



U.S. Health Care Reform: Will It Change Postgraduate Surgical Education?

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Abstract. The principal goals of the pending health care reform initiatives in the United States are improving access to health care and controlling its costs. There are multiple proposals designed to reach these goals. Regardless of the final result, health care reform is likely to have significant implications for postgraduate surgical education. The teaching environment is already rapidly changing. Present environmental influences include the explosion of surgical knowledge, demographic changes, expansion of regulatory requirements from within the health care delivery system and within surgery as a discipline, societal and cultural changes, and economic pressures. Current and pending concerns prompt several questions: What should we teach? Where do we teach? How long should it take? Who are our learners? How do we evaluate our educational programs? Who should pay? A number of predictable changes affecting surgical education are proposed. New, more complex technologies will result in increased surgical specialization. Demands on surgical education will require that it be shorter, more relevant, more efficient, more effective, and more accountable. Surgical manpower requirements must be more clearly defined. Better and more relevant measures of clinical outcomes will be developed. Use of improved informational technology to manage clinical activity will expand. Solutions to the problem of foreign medical graduates will be clarified. The issue of who pays for surgical education will require resolution with some new and creative results. A proposal for shorter and more effective surgical residency is advocated.

We badly need a radically more efficient (health care) system. That will mean closing hospitals and putting surgeons out of work.—Alain C. Enthoven, Stanford University Business Professor and a main theorist of managed competition. *New York Times* May 1, 1993

Health care reform is an all too familiar phrase to Americans during the 1990s. Although the American press has treated this issue as a sudden crisis, the “crisis” has actually been growing since World War II, with the explosion of medical knowledge, new therapies, new technologies, and new organizational structures.

At this writing, a health reform task force appointed by the President of the United States has been charged with developing plans to improve our health care delivery system. The report of the task force addresses solutions for such monumental concerns as improving access to health care and controlling its costs. A number of approaches to these issues are currently under discussion. Managed competition is proposed as one solution to the cost issue [1–3]. Some even advocate managed care as a solution to both access and cost problems [4]. Still others insist that we retain consumer choice as an essential element in any plan revision [5, 6]. Expansion of existing health care programs is offered as

another solution [7]. A broader view supports the notion of maintaining the concept of the medical marketplace in reform plans [8]. A more radical approach has the federal government assuming the role of a single payer for all health care services [9]. The overall supply of physicians is included in the health care reform agenda [10, 11]. Finally, one author has addressed the medical profession’s role in the reform arena and suggested reforms in academic medicine [12].

Although costs and access do represent major concerns, other equally serious issues also confront us, such as prolongation of life, the application of genetic information, and the equitable allocation of limited resources. Yet many of these “serious” issues are also great gifts. Who, when confronted with a dying heart, would be willing to forego cardiac catheterization and dilatation of the coronary vessels? Who, given the cures available for Hodgkin’s disease, would give up chemotherapy? Or the rapid recovery from a cholecystectomy available through laparoscopy? Although it is certainly true that 12.5% of the gross domestic product of the United States is spent on health care, a proportion that exceeds all other industrialized nations in the world, it is not clear what the proportion should be. More to the point, will we let the economic engine drive the health care delivery system, or will we maintain excellence and progress by making the system more efficient and effective? For example, can we reduce administrative costs now estimated to consume 25% to 40% of our health care dollars (also the highest in the world)?

Because medical education mirrors the health care environment, all the advances in health care technology and its costs have affected the education of general surgeons in the United States. In accord with the objective of this “symposium,” let us look at how past advances have affected our present educational system and how proposed changes might affect its future.

Teaching Environment: Change Is Not New

Medical schools and their faculties, once considered “ivory towers” and almost immune to change, are now part of academic medical centers and vulnerable to such major responsibilities as tertiary and indigent care, revenue generation, and resource management. Accordingly, changes that affect medical centers also affect medical education. Those that are most influential include changes caused by (1) medical progress, (2) demographic

factors, (3) regulatory influences, (4) societal influences, and (5) economic pressures.

Medical Progress

The strongest influence on surgical education over the last few decades has been the explosion in surgical knowledge. Residents today confront a far broader range of diseases treatable by surgery, more complex and difficult therapies, and the need for a more sophisticated understanding of the basic sciences. Growth in the complexity of "general" surgery has led to the development of a whole range of surgical subspecialties. Compared with 30 years ago, few general surgeons in the United States today consider themselves ultimate surgical specialists and fully competent to perform all types of major surgery. General surgeons now share their former practice domain with vascular surgeons, hand surgeons, specialists in head and neck surgery, transplant surgeons, and other subspecialists. The fragmentation continues with expanding subspecialties, such as colon and rectal surgery, and new fields, such as endoscopic surgery, critical care, and trauma.

These changes reflect the composition and the behavior of surgical academe. As surgical teachers no longer feel confident of their command of the whole field of general surgery, they specialize in ever smaller components. With this fragmentation, more faculty members are required to teach the residents, and fewer faculty members are willing to "cover" each others' patients. Gradually, participation in the general surgical teaching activities diminish as the new specialists become increasingly insular.

Increased specialization also introduces major logistical problems in the residency curriculum. Each faculty member concentrates on a more limited area, carries a smaller proportion of the institution's surgical practice, and forces the resident to relate on a daily basis with an increasing number of teachers. Educational content formerly managed by one surgical teacher at one daily rounds now requires multiple teachers and multiple rounds.

Progress has also affected the training and functions of other health professionals who are intimately associated with resident education. Whereas in the past one head nurse knew all the surgical patients, we now have nursing specialists and nursing "teams" on which each member has a specialized role. We have also added other ancillary personnel, such as physician's assistants, respiratory therapists, and medical sonographers, each with a patient care perspective reflecting their discipline but at the same time compounding the diagnostic and therapeutic inputs a resident must manage.

The response of general surgery educators to the challenge of expanding medical progress has been to: (1) lengthen training programs; (2) split off subspecialty disciplines into separate curricula; and (3) add curricula that deal with such "unofficial" subspecialties as endocrine and endoscopic surgery.

Demographic Factors

Demographic changes in the United States have affected surgical education in a significant way. The population continues to expand rapidly because of increased births, improved longevity, and immigration. It is significantly older, with concomitant increases in the surgical diseases associated with aging. The distribution of the population has also changed, with larger concentra-

tions of citizens in suburban and urban centers causing significant redistribution of health care resources into larger and more comprehensive health care institutions.

Patients now present with different diseases. Trauma and acquired immunodeficiency syndrome (AIDS) are major burdens in urban treatment centers, adding another dimension to surgical education not foreseen 20 years ago. Cancers of the colon and breast, which once represented major exclusively surgical challenges, are now managed by combinations of radiation, chemotherapy, and surgery. Increases in life expectancy have resulted in the need to intervene surgically in the care of frail patients whose organ system functions are only marginal.

Regulatory Influences

Health care may well represent our most regulated industry. Two types of regulations influence surgical resident education: (1) those that control the delivery of health care; and (2) those involving surgical education.

Health Care Regulators. Among health care regulators, two federal health care programs are the most pervasive. Medicare supports funding of health care for the elderly. Medicaid is designed to help provide health care to the medically indigent, including children. Both programs affect the structure and staffing of the health care delivery system; impose practice constraints; prescribe allowable charges, reimbursement, and payment mechanisms; detail record keeping requirements; and limit treatment options.

Through their regulatory agencies, many other federal laws influence the management of hospitals, medical schools, and medical practice, thus directly or indirectly affecting residency education. Examples include the Americans with Disabilities Act (ADA), the Clinical Laboratories Improvement Act (CLIA), and legislation prescribing standards for antidiscrimination, such as affirmative action and equal employment opportunity. The Federal Trade Commission (FTC) enforces federal law relating to unfair trade practices and conflicts of interest between physicians, hospitals, and other health care organizations.

A number of professional associations also directly or indirectly affect residency education. The Joint Commission on Accreditation of Health Care Organizations (JCAHO) imposes stringent requirements on health care institutions in areas such as medical records documentation, facilities and their management, regulations and bylaws for the medical staff, and, more recently, quality improvement standards and clinical outcomes monitoring. Other organizations include the Association of American Medical Colleges (AAMC), concerned with the governance and management of medical schools; the American Hospital Association (AHA), a trade association representing hospitals in the political, social, and economic arena; and the American Medical Association (AMA), an advocate of physicians' interests.

Although not regulators per se, individual insurance companies and various types of health care organization impose limits and guidelines. Few surgical practices, including academic practices, escape the effects of regulation from these sources. Examples include the Health Maintenance Organizations (HMOs), which function as managed care plans; Professional Practice Associations (PPOs) and Individual Practice Associations (IPAs), which describe contractual relations between physicians, health care

institutions, and third-party payers such as insurance plans; and the most recent variant, the Hospital Provider Organizations (HPOs) a form of contract between hospitals and insurance plans.

The effects of these various regulators have been, for the most part, salutary for residency education. They have raised the standards of care, required better supervision by faculty members, and provided improved facilities and technologies. Some have even improved the quality of surgical education. On the other hand, they have added administrative and noneducational requirements to both surgical education programs and the residents they serve.

Surgical Education Regulators. Two organizations directly regulate the training of general surgeons. The Accreditation Council for Graduate Medical Education (ACGME) is a voluntary association that determines whether a residency program conforms with prescribed educational standards. The American Board of Surgery (ABS) is also a voluntary association that certifies graduates of approved surgical residency programs as qualified to practice general surgery.

The ACGME prescribes both general requirements for all postgraduate residencies and special requirements for each specialty. Each specialty has a Residency Review Committee (RRC) with membership from organizations associated with that specialty. For surgery, the RRC is composed of members from ABS, the American College of Surgeons (ACS), and the AMA Council on Medical Education. The special requirements include detailed institutional, program, and curricular requirements that must be met to achieve accreditation [13].

Similarly, the ABS is composed of representation from relevant surgical societies and specialty groups. Its purpose is to examine acceptable candidates for certification, issue certificates of qualification to candidates who meet the Board's requirements, and improve the graduate education of surgeons. ABS defines general surgery in terms of knowledge and skill requirements and describes the characteristics of effective training programs [14].

Both bodies deserve most of the credit for the excellence of American graduate education in surgery through their insistence on high educational standards, close monitoring of resident and faculty performance, appropriate working conditions, and the continued redefinition of the discipline.

Societal Changes

Changes in the social fabric of the United States have introduced new curricular demands on surgical education: Increased litigation and social alienation, high illiteracy rates, more drug use, malnutrition, and greater dependence on welfare are all social issues that the surgical resident must face in daily practice. In addition to providing appropriate and competent intervention in patients with conditions amenable to surgery, residents are expected to assist in addressing a multitude of social ills.

Changes in the role and status of women in society are reflected in the increasing participation of women in the medical profession, who now represent a significant proportion of surgical residents and surgical faculties. While surgical education appears to be adapting well to this change, there continues to be some adjustment to the notion that surgery is a male profession. Women in surgery have demonstrated their capacity to perform as well as their male counterparts, but questions of working hours

and stamina (for both sexes), childbearing and childrearing, and female role models, are still being asked.

Residents today are also more likely to marry and have children than they were a generation ago. Working spouses, the amount of educational debt, adequate and affordable child care, and the impact of physical and mental demands of the residency on family relationships are all issues affecting residency education as never before.

The ethnic makeup of the population has also shifted. There are currently major metropolitan areas in the United States where the predominant language is other than English. The impact has been that the surgery resident must adjust not only to the patient's social and cultural diversity but also to diseases that have an ethnic or cultural component.

Economic Pressures

Federal funding has been another powerful agent for change in surgical education and has manifested its effects in a number of ways. Strong support for medical education produced more medical schools and, accordingly, more residents. Medicare and Medicaid provided funding not only for patient care but also for building programs for hospitals, salaries for educators, and indeed salaries for housestaff. The National Institutes of Health encouraged additional training and research. With a liberal grants policy, entirely new ways to manage various medical conditions surgically have emerged, such as open heart surgery and organ transplantation.

These governmental programs were successful. Not only did they achieve their aims to reduce the physician shortage and to upgrade marginal hospitals, they also developed a structure of medical care and research unequalled anywhere in the world; and among the major beneficiaries of the programs were residents and surgical faculties. Governmental programs also benefited the residents indirectly through the development of new disciplines, new technologies, and new medications.

The effect of the federal programs on residency training is most evident in the experience with Medicare. Until a few years ago, Medicare funding of resident programs was included in the usual, customary, and reasonable payments hospitals received for the direct costs incurred in treating Medicare patients. In 1983 Medicare introduced Diagnosis Related Groups (DRGs) as a basis for reimbursement for hospital costs. DRG payment schedules are derived from the estimated cost of providing hospital services to patients with specific diseases. This change resulted in the costs of graduate medical education being removed from direct reimbursement to an "indirect cost" payment outside the DRG payment schedule. The result has been the gradual erosion of federal support for graduate medical education, with periodic threats to stop these payments completely. In academic medical centers, the change has resulted in additional strains on the already fragile relationships between hospitals and medical schools by causing each to seek to preserve their reimbursement sources, often at the expense of the other.

A more recent economic pressure, and possibly a more threatening one, results from the practice by HMOs, company health plans, insurance companies, and other third-party payers to ask hospitals to enter contracted fee schedules for hospital services. In effect, this practice forces hospitals to bid for the privilege of caring for patients. It will be difficult for teaching hospitals,

burdened with the costs of undergraduate and graduate medical education, research, and care of the indigent, to compete with private hospitals in these contractual arrangements. The result may be a loss of patient populations and the revenues needed to support the hospital's educational mission.

Another economic pressure results from the high and ever-increasing cost of undergraduate medical education. New physicians often have educational debts ranging from \$50,000 to \$100,000. The prospect of 5 to 8 years of additional surgical education delays their entry into practice until they are in their mid-thirties. Modest resident income, the burden of growing families, and their educational debt may prompt some physicians to seek other specialty training. In the past, surgical residents accepted these conditions, as surgeons traditionally earned larger incomes than those in the medical specialties. This income differential may not last much longer with the anticipated changes in the health care delivery system. Surgical residencies may become increasingly difficult to fill as the graduates recognize that they may not be able to afford surgical training.

In summary, we have outlined some of the changes affecting the surgical teaching environment including rapid progress in medical science practice, demographic changes, regulatory and societal influences, and economic pressures. Until now, the response of surgical educators has been reactive with incremental adjustments to surgical education and practice in response to environmental changes. Reactive responses may no longer be enough. It is time to develop an overall vision for postgraduate surgical education that can adapt nimbly and effectively to the changing health care environment.

Teaching Environment: Current Concerns

Surgical educators can be justifiably proud of the current postgraduate programs in surgery. We continue to produce highly competent surgeons who serve our patients well. Even so, the process can be further improved to create a surgical residency that is more effective (with improved learning) and more efficient (taking less time, effort, and resources). As educators struggle with these challenges, the following concerns demand our attention.

What Should We Teach?

General surgical faculties must decide the extent of the discipline and identify the essential knowledge and skill content of the surgical curriculum. There is significant evidence to suggest that there is a major dichotomy between the operative experience required in residency training and the actual practice profiles of general surgeons [15]. Two issues confront the general surgery educator: (1) The discipline has become too vast to include in a 5- or 6-year program; and (2) no resident is expected to practice the full range of general surgery when he or she enters practice. These decisions are not merely whether to spend an extra month on the trauma service and a month less on cardiac surgery. They involve such factors as whether we provide residents with nonsurgical experiences such as cardiology and infectious disease. One place to start with the "What should we teach?" question is with the *Surgical Resident Curriculum* developed under the auspices of the Association of Program Directors in Surgery [16]. The curriculum is currently being pilot-tested in 11 residency sites.

Where Do We Teach?

Although most surgical education is still confined within the walls of hospitals, much of the practice of general surgery has moved to the outpatient departments, office surgical facilities, and ambulatory surgical centers. To prepare the residents for these new approaches to surgical practice, we must devise methodologies of teaching for these very different settings [17].

How Long Should It Take?

Enthusiasm for federally supported postgraduate medical education has waned significantly. There are strong indications that many of our legislators want to abandon financial support for all training programs except for those students who promise to enter primary care. Even those lawmakers who do not want to be that restrictive favor limiting support for postgraduate medical education programs to 3 years.

Accordingly, surgical educators must address the length of surgical residency programs: Why does it take 5 to 10 years to train surgeons? Can that length of training be justified? Can general surgical residencies and the specialty fellowships, such as plastic surgery or cardiothoracic surgery, be combined into a shorter curriculum? Can the fourth year of medical school be used for postgraduate education? When should research be taught and, if so, to what extent?

Who Are Our Learners?

Surgical educators have concentrated their efforts on medical students during the 8 to 12 weeks of surgical clerkship and on surgical residents during their postgraduate training. Little emphasis has been given to training residents in other disciplines and to postresidency education for surgeons in practice. Both of those omissions need to be addressed. If the prediction comes true that most health care in the United States will be directed by primary care physicians, case managers must be educated in surgical diagnosis, surgical decision making, surgical prognosis, and the basic elements of surgical care. Furthermore, surgical educators need to develop better approaches to ensure that surgeons in practice have an opportunity to be current in the newly developed technologies.

How Do We Evaluate Our Educational Programs?

Our current methods of evaluating the quality of surgical education depend on (1) documenting the process of education and (2) measuring cognitive skills with multiple choice examinations. Neither approach tells us what we really need to know: How capable is the surgeon we have trained and how well does he or she perform? The examination methods we do have, such as the American Board of Surgery (ABS) Intraining/Surgical Basic Science Examination (IT/SBSE), the Qualifying Examination, and the Certifying Examination, provide reliable evidence of cognitive achievement, but they are poor substitutes for evaluating surgical competence. In addition, approximately 30% of the surgeons taking the qualifying or certifying Examinations fail each year.

Just as relevant is the question of how we evaluate our surgical faculties. Residents have the right to know that their teachers are well informed, that they are competent clinicians with good

results, and that their research is timely, relevant, and appropriate. Unit XII ("Program and Outcomes Evaluation") of the *Surgical Resident Curriculum* [16] suggests one approach to educational program evaluation.

Who Will Pay for Surgical Education?

Resident education is costly. Until recently, hospitals welcomed residencies because they improved the quality of care, provided status to the institution, and represented a major source of revenue from the federal government. Changes in reimbursement practices have caused some hospitals to reevaluate their residency sponsorship. Resident care is reputed to be inefficient and expensive. Residents take longer to evaluate a patient and to perform operations, they tend to order more tests, and they often keep patients in the hospital an extra day or two. Faculty and staff required to support residency programs are also expensive—whether that expense is paid by the hospital or the medical school. Costs include faculty and staff salary and benefits, administrative support, research resources, travel expenses, dues, and other benefits. In the past, these hidden costs of teaching have been absorbed into hospital charges. Shifts in the costs of health care between the federal government, insurance companies, HMOs, and other third party payers [18] have prompted these funding sources to rebel against the inclusion of the costs of postgraduate medical education in the hospital bills they pay.

Furthermore, the costs of direct support for residents has also increased. Salaries have increased, as have demands for such amenities as better call rooms, exercise rooms, free food, parking, professional trips, research funding, and staffed libraries. Finally, the prolongation of the training programs has become an incremental expense as another year or two is added to training programs or as a new fellowship is introduced. Today, hospitals are increasingly limiting the size of their residency programs.

The argument is often given that residents represent "cheap help" for the hospital. It is not a strong argument. Actually, the housestaff serves the attending surgeons and faculty. If there were no residents, the hospital's function would not change; the additional calls and various clinical tasks would be the responsibility of the attending staff.

Teaching Environment: A Tentative Prediction for the Future

To quote Yogi Berra, "It's hard to predict, especially the future." However, one conclusion is certain: there will be change; and if we are to thrive, we need to prepare for it. The most likely changes to come in the surgical teaching environment are (1) increasing specialization, (2) more efficient and effective surgical education, (3) challenges of manpower needs, (4) a demand for better measurement of clinical outcomes, (5) increased use of information technology, (6) foreign medical graduate issues, and (7) who will pay.

We share Petersdorf's [19] concern that the proposed changes in the health care system will be counterproductive if reforms in the health care system do not maintain (1) the training of excellently prepared physicians and other health care workers; (2) biomedical research; and (3) innovation and development of new treatments and procedures. As he noted in his "cornerstone"

paper, academic medical institutions are the "intellectual backbone of the health care system because they are responsible for the education of the work force (physicians and other health professionals). They are also engaged in the continuous development of scientific knowledge and the transfer of those new discoveries into medical practice for the benefit of society... failure to recognize the interrelatedness of the many activities of academic medicine, while focusing narrowly on the costs of health care, threatens the equilibrium and the viability of these institutions."

Increasing Progress and Specialization

General surgical specialties will continue to progress and incorporate the new technologies and future advances. As these new approaches become increasingly complex, and if there are adequate concentrations of patients who can benefit from these advances, new specialties will develop no matter how strong the resistance. Consider the spread of laparoscopy: the technique was adopted without official blessings, without approved curricula, and despite dire warnings by the establishment. Similarly, as new advances prove to be successful, other traditional surgical treatments will atrophy. We no longer perform radical neck dissections for Hodgkin's disease, wrap aneurysms in cellophane, excise two-thirds of the stomach for duodenal ulcers, or routinely perform radical mastectomies.

The best approach to meet the challenges of our changing field is to expect these advances and to maintain a flexible, strong, central curriculum for general surgery that can serve as a reference for educators and students alike. In addition, surgical specialties should consider developing some guidelines to keep one discipline from invading another's turf without a strong professional reason to do so.

Demand for Shorter, More Relevant, More Efficient, More Effective, More Accountable Surgical Training

We can safely predict that financial support for surgical education will wane, and that we must develop shorter, more effective surgical residency programs. We have previously suggested the development of 6-year residencies that prepare the residents not only in general surgery but in one of the surgical subspecialties as well, including (1) critical care/trauma, (2) cardiothoracic surgery, (3) gastrointestinal (GI)/colon/rectal surgery, (4) plastic surgery, (5) pediatric surgery, (6) surgical oncology/endocrinology, (7) transplantation, (8) vascular surgery, and perhaps even a (9) rural surgery track consisting of an intensive exposure to vascular, GI, and trauma rotations (Fig. 1).

In addition to the change in length and overall structure, residency education will also see the introduction of better educational technology using computers, interactive programs, and real-time technical models. Although past attempts to incorporate computer technologies into surgical education have not been particularly successful, we have also not had a critical mass of surgical educators able or willing to use computer-based educational technology. More effective use of this technology will enable us to do a far better job of teaching than we are now doing with conferences, lectures, and exhortations to read more.

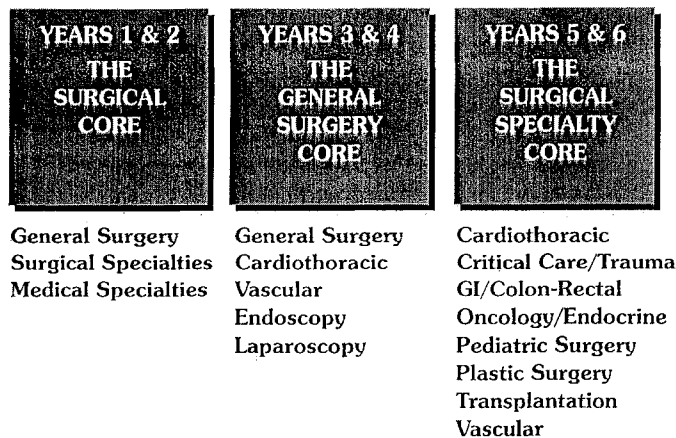


Fig. 1. Proposed surgical residency program.

Surgical Manpower

The supply of surgeons in the United States has been remarkably stable and appears to be appropriate to the needs and demand for surgical specialists. About one-fifth of U.S. physicians are surgeons. In 1990 there were 615,421 physicians caring for the population of 248,710,000 Americans, with a ratio of 247 physicians per 100,000 individuals. Of these physicians, 136,687 were surgeons, providing a ratio of 55 per 100,000 population. The number of primary care physicians has increased over the last 20 years from 58 per 100,000 to 84 per 100,000, or 44.8%. The increase in surgeons has been more modest from 42 per 100,000 to 55 per 100,000; or 30.1%. If we subtract 33,697 obstetricians/gynecologists from these totals; the traditional "surgeons" equal 102,030. Of the various surgical specialties, general surgeons are the most numerous with 38,376 (37.3%) followed by 19,138 orthopedists (18.6%) and 16,073 ophthalmologists (15.6%) [20].

Whether these numbers constitute a deficit or excess or are appropriate to the need for surgeons in the United States is still not clear despite the assessments by the Graduate Medical Education National Advisory Committee (GMENAC) and other surveys. The estimates of surgical manpower needs for the United States are made less clear by several unanswered questions: Will the 4,205 women who are now in surgical training and who represent 20.4% of the total 20,662 trainees be as productive as their male counterparts during their childbearing years? Will the current restriction of foreign medical graduates from entering surgical practice in the United States be maintained? How many of the finishing general surgical residents will be lost to that broad specialty by entry into one of the surgical subspecialties such as cardiothoracic, plastic, or vascular surgery?

Studies of surgical manpower are also hampered by our inability to predict the technical advances that may increase or decrease the need for surgeons. For example, a new medical therapy for coronary artery disease could sharply diminish the need for cardiac surgeons and their extensive use of hospital resources. On the other hand, a breakthrough in xenografting that would allow the transplantation of animal organs to humans could increase the demand for surgeons far beyond our present expectations.

The evaluation of surgical manpower depends on the role expectations of surgeons and those who hire surgeons. If surgeons continue to fulfill their traditional roles as the providers of

perioperative and operative care and, in addition, as managers of a number of nonoperative problems such as pancreatitis, many more will be needed than if the role of the surgeons is limited to the technical performance of surgery. Thus a hospital with 700 beds that performs 3600 general surgical operations per month could be staffed by 20 "traditional" surgeons each performing 15 cases per month or by six surgeons, acting primarily as technicians, each completing 50 cases per month. Because surgical salaries are generally higher than those of primary physicians, it is reasonable to expect that managed care organizations will favor the model where surgeons spend most of their time in the operating rooms and leave the care of the patients to other providers. Although the American College of Surgeons and the American Board of Surgery strongly defend the broad patient care model of the surgeon, some surgical specialties, notably cardiac and ophthalmologic surgery, have already crossed that line, with medical specialists providing more of the nontechnical care.

So where do we stand? Most likely, the supply is fairly close to the demand for each of the specialties except general surgery and pediatric surgery. Only 400 general surgery residents finish training each year—not enough to replace the 800 who retire annually. In pediatric surgery, the 20 Fellows who finish each year are not nearly enough to fill the various openings around the country. The ability to increase the number of surgical trainees is limited by the number of available cases in contrast to the medical specialties where several residents can learn from the same patient. Accordingly, at least for the next 5 years, there is little indication for a change in the number of surgical residency positions, although a modest increase in general surgery and pediatric surgery positions would be welcome.

Computerized Medical Record. A computerized, "paperless" medical record is an essential component to any program for the evaluation of the nation's medical care. With that technology, it will be possible to evaluate medical therapies, conduct clinical research, monitor the prevalence and incidence of disease, measure the quality of care delivered by various providers, determine manpower needs, and develop national care plans based on data rather than on guess. The current White House administration has already named the "smart card," a miniature computerized medical record, as one of the central objectives of its health care program. Privacy issues, cost problems, and difficulties in getting providers to participate remain serious issues. Even so, because the technology is already available and because there is an increased conviction that better information is needed, the computerized medical record has a good chance of becoming a reality within the next 5 years.

Foreign Medical Graduates Issues. In the past, the United States has benefited enormously from the exchange of medical professionals with other countries. Visiting foreign medical students, residents from foreign medical schools, visiting foreign professors, and immigration of health professionals have all made important contributions to our health care delivery system. The present limitations on foreign medical school graduates in residencies benefit neither the United States nor other nations. We hope that the present hurdles can be overcome in order to provide better exchange of colleagues and better cooperation in research and educational efforts.

Who Will Pay for Surgical Education? There is little question that some medical students will continue to choose surgery as a career and that residencies will be needed to complete their training. There is also little doubt that Americans will continue to require surgeons and will expect them to be fully qualified and readily available. What is not as clear is who will pay for their educational preparation. Managed competition programs are unlikely to reduce health care costs [21], and none appears enthusiastic about supporting the costs of postgraduate education and research. Accordingly, it is easy to pose the questions facing today's surgical educators: What happens to the residency programs when "managed competition" forces the patients into nonteaching health care systems? Where will we find the cases needed for teaching? Where will medical schools find funding if the teaching hospitals are empty? Who will fund the research that has led to the unprecedented technologic advances, especially as much of that research is currently based on pilot studies funded by practice funds?

According to the AAMC, federal funding for medical schools dropped from 55% of the cost in 1964–1965 to 22% in 1990–1991. During the same period, the portion financed by the medical schools' clinical activities has increased from 17% to 51%. More than 60% of these revenues came from clinical practice plans [22].

Evidence that the federal government intends to significantly modify its support to graduate medical education comes from recommendations contained in the Annual Report to Congress prepared by the Physician Payment Review Commission [23], an agency that determines federal health care reimbursement practices primarily for Medicare and Medicaid programs. These recommendations include the following: (1) that all payers contribute to a national pool to fund graduate medical education; (2) that a Congressional limit on the number of residents be funded; (3) that the number of residency positions per specialty be determined by a federal body appointed for that purpose; (4) that funding from the pool to be determined by educational quality; and (5) that payments for graduate medical education be made to entities other than hospitals to encourage training in ambulatory sites.

Any further withdrawal of the federal government from the support of residency education, and especially the education of surgical residents will leave a serious vacuum. Hospitals may pay a fraction but cannot bear the enormous costs by themselves, and certainly the medical schools do not have the resources. Without the ability to generate patient care revenue, tuition must be raised prohibitively or the states and private universities must make up the shortfall. Those institutions are unlikely sources, as tuition has already increased 400% (CPI adjusted) over the last 30 years, and states are not likely to have the resources to offset such a major expense. All medical schools will feel the pinch, but those without an integrated hospital, those without the cushion of large endowments, and those with few research grants will be the most threatened. Some of these centers may well go bankrupt and close.

In the past surgeons in certain centers were willing to share some resident support, but the recent reductions in reimbursement make that an unlikely source. The most likely approaches include (1) residents paying for their education by a combination of service and tuition; (2) "contributions" forced by the federal government from the various health insurance companies into a common educational fund; and (3) stimulus funds from the

government to support those programs, such as general surgery, with clear manpower shortages.

Conclusion

Health care in the United States has undergone enormous changes over the last generation and will continue to change, perhaps even more rapidly. The need for surgeons and for surgical education will continue but will probably be conducted in a far different environment. Residency programs will probably be run on a far tighter budget and, accordingly, will be shorter, include a significantly larger outpatient experience, limit research training to those residents planning academic careers, and may, in certain desirable and crowded specialties, even charge tuition. The concept of a residency in "general" surgery will gradually give way to the idea that every general surgeon is also fully trained in at least one and perhaps two surgical specialties. Furthermore, residents will require training in the use of computers and informatics, ranging from smart cards to ROM rapid access computer systems for references and outcome research in order to master future medical communications and be capable of conducting outcome studies. The changes are well on the way; and to thrive, surgical educators must respond with vision, with concern for their students, and, most importantly, with compassion for their patients.

Résumé

Les objectifs principaux des initiatives de réforme de la santé aux États-Unis sont d'améliorer l'accès aux unités de soins et d'en limiter les coûts. Il existe une multitude de propositions pour atteindre ces buts. Indépendamment des résultats finaux, cependant, la réforme risque d'avoir des implications graves en ce qui concerne l'enseignement postuniversitaire. Actuellement le milieu enseignant change rapidement. Les influences principales sur l'enseignement sont l'explosion des connaissances médicales, les changements démographiques, le durcissement et la complexité des règlements à la fois à l'intérieur de la communauté chirurgicale et à l'intérieur du système des soins, les changements sociaux et culturels et les exigences économiques. Les problèmes actuels peuvent être résumés ainsi: Que faut-il enseigner? où faut-il enseigner? Quel est le temps nécessaire? Qui doit le faire? Comment évaluer nos programmes d'enseignement? Et qui doit les payer? Un certain nombre de changements prévisibles, influençant la chirurgie, sont proposés. De nouvelles technologies, de plus en plus complexes, vont avoir comme conséquence une augmentation de la spécialisation chirurgicale. Il s'en suit que la formation chirurgicale va être plus courte, plus spécifique, plus effective et efficace? Les demandes en moyens humains seront mieux définies. Il faut également mieux définir les critères d'efficacité clinique. La nouvelle technologie informatique progressant sans cesse, intervient sur l'activité clinique. Le problème des médecins diplômés à l'étranger va être clarifié. Le financement de la formation médicale va connaître de nouvelles tournures. Une proposition pour une formation postinternat plus courte et plus spécifique est formulée.

Resumen

Los principales propósitos de las iniciativas sobre reforma de la salud que actualmente se encuentran en discusión son el mejora-

miento de la atención y el control de costos. Existen múltiples propuestas para alcanzar tales objetivos. No importa cual sea el resultado final, la reforma de la atención de la salud muy probablemente tendrá significativas implicaciones sobre la educación quirúrgica de postgrado. El escenario educativo ya está en un franco proceso de cambio. Algunos factores determinantes son la explosión del conocimiento quirúrgico, cambios demográficos, la explosión de los requerimientos regulatorios tanto en lo referente a los sistemas de los servicios de salud como a la cirugía misma como disciplina, los cambios sociales y culturales y las presiones de tipo económico. Algunos interrogantes pertinentes son: Qué debemos enseñar? Dónde debemos enseñar? Qué tan prolongado debe ser el programa? Quiénes son nuestros discípulos? Cómo debemos evaluar nuestros programas educativos? Quién debe asumir los costos?

Se visualizan algunos cambios que han de tener impacto sobre la educación quirúrgica. Nuevas y más complejas tecnologías habrán de resultar en creciente especialización quirúrgica. Las demandas sobre la educación quirúrgica harán necesario que el proceso sea menos largo, más pertinente, más eficiente, más efectivo y más responsable y explicable.

Los requerimientos en cuanto a recursos humanos tendrán que ser más claramente definidos. Se desarrollan mejores y más pertinentes métodos para determinar los resultados finales. Se incrementará la utilización de mejores tecnologías de la información para el manejo de la actividad clínica. Se definirán soluciones al problema de los médicos graduados en el exterior. El tema de quién debe pagar por la educación quirúrgica deberá resolverse mediante nuevas y creativas soluciones. Se plantea una propuesta para una residencia quirúrgica más corta y más efectiva.

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