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The Health Work Force, Generalism, and the Social Contract

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Since 1990, society has been evolving through a period of significant transformation. In response to an increasingly information-rich and knowledge-based environment, the work force for most of society is becoming more specialized. Medicine is one of the few areas developing a work force which emphasizes generalism.

For our current needs, the transitional work force has overproduced physicians. Because the overproduction has been uneven by specialty, it is deceptive to evaluate growth collectively rather than by individual subspecialty.

Future shifts in age and types of illness combined with enhanced technology will transform the public's expectations of the American health care system. The type and number of physicians that will be needed in the future will be substantially different than in the past, so current patterns in physician education may not address the population's future demands.

> Make up your mind how many doctors the community needs to keep it well. Do not register more or less than this number.
>
> G. B. Shaw
> *The Doctor's Dilemma*

The health professions' relationship to the population should be in proportions, skills, and geographic distribution to allow universal access to health care of high quality. Recently, concepts of "generalism" and "primary care" have dominated health planning. These terms imply reorienting the health care work force from a disease-specific focus to a population-based system. Because of the many years required to educate a physician, the production of physicians by our academic medical centers frequently lags behind the public's perceptions and expectations of health professionals. Current dissatisfaction with the U.S. health care system reflects, in part, the sluggish response to public expectations that the lengthy process of medical education causes. While policies guiding undergraduate and graduate medical education are continually evolving, the objectives and roles of physicians for the future are ill-defined.

As we near the 21st century, health system change is expected to occur through physician work force reform. The 1994 report to Congress by the Council on Graduate Medical Education (COGME) is entitled, *Recommendations to Improve Access to Healthcare Through Physician Work Force Reform.*[1] A problem exists, however, in estimating future work force needs because of the different methodologies used. The methodology on which the health work force is planned should be "needs-based." Projections of work force needs should be based on the following:

1. Age and composition of the population.
2. Illnesses and therapies projected.
3. Public expectations of the technology that will be available.

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4. Willingness of society to absorb the costs of health care.
5. Inevitability of a changing work force, as our industrial, service-oriented work force is transformed to one that is predominantly knowledge-based.

PERIODS OF PROFOUND CHANGE IN SOCIETY

There are epochal periods when a sharp transformation occurs in society. These transforming changes may be secondary to natural events, human conflict, war, or technology. A period designated as "epochal" is one in which changes are so great that no one living at that time could imagine the world in which their parents had been born. Such periods can result in changes in basic values and political structure and even in the creation of new societies.[2]

Drucker identified several periods of profound change of transformational magnitude. They include 13th century Europe, in which society seemingly overnight became centered in cities, trade occurred over larger distances, and the bourgeoisie evolved. Urban centers developed with universities, and religious orders became a strong societal structure.

In the 15th century, another period of profound change followed Johannes Gutenberg's invention (1455) of movable type, Martin Luther's Protestant Reformation (1517), and the Renaissance. This period included a rediscovery of antiquity, the discovery of America, the development of the first standing armies, and the modernization of the study of anatomy.

The year 1776 ushered in another epochal period characterized by the American Revolution, James Watt's perfected steam engine, and the publication of Adam Smith's *The Wealth of Nations*. After Waterloo, the modern political "isms" were born (capitalism and communism) as the Industrial Revolution occurred. The early 19th century saw the founding of the modern university (Berlin) and the advancement of universal schooling.

Drucker identified the late 20th century as a period of profound change equivalent to the 13th, 15th, and late 18th centuries. Contributing factors are the discovery of atomic power, the emergence of a non-Western country (Japan) as an economic power, and computer technology. Labeling our current period the "Knowledge Society," Drucker cited the G.I. Bill of Rights as a key influence. Drucker's Knowledge Society impacted transnationally with events such as the fall of the Berlin Wall and the 1990 multinational war against Iraq.

THE WORK ENVIRONMENT OF THE "KNOWLEDGE SOCIETY"

The 21st century may be an era when computers and robots do more of the work, leaving people more time to be creative.[3] In the past, nine out of ten people did manual work in fields, such as manufacturing, farming, mining, or transportation. As recently as 1900, more than 30% of the population lived and worked on farms, a figure that had declined to 25% by the end of World War II and now is less than 2% (Fig. 1). In the 1950s, people whose work involved "moving or making things" were a majority in all developed countries. The manufacturing economy overlapped with the farm-based economy. Manufacturing and farming are now being displaced by information services in a knowledge-based society (Fig. 2).[4]

The five fastest growing occupations since 1982 are computer service technicians, legal assistants, computer system analysts and programmers, computer operators, and office machine repairers. The most rapidly declining occupations are railroad conductor, shoemaker, machine operator, aircraft assembler, central telephone operator, taxi driver, and postal clerk.[3]

The evolving Knowledge Society facilitates global networking. These transnational networks are not limited to economic transactions. For example, a profound increase in the movement of professionals across national boundaries has begun in the European Union. The Knowledge Society is transforming our work place and our political and personal lives at a time when the characteristics of the population are changing by age, sex, race, location, and profession.

THE POPULATION AND THE HEALTH ENVIRONMENT

At the turn of the century, the average life expectancy of women was 48.3 years; of men, 46.3 years. The gender gap in life expectancy has since widened considerably to 78.9 years for women compared with 72.0 years for men. Women have proportionately risen to 60% of the population of those older than age 65 and 72% of the population older than age 85—a 77% increase in life expectancy.[5]

The number and proportion of the population has changed, with the number of people age 65 and older more than doubling—from 12.3 million in 1950 to 25.5 million in 1980.[6] During this 30-year period, the percentage increase in the number of elderly was 74% greater than for the population younger than age 65—108% compared with 62%. For those age 85 and older, the rise was the greatest—a 281% increase, from 577,000 in 1950 to 2.2 million in 1980.

Figure 1. The Hromadka family, haying in Milligan, Nebraska, c.1915. Farming occupied more than 40% of the work force at that time, but now occupies less than 2% of our work force because of industry and technology (used with permission of author's family).

Between 1920 and 1940, birth rates were higher than currently, and they were even higher between 1946 and 1964, resulting in the "baby boomers." Current indications are that the death rates per age are continuing to decline. A steady rise in the elderly age 65 and older—from 25.5 million (11.3% of the total population) in 1980 to a projected total of 64.3 million (21.1%) in 2030—is expected to occur, representing a doubling over the 50-year period.

The baby boomers, a group of people born between 1946 and 1964, encompass 77 million people. By 1996, the first group will reach 50 years of age. Over the next 18 years, the rest will enter that category. A secondary population bulge, the "baby boomlet," is yet another cohort that will increase the number of aged in our population.

The progression of the postwar baby boom group peaks for the 65-to-74 age group in 2030; for the 75-to-84 age group in 2040; and for the group age 85 and older in 2050. In 1980, the "oldest old," those older than 85 years, constituted 1% of the total population and 9% of the elderly. By 2050, the over-85 group will account for 5% of the total population and 24% of the elderly population.[7]

Americans older than 50 years of age are currently 26% of the population, owners of 80% of the money in banks and savings and loans, holders of 77% of the nation's financial assets, and buyers of 48% of all luxury cars.

Between 1990 and 2020, the population of the United States will increase by 31%, to 325.9 million people.[8] Population gains among the various racial groups will differ markedly. The Asian-American population will more than double, while whites and African-Americans

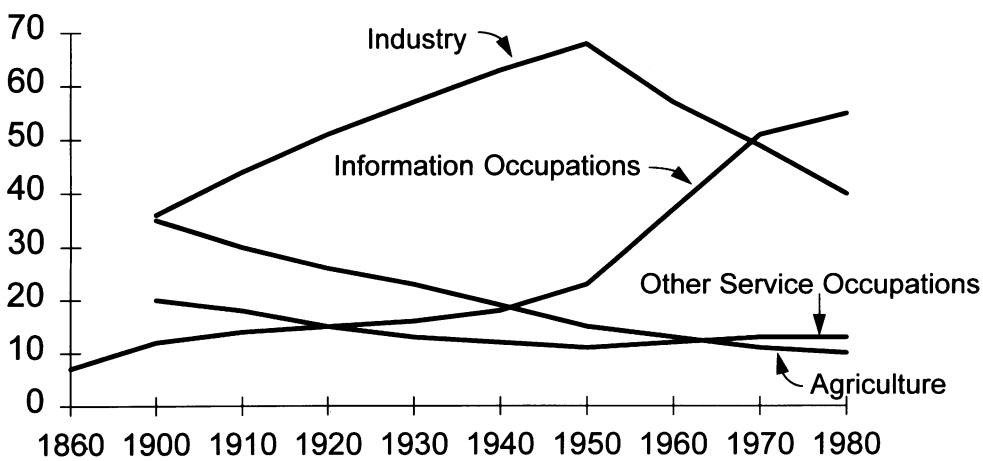

Figure 2. The rise of information workers. The decrease in agricultural workers, industry, and other service occupations is being superseded by an increase in "information workers." From Coates JF. The changing nature of work. In: Didsbury HF, ed. The World of Work Society. Bethesda, MD; 1983:26. Used with permission.

will increase by less than 50%. During this period, the number of whites as a percentage of the total population will decline from 84% to 78%.

Changes in state populations are influenced by disparate growth patterns. Gains are forecast in population for the Pacific Mountain states. By 2020, nearly 50 million people will live in California, 25.6 million in Texas, and 9.5 million in Florida.

In summary, the largest increase in U.S. population between 1990 and 2020 will be in persons older than age 44. The largest relative increase (126%) will be in persons age 85 and older.

HEALTH REQUIREMENTS OF AN AGING, HIGH-TECHNOLOGY SOCIETY

Because our current population is younger than the projected population of the 21st century, health care technology that serves our current population will not address the needs of the older population of the 21st century. There is a higher incidence of chronic disease among the elderly: 86% of persons age 85 and older have one or more chronic diseases, such as arthritis, hypertension, hearing loss, and heart conditions.[7] Issues of concern regarding planning for health needs of the elderly include the inconclusiveness of scientific data for health promotion and disease prevention activities, the need for additional knowledge of aging, and the shortage of a health care work force that is knowledgeable about geriatric issues.

Managed care with capitation will have an effect on the care of the elderly. The elderly make more visits to physicians than the do the middle-aged. In 1985, persons age 65 to 74 averaged 7.7 physician visits per year; those age 75 and older averaged 9.3. In contrast, persons age 45 to 64 averaged 6.1 visits; only 5% of the elderly had not seen a physician for 5 years.

Currently, the leading causes of death are heart disease, cancer, stroke, and trauma. Mortality and morbidity in a technologically advanced society with an older population will differ and thereby can be expected to transform the population's health needs and expectations.

Between 1980 and 1990, the age-adjusted death rate for heart disease, the leading cause of death for both men and women, declined 25%, continuing the downward trend of the 1970s. Since 1980, heart disease mortality declined 27% for white men, 23% for white women, and 16% for African-American men and women.[8] In 1990, heart disease mortality was almost twice as great for white men as for white women. Between 1980 and 1990, the age-adjusted death rate for stroke, the third leading cause of death, declined by 32%, continuing the downward trend of the 1970s. Between 1980 and 1990, the age-adjusted death rate for lung cancer increased by 41% to 46% for African-American women and white women, increased by 11% for African-American men, and remained stable for white men. The mortality from the human immunodeficiency virus, HIV, increased by 13%, a smaller increase than in 1989. The HIV age-adjusted death rate for African-American men was almost three times that for white men: 44.2 deaths among the former compared with 15.0 deaths among the latter per 100,000 population.

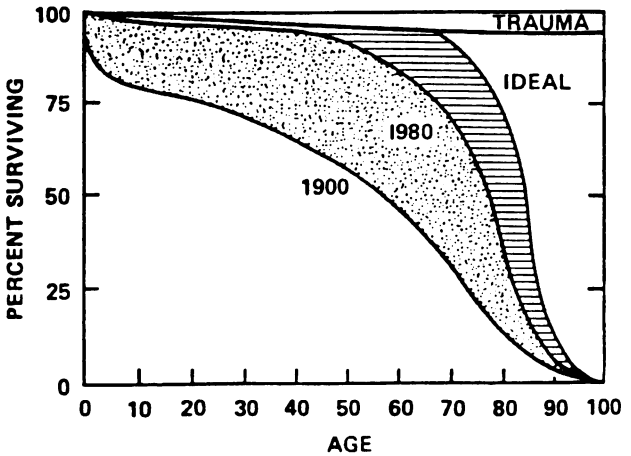

Figure 3. The increasing rectangular survival curve. As infectious diseases and other illnesses that were common causes of death decreased, life expectancy increased. New challenges for health professions are reflected in an aging population with chronic illness. From Fries JF. N Engl J Med 1980; 303:131. Reprinted with permission.

The compression phenomenon is a concept describing health status as life span increases in an aging society. An optimistic view is that the years of unhealthy life are compressed into a relatively brief period before death and that most of "old age" will be healthy (Fig. 3). Older people do, however, require more medical services. The health gains of the elderly will lead to higher health costs. The elimination of certain diseases and accidents results in a longer life expectancy but has the potential to significantly increase health care costs.[3] For example, if heart disease could be eliminated, a 30.9% increase in life expectancy at age 65 would occur, but with an estimated cost of $67.4 million (Table 1). Similarly, less dramatic costs would occur with the elimination of death from neoplasms, cerebrovascular diseases, motor vehicles, and other accidents.

The public's expectations of our health care system are extensive and sometimes unrealistic. There is a tendency to "scientificize" our diseases and expect that all health problems can be solved as dramatically as were pneumonia by penicillin and polio by the Salk vaccine. Infectious diseases have largely been replaced by chronic and degenerative diseases in an older population. For example,

Table 1. POTENTIAL INCREASES IN 1983 FEDERAL COSTS IF CERTAIN CAUSES OF DEATH WERE ELIMINATED

	% Increase in Life Expectancy at Age 65	Full Federal Cost (in billions of 1983 dollars)
Heart disease	30.9	67.4
Neoplasms	8.5	18.5
Cerebrovascular disease	7.3	15.9
Motor vehicle and other accidents	1.2	2.6

Health care costs are likely to increase with continued efficacy in lowering death rates from heart disease. Less dramatic alterations currently occur in cancer death rates, but scientific advances should increase survival.
From Begold C, et al. The Future of Work and Health, Auburn House, Dover, MA.

cancer causes nearly one out of four deaths in the United States and is a constellation of probably more than 1000 diseases. Of the 250 million Americans now living, about 75 million will eventually develop cancer. Although the incidence of cancer has increased in the past two decades, the death rate from cancer for those younger than age 55 has declined. With early detection, many cancers can be prevented and survival improved.

Dr. Leroy Schwartz, president of Health Policy International, has coined the term "Medicalization of Social Problems."[9] "Medicalization" means describing a social problem in medical terms and funding it through our health care system. Poverty, behavioral factors, and drug abuse are "medicalized." For example, more AIDS cases occur in the United States than in any developed country, at a cost of $15.2 billion. Most countries, such as Germany, spend about one third of their gross national product (GNP) on social problems. In the United States, only 15% of our GNP is spent on social problems, but many social problems are included in our health care budget. For example, $6 billion in health care dollars was spent in the United States for drug abuse, and between 1985 and 1990, the age-adjusted homicide rate increased by 23% with commensurate cost increases.

Considerable frustration with traditional or scientific medicine is reflected in the use of alternative medicine by patients. In 1991, one American in three tried alternative therapies, such as relaxation therapy, herbal medicine, acupuncture, chiropractic, spiritual healing, and other "alternative" approaches, in addition to standard medicine. An estimated 425 million visits were made to alternative practitioners, in contrast to 388 million visits to family physicians and other primary care physicians. Approximately $13.7 billion dollars, most of which was not covered by insurance, was spent on these unconventional therapies.[9]

So, given the profound changes in health care requirements that will be experienced in an aging, knowledge-based society, careful judgment is required before reshaping the goals of medical education. Because the products and outcomes of the health care system will certainly continue to be publicly scrutinized for scope, quality, and effectiveness, tomorrow's demands will differ from today's. The shifts in age and types of illness in our population will transform the public's expectations of the American health care system.

GENERALISM AND THE PROFESSIONS WITHIN THE "KNOWLEDGE" WORK FORCE

A generalist, according to Webster's dictionary, is a person whose knowledge, aptitudes, and skills are applied to a variety of different fields as opposed to a specialist. Generalism, as an idea, is broadly applicable across crafts, professions, and even daily living.

The concept of generalism applied to a profession requires examination in a knowledge-based, technologically developed society. Alfred North Whitehead observed:

> The professions are as characteristic of the modern world as the crafts were of the ancient. Specialization and institutionalization of professions are secondary developments to the development of professions. A craft is an avocation based upon customary activities and modified by the trial and error of individual practice. A profession, in contrast, is an avocation whose activities are subject to theoretical analysis and modified by theoretical conclusions derived from that analysis.[10]

Clark Kerr noted that an impressive percentage of gross national product is spent on the training of professionals. As early as 1963, he predicted that "the day is coming when the 'knowledge industry' will occupy the same role that the railroad industry did in the 1860s."[11] In fact, Drucker's concept of a knowledge-based society is consistent with Kerr's "knowledge industry."

GENERALISM IN LAW AND DENTISTRY

In the legal profession, generalism is the historical pattern.[12] The bar and judiciary are distinct legal categories. Within the practicing bar, there are various specialties. The avoué and avoces in the French system, the proctor and advocates in the Scottish system, and the solicitor and the barrister in the English system are examples of specialized categories of law.

In the United States, formal division among legal practitioners has historically been absent, so a lawyer may have served as a solicitor, a barrister, *etc.* The legal profession in the United States, unlike in France and En-

gland, has avoided specialization through most of the life of the country. Traditionally, specialization in U.S. law has been limited to the areas of patent, trademark, and admiralty law. However, in recent years, U.S. law has developed both specialization and certification (Hochstadt A, personal communication, 1995). A 1989 study made for the Commission on the Legal Profession and the Economy of New England reported that the most frequently identified legal specialties include general practice, real estate, civil litigation, corporate law, probate law, negligence law, family law, trust and estates, tax law, and criminal law. Seventeen states now have 50% of their legal practitioners indicating that more than half of their time is spent in a specific area of law. Other studies have revealed that as many as 64% of lawyers spend more than half of their time devoted to specialty practice.

The growth of specialization in law has presented a dilemma because of self-designated specialization for advertising purposes. For example, the Yellow Pages of Manhattan lists 35 different self-designations for lawyers. A comparable problem of self-designated specialization occurs in medicine. Law, however, does not have an established mechanism similar to Board certification in medicine.

Evolutionary patterns of increasing specialization have occurred in dentistry, also. The number of U.S. dental schools increased by 43% between 1950 and 1978, peaking at 60.[13] Six dental schools have since closed: Oral Roberts (1968), Emory (1988), Georgetown and Fairleigh Dickinson (1990), Washington University (1991), and Loyola (1993). In the mid-1950s, 62% of dental schools were private. Now, only 35% are private. Since 1980, the total number of specialty programs in dentistry has decreased, especially oral pathology, which has decreased from 37 programs in 1980 to 13 programs today. The number of advanced general dentistry programs, however, has increased by 11% since 1980, and the demand for services of dental specialists has increased.

Unlike law and medicine, whose work forces are overproduced, there is an evolving shortage of dentists. Dental schools, faced with effective prevention of caries by fluoride and declining applications, downsized from 7000 to 4000 graduates annually. While the number of graduates has decreased, the proportion of graduates in dental specialties is increasing. The long-standing specialty ratio of specialists to generalists in dentistry has been 11% but is now approaching 25%. An aging population is requiring more specialized dental services from a smaller, more specialized work force.

GENERALISM IN MEDICINE

The ratio of generalists (family practitioners, pediatricians, and internists) to specialists is considered to be lower in the United States than in most industrialized countries. The consequences remain a subject of debate. Many consider producing fewer generalists problematic (Millis, 1966; Petersdorf, 1978; Schroeder, 1985; Colwell, 1988; COGME, 1988, and others).

The terms "primary care" and "generalism" are not interchangeable. "Primary care" is a service that is rendered by health providers of varying backgrounds.[14] Primary care specialties are usually thought to encompass the specialties of general internal medicine, family medicine, general pediatrics, and sometimes obstetrics and gynecology. The relationship of primary care to generalism is being studied by a committee of the Institute of Medicine. Generalists, pressing for a broader definition of primary care, contend that complex as well as simple functions need to be incorporated.

A definition of primary care was developed in 1978, when a committee of the Institute of Medicine chaired by Dr. E. Harvey Estes, professor and chairman of the Department of Community Health Sciences at Duke University Medical School, characterized primary care's five attributes as accessibility, comprehensiveness, coordination, continuity, and accountability.[15] Dr. Estes, citing data from the Mayo Clinic and other sites, demonstrated that many primary care services are actually delivered by specialists.

In 1994, the Institute of Medicine revised its definition of primary care:

> Primary care is the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community.[15]

The current Institute of Medicine Committee, chaired by Dr. Neal Vanselow, the former chairman of the COGME, stresses the importance of the patient–physician relationship within the context of today's family.

Dr. Stuart Bondurant, chairman of the Association of American Medical Colleges, observed:

> Specialization is a near-universal phenomenon of our times in practically all human enterprise. Business, law, teaching, and even the clergy have, like medicine, moved far toward becoming aggregations of specialists. The renaissance of the generalist physician now under way is counter to this widespread trend.
>
> Generalism is characterized by the breadth and diversity of its operational responsibilities, its goals, and its knowledge base. It also is characterized by the distance of the individual generalist from the source of much of the knowledge base, so that the generalist, more than most specialists, must have the capacity to review, codify, and use large databases for which he or she is not prepared to be the primary assessor.[16]

The efficacy of generalism is controversial. Genera-

lism is believed by many to be associated with more preventive care, fewer hospitalizations, lower cost, and improved accessibility to services. Generalists are viewed as reducing unnecessary emergency room visits, consultations, and hospital days.

The quality issues surrounding generalism are also controversial, and research findings can be found to support both sides of the issue. Some people fear that if specialists "dabble" in primary care, their specialty skills may deteriorate. In the context of the Knowledge Society, Drucker opines that "specialists are effective only as specialists."[2]

The marketplace favors specialism. The nature and quality of the sophisticated medical services performed by specialists in the United States are consistent with what Americans want and with what medical students choose as careers. Nevertheless, many assume that the generalist will be favored over the specialist in a managed health care system.

Health professionals in our future society must be prepared to deal with a knowledge-based economy, a limit on the availability of total health care, and an increasingly managed health care system. Therefore, the number and types of health professionals that will be required in the future—a future characterized by change and uncertainty—must be meticulously analyzed and carefully considered.

STUDIES OF THE HEALTH CARE WORK FORCE

Concern about the educational process, the number of physicians, and the related effects on the health of the population has been voiced throughout most of the 20th century. Attempts to stimulate and modulate the health care work force have been ongoing and have been major determinants of our health care work force policies.

The Flexner Report (1910) consolidated a number of concerns about the quality of 19th century medical education, and by its effect on the number of medical students, became the first health care work force study.

A study performed by Kletke for the COGME identified four periods of work force development:

1. Between 1900 and 1925, when the physician-to-population ratio declined from 173 to 125 per 100,000.
2. Between 1925 and 1960, when the ratio was stable.
3. Between 1960 and 1988, when the physician-to-population ratio increased by more than 70%.
4. Between 1988 and 2020, when the ratio is projected to rise (Fig. 4).[17]

In 1950, the Omnibus Medical Research Act gave the surgeon general authority to establish disease-oriented institutes. These institutes were instrumental in funding biomedical research, and were supported by Mary and Albert Lasker.[18] In 1952, Residency Review Committees were founded. In 1957, the Educational Council for Foreign Medical Graduates was created by the American Medical Association (AMA), the Association of American Medical Colleges, the American Hospital Association, and the Federation of State Boards.

In 1958, the Bane Jones Report, entitled "The Advancement of Medical Research and Education," was prepared for the Secretary of the Department of Health, Education, and Welfare's consultant on medical education. The report called for an increased output of physicians and suggested the creation of 14 to 20 new medical schools by 1970. The response to that report resulted in more than doubling the health care work force available at the time, and it set in motion the expansionist period of medical education, the results of which are still apparent. Incidentally, one of the goals of increasing the output of physicians was to reduce American dependence on international medical graduates, which then as today constituted more than 23% of practicing physicians.

In 1963, the first bill to directly aid medical education (PL88-129), the Health Professions Educational Assistance Act, was signed into law by President Kennedy. The Coggeshall Report, entitled "Planning for Progress through Medical Education," was published in 1965 by the Association of American Medical Colleges. That report expressed optimism, designing a blueprint by which the Association of American Medical Colleges' responsibility would be substantially broadened and recommending instituting at all levels of medical education a social and educational role for students.[19]

In 1965, the Social Security amendments (PL89-97) provided another stimulus for medical education. The Social Security amendments legislated hospital and supplemental insurance for the aged (Medicare) and grants to the states for medical assistance for the poor (Medicaid). Also in 1965, the John S. Millis Report on Graduate Medical Education was published, which planned, coordinated, and reviewed standards. It was not until 1985, with the Consolidated Omnibus Budget Reconciliation Act (COBRA), that the COGME was founded by Congress. Its purpose was to make recommendations regarding current and future adequacies of the health care work force.

For most of this century, there have been efforts to predict and plan for an appropriate health care work force. Predictions and planning were based on the assumption of an impending "doctor shortage."

It is important to note that when the methodology and assumptions on which health care work force projections are based vary among studies, the results of the studies can be expected to vary. Different methodologies and

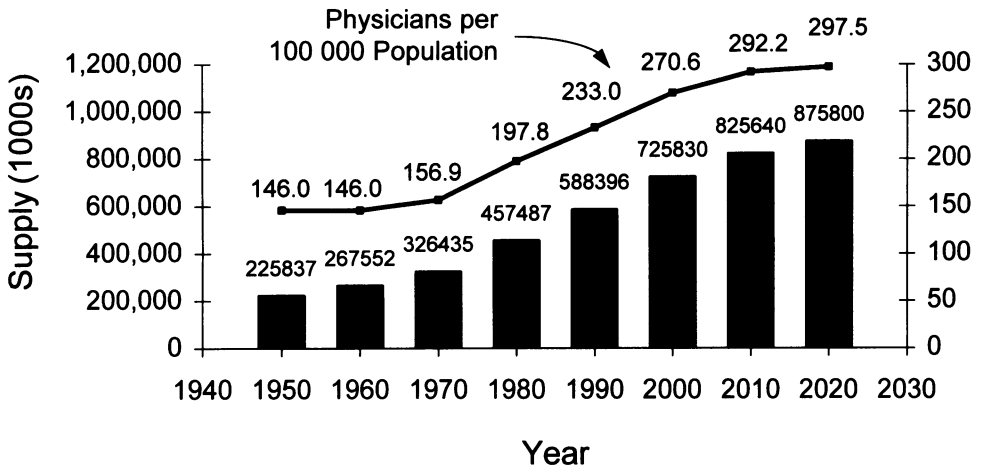

Figure 4. The supply of active physicians has increased to 233 per 100,000 and is projected to continue increasing into the 21st century. The education of the work force and its orientation toward an aging, knowledge-based, information-rich society will require planning. From Rivo M, Satcher D. JAMA 1993; 270:1077, and COGME, Fourth Report to Congress, 1994.

variable terminologies may produce very different policy conclusions.

By any standard, the study submitted by the Graduate Medical Education National Advisory Committee (GMENAC) was the most optimistic and best health care work force study ever done.[20] GMENAC had been established in 1976 to report to the Secretary of the Department of Health, Education, and Welfare regarding several national health planning objectives, including work force needs. Using an adjusted needs-based methodology and using 1978 as the baseline supply year for forecasting, GMENAC developed work force estimates for 1990 and 2000. Jacobson and Rinn adjusted the GMENAC supply forecasts in 1987.

The first report from the COGME was submitted in 1988. Based primarily on the original GMENAC data, it predicted a physician oversupply. A secondary report was performed by ABT Associates of Boston, which studied six specialties and updated the GMENAC data.[21]

A paper was also prepared by Phillip R. Kletke, Ph.D., of the Center for Health Policy Research of the AMA.[17] That study provided a specialty-specific forecast, which included data from the American Osteopathic Association. The Bureau of Health Professions Research in 1990 produced forecasts of work force needs for 1990 and 2000.[22]

In 1988, Schwartz et al. set out to present a new framework for estimating the future balance between supply and demand with respect to physician services by adjusting the Bureau of Health Professions Research calculations.[23] Meanwhile, also in 1988, Mulhausen and McGee predicted the number of physicians that would be required to serve the United States under a generalized health maintenance organization (HMO) system.[24] The estimate was derived by generalizing from the number of physicians employed by seven large Kaiser Permanentes, each with more than 100,000 members.

The studies from GMENAC, AMA, the Bureau of Health Professions Research, and Schwartz et al. projected an oversupply of physicians. Tarlov, Jacobson, and Rinn also projected a physician surplus, using a downward adjustment of the GMENAC requirements. Feil, Welch, Fisher, Weiner, and Cooper delineated the methods and underlying assumptions of the remaining studies and considered the effects of each forecast.

The needs-based and adjusted-needs methodologies both assume production based on physician work. Of the six major studies done, most predicted a physician excess if the output continues at current levels. Kletke's recent comments acknowledge growth without agreeing that it constitutes an excess; Schwartz actually predicts a deficit.

Unlike earlier studies using needs-based and demand-based methodologies, more recent studies have dealt with the effects of changing the health care delivery system. Enrollment in managed care has increased from 12.5 million persons in 1983 to 45 million in 1993, a trend that is expected to continue. Managed care differs from traditional fee for service in that it uses fewer physicians and a smaller group of specialists.[25]

The managed care trend requires us to re-examine our work force assumptions. Managed care staffing needs are said to be less than the projected national supply of physicians, making it likely that a substantial surplus of physicians will occur by the year 2000. The estimated surplus may be about one third of the projected total physician requirement, an excess of 163,000 physicians.

Cooper, Whitcomb, and Weiner, in separate studies, questioned the conclusions on which health care work force policy is evolving. They questioned the assumption that managed systems require more generalists than are available. They also examined the assumption and effect of efforts to modulate medical education to produce a 50:50 generalist-to-specialist mix.

Groups advocating the 50:50 ratio include the COGME and the Clinton Health Security Act. Others advocating an increasing generalist-to-specialist mix in-

Table 2. PHYSICIAN SUPPLY, PERCENT GENERALISTS, AND PATIENT VISITS: A CROSS-NATIONAL COMPARISON

Country	Active Physicians per 100,000 (1987)	Percent GP/FPs	Percent GP/FP + IM + Pediatricians*	Average Ambulatory Contracts (/yr/person)
Spain	338.9	NA	NA	4.0
Belgium	321.7	33	NA	7.4
Germany	280.8	NA	NA	10.8/11.5
Sweden	269.6	23	35	2.7/3.7
Denmark	256.2	25	31	5.2/8.0
France	249.6	NA	NA	5.2/7.8
The Netherlands	235.7	17	NA	5.4
United States	233.7	13	37	5.4

Cross-national comparison of physician supply indicates a common trend toward specialization in most industrialized countries. (From Weiner JP. Med Care Rev 1993; 50:411–447.)

NA = not available.

From Poullier, 1989; Sandier, 1989; Weiner, 1987; Garrison, Naumann, and Schoenman, 1987; Schroeder, 1984.

* Outside of the United States, also includes internal medicine and pediatric subspecialties.

clude the Association of American Medical Colleges, the AMA, The Pew Foundation, The Robert Wood Johnson Foundation, and the Professors of Internal Medicine and Family Medicine. That proportion, it is argued, occurs in most Western, industrialized countries and increases the population's access to health care while reducing cost.

None of these assumptions or conclusions have been proven. Generalists constitute considerably less than 50% of the work force in France and Germany (Table 2). Unlike the United States, in most Western industrialized countries internists and pediatricians do not provide primary care services. Moreover, considerable differences exist in the ways health care providers, such as pharmacists, are permitted to practice in other countries.

Nonetheless, the overproduction of health professionals is a problem in most industrialized countries, with the exception of the United Kingdom.

Comparison of the average number of generalists per 100,000 population in Canada, France, Germany, the United Kingdom, and the United States is enlightening. Primary care is performed by general or family practitioners in most countries, with pediatricians and internists functioning as specialists. Canada has 104 generalists per 100,000 population; France has 105 per 100,000; and Germany has 66 per 100,000 population (Table 3).[26]

The United Kingdom, a country that has organized its health care system roughly comparable to a large HMO, has 54 generalists per 100,000 people. The United States has 65 generalists per 100,000 population; U.S. HMO staffing patterns have suggested a need for only 56 generalists per 100,000. These numbers suggest that we may have a generalist work force sufficient to meet the needs of our evolving managed care environment (Whitcomb ME, personal communication, April 10, 1995).

The immigration of physicians to the United States from countries producing medical graduates in excess of their indigenous needs is a problem. The United Kingdom, having a relatively small health care work force compared with other countries in the European Union, also has the problem of physician immigration. The British Parliament recently signed into law the "General Practice Vocational Act," partly to help manage this situation.

The health care profession has always had mobility across national boundaries, both for educational purposes and for professional opportunities. The first U.S. medical schools were founded on the Edinburgh model of medical education. Since colonial times, physicians from the United States have received training in Europe, Edinburgh, London, Paris, and Germany. Conversely, access to graduate medical education (GME) in the United States by international medical graduates has been extensive. The United States serves as the graduate medical education setting for the world. Many international graduates of our GME programs choose to remain in the United States to practice.

In addition to the 17,000 students who graduate annually from U.S. medical schools, 7000 international medical graduates immigrate to fill the excess first postgraduate year (PGY-1) slots available. This large number of international medical graduates constitutes a problem of significant magnitude. Their number has been increasing over the past 5 years, partly because of our immigration laws. International medical graduates represent 22% of practicing physicians in the United States and 25% of physicians in graduate medical education. In the 1994 National Residency Matching Program, international

Table 3. GENERALIST PHYSICIAN WORK FORCE COMPARISONS*

	Canada	England	France	(Former W.) Germany	United States†	US-HMO
Population (millions)	27	48	57	64	258	
Physicians	53,000	44,000	134,000	155,000	530,000	
Generalist-MD	28,000	26,000	60,000	42,000	180,000	
% MDs in primary care	53	59	45	27	34	
Primary care MDs/100,000	104	54	105	66	65	66

The per capita primary care MD is comparable among England, Germany, and the United States and is at the current HMO targets. (Data modified from and with permission of Michael E. Whitcomb, MD.)

* Data from Whitcomb (in press).

† Exludes physicians in training.

medical graduates accounted for 40% of all slots in internal medicine. States in the northeastern United States have the highest international medical graduate concentration (New Jersey, 53%; New York, 42%). It obviously will be difficult to request downsizing of our medical schools unless limitation on international medical graduates also occurs, as has happened in Canada. The continued expansion in residency positions and medical school graduates combined with an increasingly managed health care environment raises the specter of physician underemployment. Although control of the number of medical students graduating annually could occur, a secondary problem exists with the number of residency positions. The total number of residency slots continues to increase, now reaching about 105,000 positions.

The number of allopathic and osteopathic 1st-year residency positions had been increased to almost 24,000, even though the eligible American graduates numbered fewer than 18,000 (Fig. 5). International medical graduates, who now constitute almost 25% of all residents and 38% of 1st-year residents, filled the leftover slots. At the same time, the United States' per capita ratio of practicing physicians per 100,000 has increased from 157 in 1970 to 233 in 1990 and should exceed 292 by the year 2010. The increase in physicians has been accompanied by an increased tendency to specialize. The United States is understandably proud of its reputation as world leader for GME, but when permanent immigration results, the United States becomes a safety valve for relieving the overproduction of physicians from many other parts of the world.

On March 13, 1995, the *Nurnberger Zeitung* reported that the chairman of the *Marburg Bund*, Frank Ulrich Montgomery, held a press conference to announce that 6000 to 8000 physicians in Germany had registered as unemployed. Most of these unemployed consisted of recent graduates and women.

The effects of physician overproduction are becoming apparent in the United States, too. The harbinger was "Black Tuesday," the resident match day in 1987 when some famous residencies in internal medicine failed to fill their match quotas for the first time.

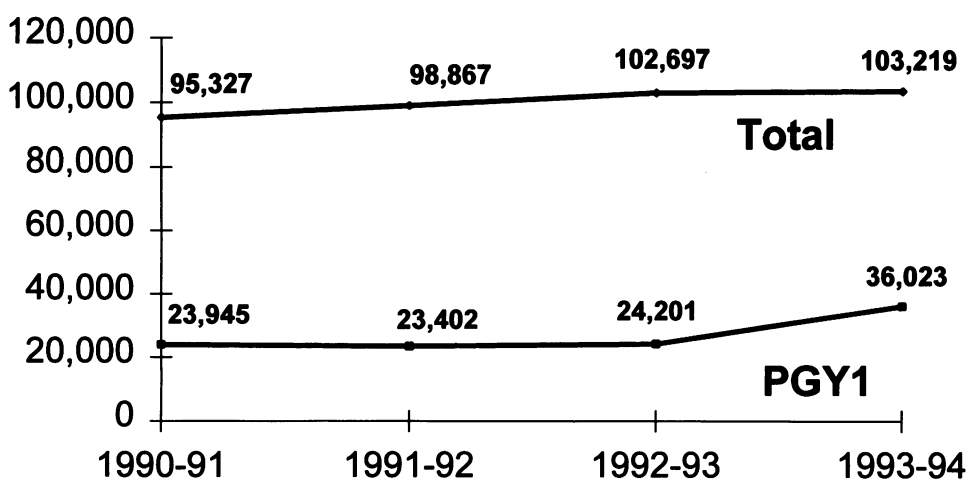

Figure 5. PGY-1 and total allopathic and osteopathic residents. The number of PGY-1 residency positions exceeds by approximately 7000 the graduates of U.S. medical schools. The total number of residency positions continues to increase. Modified from COGME, Fourth Report to Congress, Jan 1994, p 4.

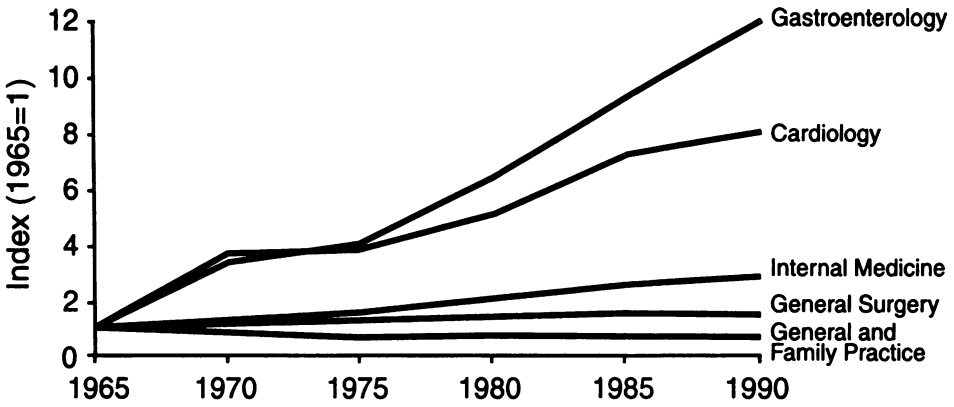

Figure 6. Trends in the growth of selected specialties. Specialty growth has been uneven, with, for example, a 1073% increase in gastroenterology and a 740% increase in cardiology since 1965. Because of "demand" issues, growth does not necessarily indicate excess. From the Physician Payment Review Commission's *1992 Annual Report to the Congress*. pg. 290. Data from AMA Database, 1992. Used with permission.

In the 1995 match, anesthesiology, anticipating a diminishing applicant pool, decreased its residency positions from about 1800 to 1450. Only about 650 students applied, filling less than 50% of anesthesiology's available positions. Only 423 U.S. medical students matched in 1995.

Several alternatives, mostly unattractive, exist when specialties fail to fill their residencies due to marketplace factors or to other forces. The most commonly used alternative is to fill the positions with international medical graduates. A preferable alternative would be to more realistically size the number of graduates relative to the population's future needs.

As in Germany, the physicians most vulnerable to unemployment in the United States are the most recent graduates and women. One legacy of our generation of medical educators should be to downsize the medical student and GME pipelines in order to more realistically plan for the future.

Most U.S. health policy is based on the assumption that "specialists" are in excess. Although most subspecialties are probably overproduced for the next 15 years, the magnitudes of overproduction vary dramatically among specialties. For example, since 1965, a 1073% increase in gastroenterologists and a 740% increase in cardiologists have occurred (Fig. 6).[27] In fact, many subspecialties of medicine produce more graduates than some entire specialties. Compare cardiology's 7117 graduates with orthopedic surgery's 5220 graduates (Table 4). Needs determinations must be calculated individually for each specialty. Generalizing a universal reduction over all specialties is too simplistic an approach.

CONCLUSIONS

Analysis of these data yields a number of conclusions.

The U.S. work force per capita is eighth among industrialized societies. Our generalist-to-population ratio is comparable to other Western industrialized countries, other than England.

Most industrialized countries have overproduced the total number of physicians, particularly specialists. Overproduced countries include the United States, in which, as noted in the first COGME report, there exists an aggregate oversupply of physicians and an excess of specialists. Specialties likely in balance are general internal medicine, family practice, general pediatrics, obstetrics and gynecology, general surgery, otolaryngology, and thoracic surgery. Specialties in excess include all of those in internal medicine, except possibly geriatrics. To a lesser magnitude, some surgical specialties have overproduced, including orthopedics, plastic surgery, and possibly urology.

The expansionist period of medical education, from 1960 to 1980, resulted in an increase in the number of health care providers, the products of which continue to affect our health care system today. It is important, however, to analyze the growth during that period of time by individual specialty. Many specialties reacted to GMENAC and to other work force studies by expanding, while others reacted by downsizing, leaving disparate sizing patterns. Residency positions expanded disproportionately during that period to increase those available to primary care disciplines.[28]

Currently, there are 105,000 residency positions available in the United States. The surgical portion of these is about 20%. The American Board of Medical Specialists has documented that there has been little growth in the number of surgeons over the past 10 years. The largest surgical specialty, general surgery, graduates about 950 people a year.

By contrast and by intent, the decade from 1980 to 1990 yielded a substantial increase in generalists (Table 5). The COGME goal of 50% by first certification has been achieved. The problem occurs after first certification, when approximately 75% of all internal medicine residents enter fellowships and become "subspecialists." It is critical that we re-examine how much primary care is being delivered by specialists and that we modernize our definition of "primary care."

Table 4. SUBSPECIALTIES VERSUS SPECIALTIES: 1982–1991

Subspecialty	No.	Specialty	No.
Cardiovascular disease (IM)	7117	Orthopedic surgery	5220
Critical care (IM)	4149	Pathology	4861
Gastroenterology (IM)	3705	Dermatology	2737
Child/adolescent psychology (psych)	1374	Plastic surgery	1569
Geriatric medicine (fam med)	1225	Allergy and immunology	1193
General vascular surgery (surg)	1147	Neurosurgery	1059
Cytopathology (path)	659	Nuclear medicine	785
Pediatric cardiology (peds)	401	Colon and rectal surgery	402

Disparate growth among specialties; some subspecialties have grown in excess of specialties, reflecting a continuing trend toward specialization.
From the American Board of Medical Specialties.

Additionally, we must strive toward a more consistent classification of our graduates. The general surgery work force is especially complicated, because it is preliminary to other specialties. Approximately 60% of the 950 annual graduates in general surgery subspecialize. The challenge is how to classify a general surgeon who is practicing beyond first certification in such subspecialties as plastic surgery, thoracic surgery, colorectal surgery, vascular surgery, critical care, *etc.* The comparable situation in internal medicine has already been noted.

Most work force studies use the AMA data base to classify surgeons. The AMA data base overinflates the number of physicians in surgical specialties because it uses specialty self-designations.

Counting non–Board-certified surgeons as surgical specialists also inflates specialty numbers. It is interesting to note that the percentage of Board-certified surgical specialists working for health maintenance organizations is estimated to be 85%, when only 65% of surgeons in the AMA database are Board-certified. A legitimate assumption for planning is that in the future most surgeons will be Board-certified, so the Board-certified number should be the number counted in work force modeling.

Jonasson et al. have used several data bases to try to determine the number of active general surgeons in the United States. The AMA master file lists 38,239, while the American Board of Medical Specialists lists 20,737 who are 62 years of age or younger. The American Board of Surgery lists 17,775.[29]

A good approximation of the actual number of Board-certified general surgeons in practice is 18,000 to 19,000—practically half the number counted in every study done since the initial GMENAC study (Table 6). The number of general surgeons per 100,000 population

Table 5. SPECIALTY MANPOWER: 1980–1990

Area	No.
Surgery	9445
Obstetrics and gynecology	10,345
Radiology	9633
Primary care	
Pediatrics	21,105
Internal medicine	48,356
Family practice	22,894
Total primary care	92,355 (49%)

A decade of production of American Board of Medical Specialties (ABMS) certificates. At first certification, the 50% primary care target (IM, PED, FM) is achieved. However, because nearly three fourths of IM graduates specialize beyond first certification, the primary care percentage is approximately 35%.
From American Board of Medical Specialties Annual Report and Reference Handbook, 1992, pp 60–71.

Table 6. CALCULATION OF FULLY TRAINED GENERAL SURGEONS* ACTIVE IN PATIENT CARE: 1994

All "general surgeons" including residents, specialists, and nonpatient care	38,239
Pediatric surgeons	601†
Cardiovascular surgeons	2366
Vascular surgeons	1425
Head and neck surgeons	331
GS residents and fellows	8879
Nonclinical general surgeons	1030
>65 yr	3521
62–65 yr	1178
Total	18,908

Most projections of physician workforce are based on the AMA database. Because the database is self-designated, and managed care organizations usually require Board certification, a more accurate database would be based on certification.
* AMA Masterfile includes as "General Surgeons" all surgical specialities with a prerequisite for completion of a General Surgery Residency.
† Numbers in parentheses are subtracted from the 38,239 total.

today is similar to the number in the 1965 Study of Surgical Services in the United States (SOSSUS).

The COGME identifies general surgery as currently balanced but trending toward deficit. Various estimates of the future need for general surgeons have been calculated (COGME, AMA), and most of these estimate the need as 10 to 12 general surgeons per 100,000 population. Notably, general surgeons currently only number about 7 per 100,000 population once age, retirement, and first certification have been considered.

Given the changing health care environment, an aging population, and enhanced technology, the type and number of physicians that will be needed in the future can be expected to be substantially different than in the past, meaning that current patterns in physician education may not address the population's future needs.

RECOMMENDATIONS

Courage and leadership from today's health care professionals and medical educators will be required to produce the proper type and number of physicians for the future. One of the least controversial recommendations of Clinton's Health Security Act was that graduate medical education positions should be reduced to 110% of the number of graduates of American medical schools. This action would significantly downsize the number of residency positions. Objections may be raised, especially in the Northeast, where most international medical graduates are trained. Nevertheless, the United States can no longer afford to be the safety valve for medical graduates from countries that have produced physicians beyond their needs. Access to American GME programs by international medical graduates must focus on the educational venue. Medical school class size should concurrently decrease.

Second, there should be the creation of a National Council on Graduate Medical Education, perhaps through transformation of the COGME into a federal nonprofit organization that directs health care work force policy, including ensuring caps on specialties. The needs of the U.S. Public Health Service and of the military services would be incorporated, and all of the health professions—including public health, pharmacy, nursing, medicine, and dentistry—would be represented.

The evolution from a disease-oriented to a population-oriented health care system, although likely to happen, could have unpredictable results. Consider that the American public will probably continue to demand state-of-the-art technology. The 77 million baby boomers are not likely to lower their expectations of health care services. At least 50 more years would be required before the population could be expected to change its orientation about health and its service expectations. Also consider that the diseases of the future are not likely to be self-limited. The elderly, as we have seen, make frequent visits to physician offices, usually due to chronic illnesses, and they present with a variety of specialized surgical needs. Cataract surgery is common among the elderly, because the operation affords mobility and maintains quality of life. Joint replacement will also be common in the 21st century for the one-in-seven arthritic elderly.

These days we are seeing on the horizon the inevitability of health care rationing due to cost imperatives. This thought leads to a third recommendation: universally funded health care should be a national priority of the highest order and should come about through a federal single-payor system.

The new system would need to accurately predict and address the population's needs, which the 50:50 generalist-to-specialist solution is unlikely to do. Specialties and subspecialties need to constructively evaluate their own future work force requirements. The work force of the future will use sophisticated technology, be knowledge-based, and perform work in an information-rich environment. The concept of "generalism" must be revisited, for within the Knowledge Society there predictably will continue to be a tendency toward specialization.

Our society has been described as a "business society," an "industrial society," a "capitalist society," and now a "knowledge society." In many ways, it is all of these, but in addition it is a "professional society."

Professional behavior has four attributes:

1. A high degree of generalized and systematic knowledge.
2. A primary orientation to the community interest rather than to individual self-interest.
3. A high degree of self-control achieved through codes of ethics that have been internalized during the process of work socialization and through voluntary association with organizations that are operated by the professionals themselves.
4. A system of rewards (monetary and honorary) that signify work achievement and thus are ends in themselves rather than means to some end of individual interest.

The generalized knowledge and community orientation characteristics of professional behavior are indispensable in our society. The scope for professional behavior should be enlarged to facilitate a better understanding of how the various professional groups function. Professionalism is a derivative of the social contract, historically defined by Locke and Hobbes as a combination of people together instituting common authority to interpret laws of nature and to secure each individual's rights.

We are experiencing a corporate approach to health care, which is an outgrowth of the business orientation of our society. Our professionalism, which remains essential to our overall mission, must adapt to these epochal forces. The adaptation will require an understanding of society's social contract, a retention of professionalism, a participation in the larger work force, and an overriding commitment to service and ethics.

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