Projected Changes in Medical School Curriculum

Are three years really better than four?

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Much ink and passion have been spilled, in the past few years, on the subject of the crisis in medical care in the United States. Particular attention has focused upon the shortage of physicians, present and future, ever since the dire predictions of the so-called Bane report of 1959 (*1*). The decline in the physician : population ratio which was forecast then has never materialized. Despite the steady but continuous rise in this ratio over the past decade, analysts of the problem still find bases for further rise in physician demand (*2*), and the existence of a shortage of 50,000 or more physicians has become an article of dogma. A massive effort to offset this shortage has been initiated and federal largesse has provided incentives (i) to establish a number of new medical schools; (ii) to increase, in most existing schools, the size of the admitted classes; (iii) to minimize attrition; (iv) to encourage programs to reduce the medical school curriculum from the traditional four to three years (*3*).

I am not yet convinced that an increase in the number of physicians by 50,000 will in any significant degree alleviate the crisis in medical care unless it is accompanied by drastic changes in distribution of available health services, in quality control of these services, and in the mode of payment therefor. However, in this article, I should like to consider some of the advantages and disadvantages of altering the length of the term in medical school and the likely impact of such alterations upon the quality and quantity of the physicians produced.

The notion that one may increase physician production, and hence the total number of available physicians, by curtailing the curriculum of medical schools is an appealing one. During World War II such a curtailment was indeed put into effect, with the transient generation of additional physicians for military service. It will be immediately apparent that, of itself, reduction of the medical curriculum from four years to three will generate one and only one additional class of physicians. It is a unique event, in all history, and would yield some 10,000 extra doctors to the present pool of over 300,000. In a recent projection, Blumberg (*4*) points out that the number of "extra" doctors produced creeps upward if the size of the admitted class goes up, approaching but never exceeding the latter quantity. Conversely, of course, it will decline if, at some future time, the size of the admitted class goes down. Like the transition to pay-as-you-go taxation, however, it works only once.

It may be argued that, in many schools, the size of the admitted class is determined by the architectural limits of the school building. If, therefore, only three rather than four classes are to be housed, an admitted class of perhaps one-third more students can be accommodated. This would be strictly true if a medical school building were undifferentiated space, which it typically is not. A gross anatomy laboratory designed for 100 students will not function well with 133, nor can 133 warm bodies be comfortably fitted into a lecture room containing 100 chairs. Still, given time and money, these matters can be adjusted and an increase in continuing physician production of perhaps 3000 per year could result. It should be noted, however, that it is the increase in numbers of students admitted, not the curtailment of the curriculum, that is the immediate cause of this effect.

Before curtailment of the curriculum is accepted as the best means of increasing class size, other means to the same end should be considered, and the predictable complications should be reviewed. Class size can be increased, in some situations, by more economical utilization of available facilities, laboratories, lecture halls, classrooms, and clinics. Clearly much of the space in existing teaching facilities is today only intermittently occupied, and tighter scheduling might accomplish much. In an extreme case, medical educators might resort to the industrial device of "shifts." Thus one would achieve fuller utilization of existing medical school space if the 24-hour day for students (and teachers) were divided into two 12-hour or three 8-hour shifts, thereby doubling or tripling the production of physicians without any additional space needs beyond lockers and dormitories. Clearly this or any other device to increase the physician production will work well only with the enthusiastic support of the faculty and administration and with high tolerance on the part of the patients in the local teaching hospitals.

To return to the matter of the curtailed curriculum, generally visualized as reduction from four to three post-baccalaureate years to the M.D. degree, let us briefly consider some of the problems and some of the costs.

First and foremost is the question of the education achieved in four years as compared with that achieved in three. It is reasonably argued that, despite our best endeavor, we are teaching the wrong (some say "irrelevant") subject matter, and inefficiently at that. Surely there is no guaranty that with less time at our disposal we shall necessarily become wiser in our choice of subject matter, or that students and teachers will at once become more competent in discharging their respective responsibilities. On the contrary, with accelerated pace and increased fatigue, may not the teaching-learning process become less rather than more effective? Those of us who taught during the "accelerated program" years of World War II recall increased student tension and increase in frank psychoneurosis among the students. To state that as much can be learned in three years as in four is in effect to deny that anything can be learned in the fourth year, which is patently untrue.

But it is certainly true that entering medical students today are more highly

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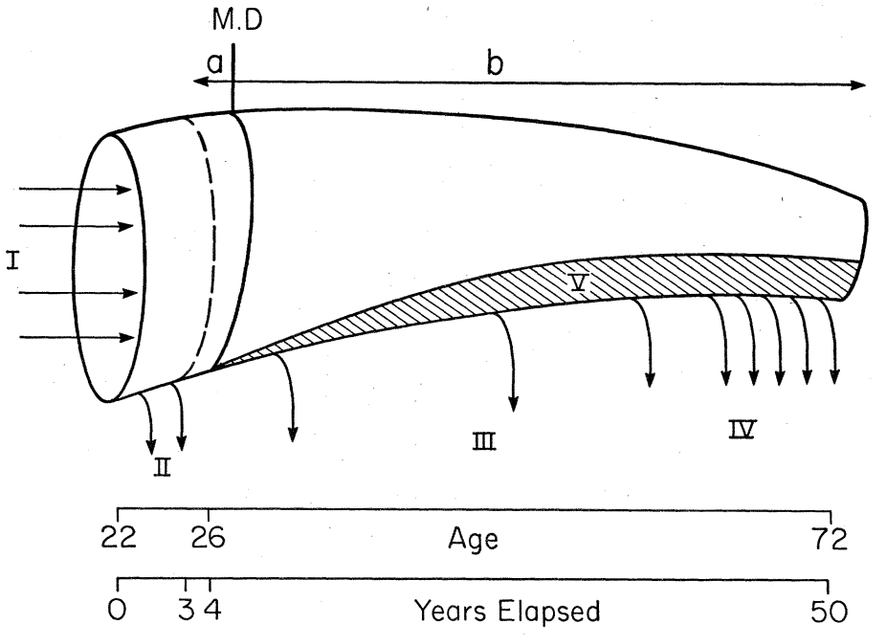

Fig. 1. Physician manpower pool: *I*, Entrants to medical schools; *II*, losses due to failure, attrition; *III* and *IV*, losses due to death or retirement; and *V*, effective manpower losses due to obsolescence.

educated, more sophisticated in science and in society, than their predecessors. This is taken by some as an indication that less time and effort are needed to bring them up to the level of the M.D. degree, thereby implying that there is a body of knowledge and experience required to become a doctor which is immutable throughout the ages. If this were so, the physician of 1970 would, on graduation, know no more than his father did in 1935 or his grandfather in 1900. Over the years we have generally accepted improved education at the lower level as a challenge to improve, not to curtail, education at the higher level. Do we clearly see at this time a valid reason for reversing this trend?

There are other problems which may arise from abbreviation of the curriculum. Hard decisions will have to be made about material to be deleted. Faculty must be deconditioned against the normal response to a smaller time allotment, which is to talk more rapidly. The fashion would appear to be to decrease the laboratory exercises which have painstakingly been added over the past half century and to eliminate totally the medical student's exposure to a research experience which some of us had welcomed as an evidence of the coming of age of medical education. Even with severe editing, to fit an acceptable medical curriculum into three calendar years would seem to invade the traditional summer vacations. Indeed a recently advocated schedule (*4*) completely annihilates these vacations. Many existing four-year curricula have already invaded one or more of the summer vacations, in order to include the material deemed essential, thereby preempting this segment of time and making it unavailable for a compacted schedule. It may further be argued that vacations during medical school serve useful purposes. They permit students a respite from a sometimes grueling and occasionally traumatic educational experience. They provide the financially disadvantaged medical student with an opportunity to earn those dollars required for his continued education. In addition, certainly the majority of students use their vacations to expand their medical educations, often taking jobs in research laboratories or in clinics. On occasion these summer experiences turn out to be very important, even career-determining.

Another hazard which must be appreciated and anticipated stems from the growth in quality and quantity of programs at universities directed toward production of various types of physician assistants. The desirability, indeed the need, for such programs is not in question. It is interesting and a little terrifying to compare the curricula of some of these two-year programs with some of the proposed condensed three-year medical school programs. With modest expansion of the physician assistant program and further minor condensation of the M.D. course, the products of these two efforts will become more and more difficult to distinguish. Particularly, with loss of laboratory science training and exorbitant stress upon the "relevant," is not some of the essence of the physician being lost? It would surely be a shame if our medical schools ended up producing nothing but physician assistants. Whence would we then procure our physicians?

The typical student enters medical school at the age of about 22 years, and at that time it is the fond hope of his teachers that he is making essentially a lifetime commitment to scholarship. We know that, if he is to become and remain a good physician, he cannot afford to discontinue the study of medicine. Medicine marches forward and woe betide the physician who long neglects his texts and journals. He is doomed to become an outmoded, less-than-competent physician, of decreasing value to his community. Regrettably, once the pedagogic incentives which include grades, examinations, licenses, and degrees are behind him, his motivation for continuing study all too frequently deteriorates. I shall discuss this aspect subsequently.

Let us return to our 22-year-old idealized medical student. After a year or so of medical school, he starts, feebly at first, to make a contribution to society. He meets sick people, he takes histories, he performs physical examinations, and by progressive steps he becomes, over the next several years, a "compleat physician." The development is a gradual process, artifically punctuated by such events as a degree award, an internship, a residency, and others. During all these years he becomes progressively more valuable to his community. As long as he remains active, as long as he continues to study medicine, his value is sustained.

In Fig. 1, I have attempted to diagram the physician population as a dynamic steady state. The resemblance to a "pipeline" is not to be taken too seriously. The system is fed at the left end by newly entering, newly committed medical students. During the next few years there are losses due to what is euphemistically called attrition. Losses continue along the way as physicians die, retire, or seek other work. Then, at about 70 years, most but not all survivors are ready to retire. There is, superimposed upon this, a continuous loss of effective manpower due to premature

senescence of those members of the profession who fail in their commitment to continuing education.

Arbitrarily, four years down the pike, we traditionally celebrate an event called a "commencement" (not a "termination"), at which time we admit the physician to the degree of Doctor of Medicine. It is now proposed that by pushing this ritual forward one year we shall somehow increase the manpower contained in the "pipeline."

Clearly there are ways to increase physician manpower. The most obvious is to increase the input by enhancing the number of schools, enlarging the admitted classes, or by some combination of these two. Alternatively, we can legislate against attrition and/or somehow postpone the death and retirement of physicians. Again, if we can prevent obsolescence of physicians by stimulation of continuing study, we will increase the effective manpower. Awarding the M.D. degree after three rather than after four years would of itself seem to accomplish little or nothing in this regard (*a*, Fig. 1).

It has often been stated that one of the benefits of reduction of the medical school curriculum from four to three years would be the economy thus effected. It costs the school less to produce an M.D., and the student incurs a smaller indebtedness over the shorter period. These things are undoubtedly true as far as they go, but let us look a little more deeply. The same community which is the ultimate source of support of the medical student via tuition, taxes, and gifts is also the source of support of the practicing physicians via fees, insurance premiums, and taxes. If we totally disregard the support of the physician, then clearly the shortest medical curriculum is likely to be the cheapest. Are we entitled to do this when obviously the physician expects to continue to be supported in the relatively handsome style to which he has grown accustomed? Furthermore, it must be assumed that each year deleted from the term at medical school will be offset by an additional year of medical practice. This, after all, is a major purpose of the proposed curtailment of the curriculum.

Even a superficial comparison of medical school costs and average physician earnings strongly suggests that the community pays far more to support a physician in practice than to maintain a student in medical school. Such a comparison would have limited meaning if a medical student performed no useful services, if a physician ceased to be a student, if indeed the award of the M.D. degree was accompanied by a complete metamorphosis. I have watched enough medical students before and after commencement to attest to the absence of such an abrupt transformation. A progressively increasing usefulness of the services rendered to the community is detectable after one year of medical school and continues thereafter for many years. Good study habits, if well ingrained before commencement, will continue throughout active professional life. In my view, these observations leave open the question of the gross economy to be effected by curtailment of the curriculum.

I should like now to suggest an alternative resolution (*5*). Since the prospect of earning the doctoral degree is to some extent an incentive to continued study, since continued study over his lifetime is a sine qua non of a useful physician, since it is already admitted that there is nothing sacred and immutable about the four-year interval between entrance into medical school and commencement, why not delay the awarding of the degree for about 50 years? Then, on his 72nd birthday or on his retirement, whichever occurs first, award to each physician the M.D. degree (*b*, Fig. 1). This prospect could do no harm and might, for some physicians, provide the carrot on the stick, the needed additional stimulus to be true physicians—that is, scholars as well as practitioners of medicine. It would symbolize the fact that the only acceptable date of termination of medical education is the date of death or retirement of the physician.

Although this proposal may startle some, it is not without precedent. The graduate of a medical school in the Soviet Union is not at that time awarded a doctoral degree. He may, at a much later date, receive this degree for additional services and studies, or he may never earn the M.D. degree. In other regards, comparison of trends in medical education in the United States and the Soviet Union is of interest. We in this country are talking of reforming medical education by curtailment of the curriculum, deletion of laboratory and research exercises, and stress on courses leading to the creation of the generalist, the family physician, in contrast to the specialist (*6*). Meanwhile, in the Soviet Union:

"Wide-ranging modifications are being introduced into medical education in the U.S.S.R. The major thrust of the changes is directed at: increasing the number of physicians from the present level of 266 per 100,000 population to 350 per 100,000 over the next 10 years; improving the quality of education by lengthening the curriculum from six to seven years after graduation from secondary school; increasing opportunities for medical students to engage in research; and abandoning the education of general practitioners and preparing only specialists."

The above quotation is the opening paragraph of a report (*7*) by John A. D. Cooper, president of the Association of American Medical Colleges, describing a recent tour of Soviet medical schools. It would appear that the United States and the Soviet Union may well be striving toward some of the same goals, but their approaches would seem to be 180 degrees out of phase.

Before irrevocable decisions about changes in the medical school curriculum are made, very serious consideration must be given to effects upon the quality of medical education and of the physician to be generated. As a minimal condition, the present level of quality must be sustained; as an aspiration, it should be elevated. If we fail to do this, we shall inevitably lose the present high esteem enjoyed by American medical education in world medicine.

Unfortunately, quality has received short shrift in some of the recent studies of the health manpower problem [see (*3*) and (*4*)]. These reports treat almost exclusively such quantitative aspects as numbers of medical schools, of physicians, of dollars to produce a physician, of hospitals, of beds, of patient days, and so on. That there are good and bad hospitals, good and bad physicians, is largely disregarded because: (i) quality is extraordinarily difficult to judge and (ii) once judged, quality appears to be incommensurate with quantity.

The latter difficulty is made apparent by the question: "How many poor physicians equal one good physician?" Numbers, quantities, are easy to secure and to tabulate. To disregard quality merely because it is difficult to assess, to devote entire attention to numbers (of medical students, of years in study) is to adopt the argument that search for a lost article should be conducted where the light is brightest rather than where the article was lost.

Continuously to consider curriculum

change, to experiment with new pedagogic devices—these are proper areas for faculty concern and action. It is imperative, however, that the quality of the student, of the educational process, of the physician, and of the medicine which he practices be subject to continuous vigilance. To make medical education bigger without at the same time making it better is an insufficient goal. Any suggestion that medical schools may revert to the condition of trade schools of the pre-Flexnerian era must be resisted. The number of years which intervene between baccalaureate and doctoral degrees, is, in my opinion, not important provided the product, the physician, is a continuing scholar in medicine. We should be dissatisfied with anything less.

References and Notes

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4. M. S. Blumberg, "Accelerated programs of medical education," *J. Med. Educ.* **46**, 643 (1971).
5. One referee of this manuscript feared lest this paragraph might be misconstrued by a reader. That reader, if such there be, should be cautioned that this suggestion has an intentional element of irony.
6. Carnegie Commission on Higher Education, *Higher Education and the Nation's Health: Policies for Medical and Dental Education* (McGraw-Hill, New York, 1970).
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NEWS AND COMMENT

Special Virus Cancer Program: Travails of a Biological Moonshot

Can basic research be targeted? The assumption that it can or ought to be has proved increasingly attractive to politicians and budget makers disenchanted with science for science's sake. Yet despite the importance of the issue, little attention has been given to a uniquely ambitious attempt at targeting basic research toward a specific goal, the Special Virus Cancer Program (SVCP) of the National Cancer Institute (NCI). The SVCP, now in its eighth year, has from the start relied heavily on the planning techniques used in space and military programs, and, for a biological undertaking, it has made similarly lavish use of resources. How well has the SVCP's moonshot approach succeeded in forcing the pace of scientific advance?

On the face of things, there has been much progress made since 1964, when the SVCP was launched with a $10 million budget. Much new knowledge has been acquired about tumor viruses and their role in causing cancer in animals. Within the last few months, the SVCP seems to have come within reach of a major goal, the isolation of viruses presumed to cause cancer in man. Discovery of one such virus was announced this July by SVCP-supported scientists at the M. D. Anderson Institute in Houston, and two more eurekas were sounded earlier this month by SVCP teams at the University of Southern California and at Georgetown University. With a tally of no less than three viruses, each announced as a probable human cancer agent by its discoverers, the SVCP might seem well on target in its goal of developing a human cancer vaccine or other antiviral magic bullet.

Although this is how the public and Congress may see it, the SVCP is held in rather lower esteem among the scientific community, particularly by those best qualified to assess the program's contribution.* "The SVCP has been extremely ineffective and maybe has even had a negative effect," says one distinguished cancer researcher. "I hear nothing but complaints about the SVCP. Its main trouble is that it doesn't have much of an intellectual base; it has Huebner's enormous energies, one very good person—George Todaro—but most of the contractees are pretty mediocre"—runs the verdict of a well-established biologist. An eminent West Coast virologist complains, "The SVCP is a masquerade; they make continuous proclamations of progress to justify the vast amounts of money being spent. But the nature of the program is that it excludes people who are highly critical. It has created a kind of stampede in which everyone rushes lemming-like in the same direction, and critical discussion, points of obvious contradiction, are ignored."

Several virologists blame the moonshot-style approach of the program for what they see as its lack of evident intellectual underpinning. The present emphasis on finding a human cancer virus is regarded by some virologists as more a political than a scientific goal, designed to impress politicians and sustain the program's funding momentum. (For unless human cells differ from mouse and chicken cells, it is already clear that their genetic inheritance includes the specifications for a virus; the physical isolation of a human-derived virus will not lead to an understanding of the fundamental aspects of cancer and cell biology, which are given less attention by the SVCP.)

The success or otherwise of the SVCP is of topical interest not just because of the fanfare over the recent human virus claims, but also because of the impending reorganization of the NCI hierarchy caused by the new cancer funding. (There are also signs that the programmatic approach of the SVCP is likely to be extended to other areas of cancer research—the NCI has let a $800,000 contract to a firm of systems analysts to develop a "national cancer plan.") The major criticisms made of the SVCP are that it uses a wasteful method of supporting research, allows too much power to individual scientists to channel resources in a single direction, has failed to develop an intellectual base for its overall research strategy, and excludes critics and outside advice.

The SVCP has its admirers and positive achievements, but the existence of criticisms such as these, whether justified or not, shows that the program has not won the hearts and minds of the academic world. Yet the

* Apart from officials of the SVCP, almost all scientists interviewed for this article asked that their names not be mentioned, many citing the risk of being denied funds, since, as one scientist said, "the NCI has a history of vindictiveness." Almost without exception the scientists quoted are both eminent and active in virology or related fields.