild of Barbers and Surgeons (after 1800 the Royal Society of Surgeons) and through private tutoring. Surgical techniques only gradually became part of the medical school curriculum. Apothecaries, who practiced

general medicine among the lower classes as well as compounding and distributing drugs and medicines, had a seven-year apprenticeship. Each group tightly controlled the licensing of its membership and sharp guild distinctions were reinforced.

Early Medicine in the United States

The American colonies received medical care during the early years of their existence primarily from the surgeons and apothecaries who immigrated. Few physicians left their comfortable lives in England to risk the hazards of a new country. Surgeon-apothecaries were trained by a three-year apprenticeship with practitioners drawn from a wide variety of backgrounds. At first, few of them could afford to return to Europe or England for university training, but as the colonial economy improved more young men went abroad to take a university degree. The first American college of medicine was established in 1765 at the College of Philadelphia by John Morgan and William Shippen, Jr., two young physicians who had trained at Edinburgh. “At least one year’s course of lectures after apprenticeship were required for the M.B. Three years thereafter a man could defend a thesis and qualify for an M.D., though few actually took that degree until after the baccalaureate was abolished in 1789. In terms of both curriculum and staff, the school was a progressive one by European standards.” Other schools were established during the rest of the century (there were at least thirty medical schools by

1838) mostly by groups of medical practitioners who ran their schools for profit, without a formal relationship to existing universities or hospitals. On the whole, there were few regulations and requirements were lax. Johns Hopkins School of Medicine, established in 1893, was the first medical school to combine both clinical training, with the German-European, medical-school concept of rigorous scientific research, and to offer some service to the community as well. It was an alternative to the proliferating proprietary medical schools with uneven standards. It opened the way for the reform movement initiated by the Flexner report of 1910.

The Flexner Report and Its Impact

Abraham Flexner, influenced by distinguished colleagues at Johns Hopkins, particularly by William Osier and William H. (Popsy) Welch, and appalled by the low level of American education, incompatible with the increasing wealth and technical and cultural development of the United States, wrote his famous report in 1910. This report, divided into a general part of critique and recommendations and a special part describing the existing schools, had a profound impact. There were, in 1907, 160 private commercial schools —only half of them barely acceptable; even university-linked schools such as Harvard's and Pennsylvania's medical schools could not compare with the German, Austrian, or Swiss medical schools. Flexner's basic recommendations were to link medical schools with universities; to

make nationwide searches for the best faculties; to improve the preparation of students entering medical schools by better general education and by special training in the basic biological sciences; to foster biological and clinical research in medical schools (Flexner thought clinical and scientific endeavors were similar); and to interlock the pre-doctoral training in medical schools with the postdoctoral training in hospitals, which would lead to the development of university-linked medical centers. He foresaw the development of strong full-time faculties unhampered by the exigencies of medical practice. In some institutions this eventually led to an alienation of academic medicine from clinical practice. In general, however, the impact of the reform was most favorable, even though the question of whether a pure, full-time system is best from an economic and motivational point of view has never been unequivocally answered. In the twenties the proprietary schools virtually disappeared and a profound reform of medical education was apparent. The closing of proprietary schools resulted in a reduction of the number of physicians. Although the quality of medical practitioners improved, many quacks and unscientific healers still continued to practice in the United States. The American Medical Association, through its Council of Medical Education and the Association of Medical Colleges, played a major role in these changes.

A striking uniformity of the new programs emerged, although only gradually did the fulltime system become dominant. Between the two world

wars American schools were part of state universities or of privately supported universities. They were small (rarely larger than 100 students to a class) limiting their admissions to highly selected students. Such selection was based in principle on performance—at first in the premedical college courses, later by more accurately appraised objective vocational tests such as the Medical College Admission Test (MCAT). With rare exceptions, few studies of personal and social characteristics of students have been undertaken and the assessment of desirable personality characteristics of future physicians follows a "common-sense" approach that is far from satisfactory. In reality, admissions were simply curtailed in the majority of cases by the student's ability to pay the very high tuition that is mandatory in a tutorial system of instruction with little governmental or private supplemental support for education. There were also serious restrictions on ethnic groups: many Jewish students were forced to study in Europe and American Negroes were virtually nonexistent in medical schools. Only very recently has the number of women and of university groups begun to increase.

The study of medicine took four years, following a College course of four years. The curriculum consisted of a rigorous course in the basic biological sciences with strong emphasis on anatomy; only gradually did biology, biochemistry, and physiology begin to replace the endless hours of dissections. Pathology and pharmacology were important subjects in the

second year. There was no instruction in the behavioral and social sciences and only after the Second World War did psychiatry become a major subject in most schools. The major clinical specialties, internal medicine, pediatrics, surgery, obstetrics, and gynecology, were taught in clerkships with strong emphasis on bedside teaching and letting the student assume considerable responsibility in care of indigent patients. In contrast to European schools, dentists had their own schools, and virtually no stomatology is taught in American medical schools. There was little teaching in outpatient clinics. Attendance of laboratory courses and lectures was required in most schools and course examinations were rigorously held. Yale was an exception and has demanded neither compulsory attendance nor local examinations. The faculty at Yale required a scientific thesis and evaluated the student's performance without grades, and graduated the student after he passed objective examinations by the National Board of Medical Examiners.

Gradually, the National Board of Medical Examiners has become a very important agency monitoring and influencing standards of virtually all medical schools. The same has been true for an ever-increasing number of specialty boards that examine and certify those who wish to work as specialists. Although these boards are made up of distinguished faculty members of medical schools, the existence of separate boards has set up jurisdiction over standards of medical education outside of medical schools and medical teaching centers. Furthermore, every state of the union licenses

its physicians after so-called state board examinations, often specifying educational prerequisites for licensing although the states, in most cases, recognize national board standards. Among foreign graduates—who, at present, make up about a third of the number of American interns and residents and one-fourth of its practitioners— further preliminary examinations are required.

Medical Education during the Second World War and Its Aftermaths

The period between the two World Wars was a period of stability in the system of American medical education. As might be expected, the war brought changes. The first of these changes was a decrease in the length of study from four years to three in order to provide the required number of physicians to the armed forces. Although objective evaluations were lacking, it seemed that the abbreviated course, primarily accomplished by compressing the four-year curriculum into three years through a heavy course load and a twelve-month academic year, caused no reduction in the performance level. However, when the war ended, the four-year course was resumed. The second change became apparent after the war. The war required major efforts in basic and applied research. This was organized and supervised through an Office of Scientific Research and Development (OSRD) under the leadership of such eminent scientists as V. Bush, K. T. Compton, and J. B. Conant. Originally, medical sciences were under OSRD; in 1946, the

National Institutes of Health under the leadership of James Shannon were organized. These institutes not only carried on an increasing amount of biomedical research but also financed very large research enterprises in medical schools. While in 1947 only 87 million dollars was spent, the appropriations for health research for NIH in 1972 were over one billion dollars. This dramatic increase in funds enabled medical school faculties (but not student bodies) to grow rapidly. Today in many schools over half of the budget comes from governmental research funds, and, in some, as much as three quarters. In 1972, the federal government accounted for 64 percent of national expenditures for health research. (Private industry accounted for 27 percent, and foundations, voluntary health agencies, and other organizations provided the remaining 9 percent.) The result has been not only unprecedented progress in the biomedical sciences but also a threat to the primary mission of medical schools—to prepare physicians for medical practice. Another consequence of growth and multiple functions (teaching, research, and service) has been the increasingly complex problems administrators of medical schools are facing today. As the allocation of funds for research activities in general has been made by so-called study sections, after objective evaluation of projects and programs, the economic control of schools has shifted to a certain degree from inside control to outside influence.

New Developments

After years of little change and even smug satisfaction with the "best system of medical education in the world," pressures for change began to mount. They came from students who felt overeducated in those scientific subjects which interested their teachers and underprepared for practice in the specialties, particularly in family medicine. Leaders of ethnic groups in the inner city also complained that poor, and particularly black and Spanish-speaking Americans in urban ghettos received inadequate care or none at all, and they blamed medical practitioners and educators for a lack of concern with their problems. To a lesser extent some members of the faculty were also concerned with a lack of interest and insufficient funds for teaching, as well as with an obsolete and rigid curriculum and with the need, in view of the "knowledge explosion" and the ever shorter "half-life" of medical knowledge, to emphasize the teaching of principles and methodology rather than the memorizing of data. Such data can be stored and retrieved by computers and the brains of students don't have to be overloaded with what quickly becomes trivial and out of date. A modern library system can provide references and data quickly and efficiently. There is today considerable interest in modern approaches to medical teaching, using programmed instructions and audio-visual techniques. Films, and particularly video tapes, have helped to teach some basic science subjects quite effectively—anatomy and also clinical methods, especially clinical examinations and interviewing.

Much of the blame for unsatisfactory conditions fell on the American

Medical Association, with its conservative stance in medical practice and education, which attempts to keep medicine a monopolistic "cottage industry," based on the principle of fee-for-service medical care. Some protests by students and the "inner-city community" were quite vocal and even violent. No revolution has occurred, however, but some changes have been stimulated by an interesting document known as the *Carnegie Report* written by eminent scholars and clinicians under the chairmanship of Clark Kerr.

The Carnegie Report

Higher Education and the Nation's Health

The special report on policies for medical and dental education of the Carnegie Commission on Higher Education was published in 1970. It is concerned with the contributions of university health-science centers toward the goal of adequate and effective health care for the entire population, regardless of income. Noting the "serious shortage of professional health manpower, the need for expanding and restructuring the education of professional health personnel and the vital importance of adapting the education of health manpower to the changes needed for an effective system of delivery of health care in the United States," the commission believes that the provision of highly skilled health manpower, particularly doctors and

dentists, is a special responsibility of higher education.

Emphasizing unmet needs in both medical and dental care, the report points out the growing belief that health care is not only a necessity but also a right to which all persons are entitled. It touches on the problems affecting health care today, including insufficient health manpower and maldistribution of personnel, ineffective financing and rising costs. The commission warns that no matter how much health-care education is improved and how many more professionals are trained, adequate health care will be impossible unless the delivery system is also improved.

To overcome the existing acute shortage of physicians and the less acute shortage of dentists, the report suggests that the number of medical-school entrants be increased by 50 percent to 16,400, and the number of dental students be increased by 20 percent to 5400 by the end of the decade. Further expansion of the numbers of student places available should then be reconsidered. It will be particularly important to increase the numbers of women students and minority-group representation. The commission suggests three ways to increase the student population to reach a recommended goal of 216.4 active physicians per one hundred thousand population by 2002: shift all medical schools from four- to three-year programs; add new places for students, with schools expanding to at least 100 students per class and to 200 or more in some cases; and establish nine

new medical schools in metropolitan areas of about three hundred fifty thousand or more people. Development and expansion of programs for the training of physicians' and dentists' associates and assistants will add greater efficiency to the larger number of physicians. More allied health personnel at all levels must be trained along with physicians and dentists.

Medical School Models

In addition to increasing the numbers of students, university health-science centers can work in several directions to improve the quality of both education and health-care delivery. Two new models for university medical schools indicate that the Flexner model, emphasizing biological research, will no longer be the only acceptable one. The *health-care-delivery* model, in which the medical school in addition to training does research in healthcare delivery, orients itself to external service; the *kite grate d-science* model carries on most or all basic science and social-science instruction within the main campus, while the medical school stresses clinical training and biomedical research. These models and combinations of them will provide greater flexibility in both training and health-care delivery.

The report recommends that the health-science centers should now undertake curriculum revision to accelerate premedical and medical education, including elimination of the internship year and better integrated

health-related sciences as basic training for a variety of health-related professions, perhaps awarding a master's degree at the end of this period. Two-year medical schools are considered undesirable and should be eliminated, and public-health schools must be incorporated in the university centers. As in the British model, clinical instruction in selected hospitals outside of the university would be considered. Both curriculum reforms and admissions procedures should become more responsive to the expressed needs of students, with greater emphasis on comprehensive medicine, a more careful integration of abstract theory and clinical experience, and wider experience in community hospitals, neighborhood clinics, and other community facilities.

According to the Carnegie commission proposal, medical economists, administration specialists, and behavioral scientists in the academic and service functions would be included in health-science centers to increase the educational impact in these fields as well as in preventive medicine and community health. Significantly increasing programs in continuing education for area-health personnel, undertaking extensive research in healthcare delivery systems and placing more emphasis on teaching as professionally rewarding for faculty are other ways in which the university would mold a health center. Appropriate officers would have to be appointed within the universities to develop plans for the expansion of these centers.

University health-science centers should be responsible not only for the education of health-care personnel but also for cooperating with other community agencies, such as health-maintenance organizations and other community-education facilities. Community colleges would develop training programs for the allied health professions working closely with the university centers.

To support these centers, located primarily in areas with high population concentrations, the report recommends careful regional planning to establish 126 area-health education centers as satellites of the universities. These centers would bring about 95 percent of the population within an hour's transportation of a major health-care facility.

Financial Support

In order to achieve the goals recommended by the Carnegie commission report federal and state and private support of medical and dental education is necessary. The report assumes that there will be some form of national-health insurance within the next decade, one more indication of growing federal interest. Since medical and dental education is critically underfunded, the commission recommends several ways in which the federal government can effectively augment its support. A federal program of grants in amounts up to $4000 a year for medical and dental students would attract students

from low-income families, and an Educational Opportunity Bank for students, including house officers, would offer loans repayable by a percentage of medical earnings during a number of years of professional practice. The development of a voluntary national-health-service corps, with the excuse from loan repayment during a two-year term of service and reduction of maximum indebtedness as incentives, are recommended. Tuition would be stabilized nationally at a relatively low, uniform level. In addition to helping students specifically, federal cost-of-instruction supplements should be provided to university health-science centers for each medical and dental student enrolled and each house officer, with bonuses for expansion of enrollment and curriculum reform. Federal construction grants for up to 75 percent of total costs and start-up grants of up to $xo million each would stimulate growth of new university-health-science centers. Finally, federal support of research should be maintained at its present percentage of the gross national product. Other ways in which the federal government can support and strengthen medical and dental education include strengthening of existing legislation for regional, state, and local health planning with university-health-science centers and area-health-education centers having responsibility for the planning of health-manpower education and regional agencies taking charge of planning changes in health-care delivery. The report also recommends a national requirement for periodic reexamination and recertification of all physicians and dentists, federal funds for support of

continuing education, and expansion of health-manpower research programs with the appointment of a National Health Manpower Commission.

The states should continue to provide substantial financial support for medical and dental education, too, and states that have lagged behind in the past should plan for significant increases in expenditures for this purpose. States should provide financial support, particularly for house officer training and for education of allied health workers, as these personnel tend to remain in the states where they have been trained. The states, in cooperation with universities and with regional and local planning bodies would also play a major role in the development of university health-science centers, area-health education centers and training programs for allied health personnel. Additional financial support should continue to come from private foundations that traditionally have supported health-manpower education and research.

In general, we consider the *Carnegie Report* an excellent document, in spite of certain statements which we and others question. Is there a real shortage of physicians or rather a maldistribution of physicians and a need for new types of allied health personnel, such as physician associates and nurse practitioners? In some specialties, such as radiology and psychiatry, the shortage is very palpable. There is no doubt, also, that hospitals are not sufficiently manned by American residents, forcing these institutions to take

foreign-trained doctors and thus deprive foreign countries, which are themselves short in medical manpower. We are also concerned that a de-emphasis of research might reduce medical schools to trade schools and that medical schools might not fulfill their primary mission—i.e., increase and dissemination of medical knowledge—if they assume too many service responsibilities.

Reforms in Teaching

A number of changes have occurred since the mid-sixties—and the Medical School of Case Western Reserve University under its dynamic dean, Joseph Wearn, led the way. At Case Western Reserve the interdisciplinary approach to teaching basic and clinical subjects simultaneously was developed to eliminate repetitive, overlapping, and disjointed courses. The "committee" method of teaching, however, needs careful organization and preparation, and, in general, such "horizontal teaching" is more expensive than traditional "vertical teaching."

At the time of writing, a wave of reform has swept the medical schools. It has created a modified and again relatively uniform pattern of medical education. The majority of medical schools has retained the four-year curriculum, but an increasing number of schools are becoming three-year schools. As new schools were established, the existing schools— motivated, in

part at least, by financial lures of specific increases of support for "manpower augmentation"—admitted more students, particularly more students from ethnic minorities, and more women.

There is now greater emphasis on a reduction of initial time spent with basic biological sciences and on an earlier introduction of clinical material into the curriculum as well as on health care, with its social and economic problems. This is not an easy task in view of the ever-increasing knowledge produced by the "biological revolution." The trend to specialization continues and even primary medicine or family medicine is becoming a specialty. Actually, attempts to produce well-rounded medical practitioners have not been very successful, and so-called track programs in the last semesters have been forerunners of specialization, even when this is explicitly not the intent of these track programs which are designed to enable students to revisit the basic sciences and make them more meaningful in the pursuit of clinical activities.

Current Problems

Length of Pre-doctoral Course

In the midst of the reassessment of medical education, a number of problems present themselves for the schools and for medical policy making.

The amount of time it takes to educate a physician is one unresolved problem. We have already mentioned how the federal government "encourages" schools to reduce the length of study by special financial awards. As the medical schools are rather pointedly being asked to reduce the amount of time required to train a physician, the issue of what the product is supposed to be reappears. In the absence of a clear and distinct definition of what the "product" should be, the argument about whether it takes three years or four years is difficult to answer. Nevertheless, there are increasing pressures to develop programs requiring no longer than three years to produce that which used to be produced in four years. One approach to this end has been to take the four-year program and squeeze it into three years, utilizing the summers and giving very little free elective time to the student. (This is the World War II model.) We later will discuss the obvious and important principle that medical education does not end with the awarding of a degree but must be preceded by a good preparation in college and continue through the physician's life.

Role of Basic Sciences

One of the most important questions at the moment is the issue of the basic sciences and their role in college and medical schools. There is a group of scientists suggesting that basic sciences could best be taught in the university setting. Indeed, they claim that cell biology, biochemistry,

histology, and genetics are currently being taught at a level of sophistication that far exceeds the usual training required for medical students. It is their position that with a slight augmentation of their basic science programs they could teach at equal or better levels of competence the basic sciences prerequisite to clinical medicine currently being taught by the medical schools. Alternatively, it is suggested by others that the medical school basic science departments are crucial to successful operation of a medical center and that their impact on the medical center goes far beyond the training of the medical student, especially in their effect on research programs undertaken by clinical departments. Reciprocally, the medical center milieu is important to the thrust of human biology being studied by the basic scientists. The basic science departments have an important role in the training of Ph.D. candidates in order to perpetuate their disciplines. All of these activities are complimentary and not competitive with their roles in the education of the medical student. While these two opposing views pose cogent arguments, it remains an unresolved issue that will be important over the next ten years and will require each university to resolve internally, according to its own resources. In our opinion the basic sciences, well-linked to other parts of the university, ought to remain in the medical school. In any case we feel strongly that in medical school it is important that those who teach a subject be at the frontier of knowledge in that field and have a scientific point of view resulting from personal involvement in the acquisition of new knowledge.

However the foregoing issue is resolved, we consider it essential that students be taught medical psychology, medical sociology, medical economics, and medical ethics. Since facilities and faculties for these disciplines are not yet adequate in most medical centers, it is currently difficult to provide such instruction. The lack of such teaching in most medical schools is a serious educational deficit. It is in these areas that the faculties of the college program might be used and have impact on the medical curriculum. The major task of psychiatrists in teaching medical students is not teaching of psychiatry as a specialty but rather the teaching of psychological and social factors in the diagnosis, treatment, and prevention of disease. It is also noteworthy, and indeed alarming, that attitudes of cynicism increase and attitudes of compassion decrease during the study of medicine. Certainly, such a trend ought to be counteracted.

An increasing number of students with some degree of training in the biological sciences are soliciting medical schools for advanced placement. On the basis of Ph.D. or other academic activities in the biological sciences, students are requesting placement in the second or third year of a medical school in an effort to achieve an M.D. degree in somewhat less than the prescribed three- or four-year program. While this, in the past, was a unique situation, occurring no more than once or twice a year, it has now reached a point where as many as fifteen to twenty students per year, at many medical schools, are requesting this type of special consideration. It seems clear from

the trend that the number of students soliciting advanced placement and/or altered medical school programs on the basis of their biological science background will increase.

Medical School and Community

The university medical center is increasingly under pressure to define its interface with the community and to respond to legitimate requirements for increasing involvement of medical care for that constituency which looks to the medical center as a primary care unit. At the same time, it tries not to become inundated by commitments to serve too large a community, the results of which would be a loss of primary thrust in the area of education and research.

It becomes evident, however, that the only focus, and possibly not even the primary focus, for pre-doctoral clinical training, is not the university hospital ward, with its highly specialized activities, but the inpatient and outpatient services of community hospitals, the practitioners' offices, and the newly emerging health centers of the community.

Family Medicine

There is much talk of the importance of primary medicine or family medicine, but actually little of it is really taught. With the abandonment of the

old internship and with new types of practitioners being educated at many levels, such as different types of physician associates and nurse practitioners, we consider it unlikely that medical students will aspire to the role of the traditional general practitioner. In contrast to Great Britain, which has made a strong commitment to train general practitioners, medical policy makers in the United States seem uncertain and confused. Even after such a commitment is made, it will not be implemented easily because the necessary clinical faculty are not currently on the academic staffs of medical schools. Whether a change in the reward system for promotion, and government and private funds, can recruit such a faculty remains to be seen.

Allied Health Professions

One of the most ambiguous area with which the medical teaching centers will be asked to deal is the broad area of allied health training. Without clearly establishing the need, a number of people are advocating the training of a large number of new health professionals called physician assistants, nurse practitioners, or health practitioners. These people tend to be post-baccalaureate students who received an additional one to two years' training in the area of pediatrics, midwifery, trauma or ambulatory care in an effort to replace a part or portion of the traditional role played by the physician. It seems quite clear that a number of students will graduate from such programs over the next few years, but what is less clear is the role they

ultimately will play in the national-health-care delivery system. Unfortunately, two simultaneous thrusts shed doubt on the future of these individuals. On the one hand, a number of schools have accepted the concept that new allied health professionals will be required and have undertaken the training of a reasonable number of such people. On the other hand, as we already mentioned, a number of medical schools have decided to respond to the increasing need for physicians (as indicated in the Carnegie report) by the training of a large number of students in three-year programs. It is likely that a student with three years of medical training competing with a physician associate with two years' training will leave the physician associate in a most unfortunate situation. Only if the number of physicians is held constant, while a large number of allied health professionals are trained, would the future of the allied health professionals seem favorable.

Postdoctoral Training

During the last thirty years, postdoctoral training has been rather uniform in all disciplines, requiring an internship and anywhere from three to five years of additional residency training in pursuit of certification by the various board specialties. Each of these programs allows approximately one year of freedom to do whatever the candidate wishes in the form of fellowship, research, or practice. The basic formulation in the year of internship and three years of residency training in an academic medical

center remain the prototype of all programs leading to board certification. This long-standing traditional approach to board certification has recently come under fire and a new pattern has evolved.

This new pattern has altered the traditional approach in terms of the total time required to accomplish board certification. It allows a variety of mixed programs, incorporating family and community medicine, and trans-discipline training programs. The utilization of the affiliated community hospitals is an important part of the programs. For a number of the board-certifying programs the internship has been abolished, allowing the student to go from his senior status in medical school into a first-year residency program in psychiatry, the surgical subspecialties, radiology and other disciplines, without the need for a general internship in medicine or surgery. This has led to a storm of protest and it is likely that this particular decision will be reversed in the near future. Some of the general surgical programs have also abolished the internship. This has been abolition in name only, since the first-year postdoctoral program requires essentially the same degree of expertise and demands of the resident the same responsibilities in the management of patients as he previously had under the title of intern. The net effect is to change the title for his first year postdoctoral training program and to reduce the total number of years required in that particular program.

A very important suggestion, yet to be implemented, that has come

about in the last three years is that the university maintain control of the postdoctoral training program. This would result in the change in emphasis from a service-oriented program to a mixed service and academic training program. It would allow the candidate for board certification to develop expertise in the care of patients and a more sophisticated approach to clinical medicine, but, at the same time, to continue formal academic study in basic and clinical science appropriate to his board certification. It is the opinion of these authors that this is a most important issue for the university to face and that the postdoctoral training program would be improved by such control by the university.

Continuing Medical Education

Closely related to the suggestion that the university maintain a greater impact in the postdoctoral training program is the role of the university in continuing education. To terminate a physician's formal training a few years out of medical school and legally never again to enter into any formal academic program nor be tested for competence is something the medical profession must face as an unacceptable situation. The legislative control of continuing medical education must be relegated either to the university medical center, the state and local medical societies, the Association of American Medical Colleges and/or the American Medical Association and/or state licensing boards. If the university medical center is considered most

adept in the area of medical education and evaluation, then it would seem likely that it is best qualified to undertake the program of continuing medical education and evaluation of the practitioner. Whether this is done by compulsory postdoctoral educational programs, formal written examinations, or oral evaluation during visits to the medical center, or by searching of the practitioner's records is an implementation problem. It will probably be of little consequence as long as the practitioner knows that maintenance of academic and intellectual proficiency is crucial to continued licensing and certification in his particular specialty. This program of recertification would be applicable also to those who are in general practice and/or the practice of family medicine. Even if the final certification were to be left to licensing boards or state medical societies the role of updating the physician in terms of contemporary medical education would undoubtedly fall upon the medical center. It is a responsibility that the medical center should appropriately assume.

Evaluation and Cost Effectiveness

We foresee a definite thrust into the area of evaluation and of cost accounting of medical education, clinical care, and research. Demands are already made by the federal government, which supplies substantial funds, to characterize activities according to the appropriate budgetary activity. Thus, it is quite clear that monies flowing from the government for the purpose of

education will require cost accounting against the actual teaching effort that the money was supposed to support. Not much longer will third-party carriers pay for other than patient-care costs. They will ferret out hidden research and teaching costs and disallow them when they are discovered. This pattern has become increasingly apparent over the last few years, and there is no question that it will continue. As the federal government support of research is decreasing medical centers will find it difficult to maintain the same degree of high-level research as they have in the past. With a growing demand for better cost accounting of education, service, and research, it will be increasingly important that the role and financial support of the postdoctoral fellow be more clearly defined. To what extent the practicing physician owes the resident and intern some part or portion of his income because of services rendered on behalf of the physician will have to be answered. In addition, that part or portion of the intern's or resident's training which is specifically academic for his best interest will have to be cost accounted in a medical education package, leaving only the uncontestable patient-care activities of the intern and resident to be charged to a category of patient costs.

Who Is Being Trained for What?

In any discussion of the curriculum desirable for a given medical school a recurrent question emerges: "What is the product that the curriculum is

designed to produce?" No one has yet, in an uncontroversial way, defined the product of medical education, namely the physician, and the characteristics that are necessary for the modern, complete practitioner of the healing arts. It obviously encompasses a certain intellectual capacity and ability to retain facts, an ability to relate well to patients, an understanding of the pathophysiological and behavioral processes of man, and the correlative ability to apply all of these facts to the management of difficult and complicated cases. Yet these generalities do not lend themselves easily to testing and in the absence of an objective criteria for evaluating the good physician, the unresolved question of whether a particular curriculum is good or bad remains. Since it is not likely that the medical profession will agree on a succinct, objective definition of the final, complete product that medical education is supposed to produce, it is likely that there will be many curricular innovations and many programs designed to attain the ambiguous goal of the excellent physician. Even if a definition of the physician were available, and objective criteria could be applied by testing techniques to determine those who are eligible, problems will remain.

The geographic distribution of physicians is unequal and will remain so as long as there are communities of high-density urban cultural centers and low-density rural communities with a minimal commitment to the cultural aspects the physician so eagerly incorporates into his daily life. Talk about incentives to move physicians from an urban-dense population by monetary

incentives is unrealistic, since it does not address itself to the basic problem that keeps physicians in the urban center. The physician is culturally and intellectually oriented to a peer group and feels lost in a lonely and isolated intellectual environment. He requires fellow physicians and fellow professionals (lawyers and engineers, for instance) in a community that has a commitment to the theater, music, and arts. A community not having these facilities is unlikely, in the relatively near future, to attract a physician even if the remunerative aspects of his practice are inordinately high. High-speed transportation allowing a small nucleus of physicians in a group setting to meet the needs of a much larger geographical area will be crucial to the solution of the distribution problem for physicians in this country. The regional program inaugurated in 1967 holds some real promise to contribute to a solution of these programs.

In all discussions of contemporary medical education there is the recurrent question of how the health-delivery system should meet the needs of the people. It is quite clear that the impact of third-party payment is already being felt by a change in the attitudes of physicians and patients toward each other. As funds for health-care delivery and education of health workers will come increasingly from public sources, the public will demand, through its leadership, to monitor these enterprises and to set board policy for them. One of the most fundamental policies will be to look at health as a right; discriminatory practices will be unacceptable. Although the people will

determine what should be done about its health, professionals must play a major role in charting the path toward progress. Ebert feels that universities rather than medical schools will play a major role in such work. Medical educators must train physicians and new teams of health workers to carry out health care in new institutions (not just hospitals.) The patient is becoming increasingly aware of his rights in demanding a high level of medical care, which he admits he is unable to determine according to an objective criterion, but the trend toward national-health insurance will undoubtedly give impetus to this reassessment of the health-delivery system, and the role the physician plays vis-a-vis the patient.

Another clearly discernible trend is the growth and bureaucratization of medical education. Most American schools have become complex multipurpose enterprises. Just like universities of which they are and ought to be parts, they are in most cases not creatively administered. A dilemma exists as to whether the leadership should be in the hands of professional persons, who are usually neither trained nor particularly interested in administration, or in the hands of administrators, who often do not sufficiently understand the tasks and problems of the schools—such as the complex budgetary, spatial, and hierarchical problems of the enterprise. Some of the best deans have been deeply vexed over such problems. In time, deans and their associates and assistants usually learn enough about hierarchical competition (the tenure problem is a particularly vexing one) and even about the

"territorial imperative," but they remain woefully naive about intricate budgetary distributions and planning. In the future probably a special academic administrator needs to be trained to take care of these tasks.

Worldwide Trends in Medical Education

There are marked differences in medical education in the United States and foreign schools, in the West and East. In general, American schools and the schools of developed countries have become, in many cases, more alike because the American model of clinical instruction has been copied. United States' schools are still small, while many foreign schools have systems of open or relatively unrestricted admission. The weeding out of undesirable students in foreign schools is done mostly by examinations, usually of the oral type. Medical education in foreign schools is almost entirely supported by government funds; it is inexpensive because faculty resources and facilities are limited. The quality of medical education in these schools is, generally speaking, in our opinion, lower than in the United States. Such differences in quality are felt less by superior students who can tailor their programs more easily according to their needs and talents in some of the good foreign schools than they can in United States' schools. The average student, however, often does not obtain the thorough grounding in the clinical and basic sciences that his American colleague receives.

There are great differences between the medical schools of the socialist countries and those in the rest of the world. In the socialist countries, medical research and medical education are quite sharply separated. Medical research is the prerogative of the academies of science and medical education is the responsibility of medical schools. This separation is particularly marked in the Soviet Union, and somewhat less in the other European socialist republics where some research still goes on in clinical and basic science departments. About the People's Republic of China very little has been known until now in Western countries. Only recently we learned of the large increase of Chinese medical education institutions and the resulting increase of medical practitioners. China has three types of medical schools; their national schools are superior to state and provincial schools. All of them are charged with the education of the largest possible number of badly needed physicians. Two types of doctors exist: modern and traditional physicians. The two types, according to official reports at least, seem to coexist in harmony. China has also trained new types of ancillary personnel with minimal knowledge, far below the standards of the Russian or American physician's associate. They are called "Red Guard" doctors, working primarily in cities, and "barefoot" doctors who work primarily in rural areas. The attribute barefoot refers to their main job as agricultural laborers in rice fields. These types get "quickie" courses in first aid and some simple medical therapeutics. Their work essentially is part-time, in medical-aid stations under medical supervisors.

In socialist countries, but also in Great Britain and to a lesser extent in other Western welfare states, the output of physicians and other health workers seems to be regulated by the country's need for physicians rather than by individual decisions of the physician or student, or by schools and guilds operating according to a *numerus clausus* principle, dependent both on the student's ability to pay and even (though less today than ever) on his ethnic characteristics.

As the United States moves toward a planned system of health-care delivery and as public financing of medical education increases, undoubtedly this will change, too. We subscribe to a system of medical education that trains different types of health workers, whatever the society needs, ranging from physician-scientists to relatively unsophisticated workers. Many types of medical workers are needed to preserve and restore health and to aid populations in their suffering from illness and injury. Hopefully this can be achieved with minimal infringement on the individual doctor-patient relationship.

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