

HEALTH MANPOWER IN TRANSITION

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Doctor Michael M. Davis, one of the pioneers in the study of medical care and health policy in the United States, identified the basic elements of medical services as 1. people, 2. professionals, 3. facilities, 4. organization and 5. finances.¹ In his opinion, finances represented the foundation that supported professionals, facilities and organizations, which functioned as a “. . . complex aggregate of human beings and material facilities . . .” to deliver health services to people.

The frame of reference for this discussion of health manpower differs slightly. Manpower will be considered as one of three *basic* health and medical resources—1. health manpower (professional, technical and supportive); 2. facilities, including equipment and supplies; and 3. biomedical knowledge, or “state of the art.” In this context, organization and financing are the intangible resources or mechanisms that serve to translate the three basic resources into health services for the consumer. An adequate analysis of health manpower at a minimum requires its consideration in this, or an alternative context that attempts to relate these variables, which together make up a highly complex, interdependent system.

In general, health manpower has not received the attention accorded to the other two basic resources. Although not impressive when contrasted with expenditures for defense or space exploration, society's investments in the resources of biomedical knowledge and facilities over the last two decades are substantial. Expenditures for medical and health related research have totaled almost \$14 billion since the end of

World War II. More than two-thirds of the two billion dollars spent in the pursuit of new biomedical knowledge during 1966 was derived from public sources, and expenditures for this type of research will be even higher in 1967. For the construction of hospitals, nursing homes, health departments and other facilities for the delivery of health services, the Hill-Burton Program has been appropriated more than \$2.7 billion since 1948, and these funds have been matched through the appropriation of public monies at the state and local level, through private philanthropy, loans and other means of financing, to achieve a total investment of \$8.5 billion.

Until 1963, on the other hand, investments in the development of health manpower were relatively neglected, especially as a responsibility of the federal government. Although a substantial portion of the educational costs of health manpower have been publicly financed, largely from appropriations by state legislatures,² federal support of manpower development has been limited to grants for research training, except for some specialized efforts on a small scale; e.g., support of graduate preparation of nurses for careers as teachers, supervisors and administrators; support of preparation at the graduate level of public health personnel; and a relatively few fellowships and training grants in maternal and child health, rehabilitation and related disciplines. One major exception to the rule has been the program of the National Institute of Mental Health, which from 1948 through 1965 supported 35,000 trainees in psychiatry, psychology, social work, psychiatric nursing and related fields; the trainees were in service, as distinct from research positions.

A federal concern for the preparation of adequate numbers of health manpower was established, however, with the passage of the Health Professions Educational Assistance Act of 1963. Passage of this act represented the culmination of a legislative effort lasting 15 years. In 1965, the legislation was amended to add formula and project grant support of basic educational costs and scholarships to the original program of construction grants and student loans, in an effort directed toward increasing the nation's supply of physicians, dentists, pharmacists, optometrists and podiatrists. The Nurse Training Act, enacted in 1964, has comparable provisions, and the Vocational Education Act of 1963 emphasizes the support of programs geared to those areas in the nation's economy which have ". . . actual or anticipated opportunities for gainful employment." These Congressional actions signify the beginning of what will undoubtedly become sustained and increasing support by the federal government of the education and training of health manpower.

But at this juncture, thorough review and analysis of the forces influencing both the preparation and the utilization of health manpower deserves the highest priority. Careful assessment of the relevant issues is needed as a prerequisite to the formulation of a rational manpower policy to guide the investment of vast sums of public monies during the years ahead. Lacking such a policy, billions of dollars could be expended without significantly increasing the availability and accessibility of health services to meet the population's rising expectations.

CURRENT STATUS OF HEALTH MANPOWER

Definitions

An even more basic prerequisite to policy formulation is definition of terms. In its usual connotation, the term *health manpower* does not extend beyond the categories of physician, dentist and nurse. Such a definition is both restrictive and deceptive, as well as unrealistic in view of the diversity and array of personnel necessary to sustain a complex social enterprise that now represents expenditures in excess of \$45 billion annually. Health manpower should rather be considered as comprising individuals ranging from the highly sophisticated, extensively educated biomedical scientist, who requires many years of postgraduate education and training, to the aide or attendant working in a hospital after only limited on-the-job training.

Two major classifications of health manpower are currently in use, frequently cited in the literature, sometimes interchangeably. The first of these classifications is used by the Bureau of the Census, which divides the civilian labor force into 71 separate industries. The "health services industry" at the time of the 1960 census ranked third among these industries, employing 2,578,214 persons. Between the 1950 and 1960 census, the "health services industry" gained almost a million workers, for a growth rate of 54 per cent. Only seven of the 71 industries experienced a higher growth rate.³

Approximately one-third of the individuals employed in the "health services industry," however, are clerical workers, craftsmen, laborers and others who assist the provision of health services by functioning in a supportive role, but whose skills and work are not unique to health services. The importance of the approximately one million clerical, technical and kindred workers in health services is not to be ignored, but their recruitment, education and utilization constitute problems that are generic to most enterprises in an industrialized, specialized society.⁴

The second classification of health manpower—"health occupations"—is more appropriate to this discussion since it focuses on those individuals possessing knowledge and skill unique to the health establishment. Also, this classification includes health manpower counted in industries other than "health services" by the Bureau of the Census; e.g., only three per cent of veterinarians and seven per cent of pharmacists are counted in the "health services industry." The "health occupations" are the categories of manpower that come to mind when one hears the often repeated statements of "shortage," "gaps" and "limited supply."

The National Center for Health Statistics has been collecting manpower data for these health occupations categorized into 35 fields, and it has been estimated that the health manpower in these fields totaled nearly three million in 1965 (Table 1). When these categories are subdivided into more discrete units, the range and diversity of health careers can be more readily appreciated. The *Health Careers Guidebook*,⁵ published recently by the United States Department of Labor, identifies approximately 200 health career opportunities, subdividing each of the 35 general categories—"health careers briefings" as they are called in the book, several of which cover more than ten individual careers—into the distinct and separate careers each comprises. Thus each medical specialty is presented as a separate career.

Trends

The changes in the types and characteristics of health manpower are perhaps the most striking to be found in the health establishment—an area where striking changes are the order of the day. It is estimated that the health professions requiring college education or professional preparation accounted for approximately 200,000 persons in 1900. In 1920, the number of individuals in these categories increased to 409,000; in 1940 to 692,000; and in 1960 to 1,140,000.⁶ Whereas, at the turn of the century, three out of five health professionals were physicians, by 1960, rapid growth in other disciplines reduced the proportion of physicians to one out of five professional health workers; a continued decline is to be anticipated as other disciplines experience more rapid rates of growth and new categories of personnel emerge. Also at the turn of the century, individuals in the health occupations accounted for 1.2 per cent of the experienced civilian labor force. This proportion increased to 2.1 per cent by 1940; 2.4 per cent by 1950; and 3.0 per cent by 1960.⁷ A projection of this trend forecasts a total of between four and five per cent of the civilian labor force employed in health occupations by 1975.

TABLE I. HEALTH MANPOWER—1965

<i>Health Field</i>	<i>Estimated Persons Employed¹</i>
All fields	2,778,900 to 2,898,700
Administration of health services ²	31,500 to 37,000
Anthropology and sociology	600 to 800
Automatic data processing	300 ³
Basic sciences in the health field	44,200
Biomedical engineering	7,500
Chiropractic and naturopathy	25,000
Clinical laboratory services	85,000 to 95,000
Dentistry and allied services	230,900 ⁴
Dietetic and nutritional services	30,000 ⁵
Economic research in the health field	500
Environmental health	32,500 to 35,000 ⁶
Food and drug protective services	16,500
Health and vital statistics	1,400 to 2,400 ⁷
Health education	16,700
Health information and communication	5,000
Library services in the health field	8,000 ⁸
Medical records	37,000
Medicine and osteopathy	305,100 ⁴
Midwifery	5,000
Nursing and related services	1,409,000 ⁹
Occupational therapy	6,000 ⁶
Orthopedic and prosthetic appliance making	3,300
Pharmacy	118,000 ⁶
Physical therapy	12,000 ⁶
Podiatry	7,600
Psychology	9,000
Radiologic technology	70,000
Secretarial and office services	150,000 to 250,000
Social work	17,500 ⁶
Specialized rehabilitation services	5,300 to 5,900
Speech pathology and audiology	14,000
Veterinary medicine	23,700 ⁴
Visual services and eye care	40,400
Vocational rehabilitation counseling	4,200
Miscellaneous hospital services	6,200 ¹⁰

¹ Each occupation is counted only once. For example, all physicians are counted in "Medicine and osteopathy" even though certain specialists perform in other health fields.

² Excludes business, clerical and maintenance workers.

³ Estimates not available for programmers, operators and electronic technicians.

⁴ Includes total personnel (active and inactive) for dentists, physicians and veterinarians.

⁵ Estimates not available for food service supervisors, clerical workers and other workers.

⁶ Estimates not available for aides and technicians.

⁷ Estimates not available for statistical clerks.

⁸ Includes technical and clerical workers in medical libraries. Estimates not available for patients' librarians.

⁹ Estimate not available for ward clerks.

¹⁰ Estimates not available for electrocardiograph technicians and hospital aides—obstetrical, pediatric, surgical and so forth.

Source: *Health Resources Statistics: Health Manpower, 1965*. United States Department of Health, Education and Welfare, Public Health Service Publication No. 1509, Washington, D.C., 1966, p. 177.

During the decade ending 1960 alone, the number of workers in health occupations increased at a rate twice that of population growth—from 1,531,000 in 1950, to 2,176,700 by 1960, an increase of 42 per cent in contrast to a population growth of 19 per cent. The rate of increase among occupational categories differed, being greatest among those with the shortest periods of training (e.g., practical nurses, x-ray technicians and hospital attendants) and among the occupational categories that have arrived relatively recently (e.g., medical technology, medical record librarians, physical therapy, occupational therapy and speech and hearing therapy).

The trend toward new careers is yet to be fully appreciated. Among the 200 plus careers listed by title in the *Health Careers Guidebook*, the majority represented but a small segment of total health manpower prior to World War II. Many careers, including inhalation therapist, nuclear medical technologist, radiologic health technician, cytotechnologist and medical engineering technician, did not exist. Admittedly, the three basic careers—medicine, dentistry and nursing—still constitute approximately 40 per cent (1.0 of 2.7 million) of persons in health occupations; however, specialization within these fields and the emergence of new disciplines are major factors to analyze in any discussion of health manpower. Although the data are limited, it can be anticipated that specialization and diversification will continue as the two foremost characteristics of health manpower in future decades.

The institutionalization of health services, and the effects of this institutionalization on health manpower, is an issue yet to be faced. The anachronistic features of the “one doctor-to-one patient mythology,” the changing technology, and the emergence of new skills and professions are well illustrated by a recent account of the diagnosis and treatment of a 28-month-old girl with phenylketonuria (PKU). The patient’s physician was backed up by a team of 14, including medical specialists, microchemists, psychologists, speech pathologists and social workers, not to mention nurses, aides and other hospital personnel. In situations such as these, organization is essential. Health services has moved from the era of the “cottage industry” to that of space exploration, and as more and more medical care is provided within an institutional structure—118,000,000 visits were made to the hospital outpatient departments, emergency rooms and specialty clinics in 1963⁸—mechanisms for effective utilization must be sought. The goal is one of maximum efficiency in delivery of services without compromising the quality of those services.

The growth of institutionalization and specialization is an effort to cope effectively with the requirements for depth and thoroughness in a wide range of tasks. These are essential to adequate provision of many new services. The exponential growth of scientific knowledge has contributed to both this inexorable trend and to a vast potential for improved health care. A physician could provide a wide range of services in the early part of this century, but now these services are provided more effectively, with greater skill and competence and in greater depth by several individuals with professional and technical skills, no one of whom represents the diversity of service that was once found in a single practitioner.

Specialization in medical practice, a post-World War II occurrence, and concentration of health manpower in hospitals, or institutionalization, have reached major proportions. As recently as 1940, 80 per cent of physicians had not specialized. In 1941, a total of 5,256 residency positions were offered and 78 per cent of them were filled. At the present time, the situation is rapidly approaching in which almost nine out of every ten graduates of the nation's medical schools enter specialty training. In 1964, 1,317 hospitals had sponsored 5,440 approved residency programs offering a total of 38,373 residencies; 80 per cent of these were filled. For the young physician seeking specialty training in July, 1966, more than 40,000 positions were offered.⁹ This represents almost a ten-fold increase during the past 25 years and a doubling of the residencies offered since 1951. It is estimated that now seven of every ten physicians in private practice are full-time specialists.¹⁰

In 1941, hospitals had approximately one professional nurse for every 15 beds and one practical nurse, aide, attendant or auxiliary person for every ten beds. Personnel increased over the next ten years so that by 1952 the figures were one to seven and one to five. By 1962 the continued proportionate increase of nursing personnel resulted in one professional nurse for every five beds and a practical nurse or auxiliary person for every three beds.¹¹ This increasing concentration of nursing personnel per hospital bed may come as a surprise to many who are familiar with the complaints of lack of personal service and attention being voiced by many of the millions of Americans hospitalized in a general hospital during a single year. These comments beg the question, "What are the services provided and tasks performed by these categories of manpower?" This of course bears on the whole question of utilization of health manpower. In addition to nursing personnel, hospitals are increasing the numbers of personnel in other occupational categories, e.g.,

occupational and physical therapists, dieticians, medical record librarians, medical technologists, x-ray technicians, pharmacists and social workers, at a rate that exceeds both the expansion in hospital beds and the climb in the total annual admissions to short-term general hospitals.

In summary, one finds divergence in the types of health manpower and a convergence of the settings in which services are delivered. Organization becomes the ranking imperative, but it is hardly the full solution to the problem.

REQUIREMENTS AND RESOURCES

This, then, is health manpower. The next step is to establish what the boundaries of *needs* are to be, for any statement of need for health manpower, as for health services, is to a certain degree arbitrary. Few would disagree that a person suffering from acute appendicitis is in need of specific health services—particularly those of a surgeon. Likewise, a patient with diabetic acidosis is in need of an array of health services to save his life. But in many areas need is determined by a highly judgmental process. How many times does a patient with well-controlled diabetes need to see a physician? How many times does a patient with hypertension need to see a physician? How many times ought an infant to see a pediatrician during his first year of life? If one definitive answer could be cited to each of these questions, a definite need would exist for a specific amount of health manpower.

However, economists and manpower specialists agree that manpower forecasts based even on a finite need for future health services are unrealistic. Instead they suggest approaching manpower forecasting in terms of demand for health services in the classic economic sense of supply and demand. For the most part, demand is the economic expression of need, but some suggest demand may go beyond actual need. Illustrative of this point of view is the affluent hypochondriac who may be expressing a demand for health services that is in excess of actual need. Others feel that anxiety expressed by a patient for a physician's services is a valid need and not an inappropriate demand.

Both need and demand for health services are greatly affected by biomedical advances. Using Phenylketonuria as an illustration shows dramatic needs and demands for health services, neither of which existed prior to the discovery of the technique for detecting, diagnosing and treating inborn errors of metabolism and congenital malformations. It might be argued that preventing mental retardation and correcting

heart lesions achieves a net saving in the utilization of health services. In the absence of data to support such a contention, these advances have increased rather than decreased the requirements for health services. The same applies to the developments in renal dialysis, exfoliative cytology, rehabilitation and the like, not to mention an advance such as the discovery of insulin, which has transformed a once-fatal disease to an abnormal variant of the metabolic process with late sequelae that require extensive and, frequently, intensive health services.

In any case, demand for health services has and will continue to increase. Anne Somers identified the "significant long-run social and economic trends over the past century that have already greatly enlarged the demand for medical services and altered the character of that demand." The trends listed were: 1. overall increase in population, 2. the increase in the over-65 population, 3. the rising proportion of nonwhites in the population, accompanied by their improved socioeconomic status, 4. increasing portion of women in the population, 5. steady increase in urbanization and industrialization, 6. steady increase in educational levels, 7. steady rise in income levels, and 8. rise in national income.¹²

The purchasing power of the aged for health services has increased with the establishment of the Medicare program, which, it is estimated, will cost well over three billion dollars in 1967. How much of this sum represents displacement of funds that were expended for health services and how much represents added expenditures is not known. Many take the position that this increased purchasing power, whatever the amount, will allow the aged to translate needs into demand, while others state that this will allow the aged to generate demand for health services in excess of actual need.

Instead, this issue will be set aside and health manpower requirements will be considered, recognizing that the term *requirements* blurs the difference between need and demand. It may mean primarily need or mainly demand; or it may mean a mix of need and demand. As one reviews the literature of projection of manpower requirements, the distinction between need and demand is frequently unclear.

In many respects the requirement for health services can be virtually insatiable, depending on a society's level of expectation and the resources it wishes to allocate. This was suggested by participants in the first seminar when they alluded to "a visit to the dentist every six months," "a complete medical check-up each year" and Nelson's aspiration, "an analyst for every adult." At any rate, it would appear that any characterization of the dimensions, quantitative and qualitative, of

requirements for health services is arbitrarily defined, at least within the limits of the present scientific ignorance.

Determination of Manpower Requirements

Whatever the definitions employed, predicting or forecasting the requirements for health manpower is a hazardous enterprise. As Hechinger commented in the *New York Times*,¹³

Why, then, make projections? The answer appears to be that modern society's dependence on highly skilled talent has made obsolete the theory that if everybody just pursues his interests, everything will come out all right.

Forecasting has become essential.

To date efforts to forecast health manpower requirements have used various methods, each with its own deficiencies, each risky:

1. *Population Ratios*: The application of existing health-manpower-to-population ratios to the projected population base is the most frequently used and accepted method for predicting future manpower requirements, but this technique is seldom used without qualification and recognition of its limitations. Admittedly, it is a crude indicator that ignores changes in patterns of utilization and increases in productivity. Furthermore, it does not take into account anticipated changes in economic conditions, awareness of health problems, sophistication in seeking health services, general level of educational attainment and availability of resources, each of which can result in an increased demand for health manpower.

This method was used by the Surgeon General's Consultant Group on Medical Education (the Bane Committee)¹⁴ in 1959, to project physician requirements by 1975. The maintenance of the ratio of 141 physicians per 100,000 population existing in 1959 was accepted as a minimum goal for 1975. The committee recognized and discussed the implications of the various factors that would probably serve to increase the need and demand for medical services (chronic disease, aging population, specialization, regional disparities and changing patterns of practice) and concluded that the existing physician to population ratio was a "minimum essential to protect the health of the people of the United States."

2. *Economic Projections*: A second method employed in attempts to forecast manpower requirements uses a formula in which projected

expenditures are the numerator and expenditures per worker are the denominator. This is an effort to translate effective demand into manpower requirements.

Using this formula and assuming a national biomedical expenditure of three billion dollars and a cost of \$39,000 per professional research worker in 1970, the National Institutes of Health has forecast a medical research manpower requirement of 77,000. Allowing for attrition from among the 39,700 research workers in 1960, a net additional requirement (1961–1970) of 45,000 was calculated.¹⁵

The Center for Priority Analysis of the National Planning Association has been using this technique to estimate the manpower requirements in health for 1975. Two premises have been used for the calculations: 1. continued expansion of total expenditures for health and medical care at the existing rate—a maintenance of effort level—and 2. expansion of effort to pursue realistically the health goal of narrowing “. . . the gap between the potentialities of the modern health technologies and the availability of medical care for most Americans,” recommended in 1960 by the Presidential Commission on National Goals. The Center estimates that the attainment of this goal would result in an increase in “. . . public and private spending for health and medical care rising . . . to 8.7 percent of GNP in 1975”¹⁶ or between \$85 and \$90 billion. Using these alternative premises, the projected manpower requirements for 1975 are: physicians (M.D.) 310,000 to 400,000; dentists, 118,000 to 140,000; registered nurses 840,000 to 1,091,000; licensed practical nurses 442,000 to 575,000; hospital attendants 930,000 to 1,229,000; and medical and dental technicians 279,000 to 352,000.¹⁷

3. *Professional Judgment*: The Lee-Jones’ study, completed in 1930, for the Committee on Costs of Medical Care, remains the major effort to calculate manpower requirements on the basis of professional judgment, or expert opinions as to medical needs. Roger I. Lee and Lewis W. Jones examined the nation’s morbidity experience and computed the manpower required for preventive, diagnostic and curative health services. The authors estimated the requirements at 135 physicians per 100,000 population, 220 nurses per 100,000 populations, and between 99 (with use of dental hygienists and assistants) and 179 (if dentists do all the work themselves) dentists per 100,000 population. Although all of these requirements fell below existing ratios, the authors doubted that the country during the Depression had the economic capacity to respond to this need.

The Surgeon General's Consultant Group on Nursing¹⁹ based its calculations of nurse requirements, totaling 850,000 by 1970, on the opinion that adequate services were provided when 50 per cent of the inpatient nursing care was provided by registered nurses, 30 per cent by licensed practical nurses and 20 per cent by aides or attendants. Qualitative judgments were also made as to the requirements for public health, occupational health, nursing education and so forth. The need was considered unobtainable, fully 25 per cent in excess of a feasible goal of 680,000 professional nurses by 1970, 920,000 in 1975.

More recently, professional judgment was used to estimate the requirements of some ten million disabled Americans for rehabilitation services, including the services of certain allied health specialists. Assuming a 2,000-hour work-year for professional personnel, the author concluded that present service requirements called for seven times the existing number of physical therapists, eight times the number of occupational therapists and five times the number of medical social workers.²⁰

The State of Health Manpower—1966

In 1966, using both the tools of economics and professional judgment, the American Hospital Association, in cooperation with the Public Health Service, undertook a survey of hospital staff and staffing requirements. The study was made to determine the number of personnel employed, current vacancies and estimates of personnel needs, and thus to provide a more adequate picture of the present health manpower situation. Data from the first 4,600 hospitals that reported, have been used to estimate totals for all 7,100 hospitals in the United States registered by the American Hospital Association. These reports indicate that the total number of professional, technical and auxiliary personnel employed in hospitals is about 1.4 million. About 275,000 additional professional and technical personnel would be needed to provide optimum patient care, an increase of about 20 per cent over present staffing. Over 80,000 more professional nurses and more than 40,000 practical nurses are needed. Some 50,000 aides are needed in general hospitals; another 30,000 in psychiatric institutions. Over 9,000 more medical technologists, almost 7,000 social workers, and about 4,000 more physical therapists, 4,000 x-ray technologists and 4,000 surgical technicians are required.

Resources

The main pool of manpower resources from which the health occupations can draw to fill these requirements is that of the nation's youth.

Viewing the situation in terms of numbers, the nation has a virtually unlimited pool of manpower from which to draw, each year bringing a bumper crop of 18-year-olds—more than 3.5 million in 1966—all of them seeking careers and making choices, many of them potential recruits to the health occupations. This figure will increase gradually over the next 15 years to reach 4.2 million in 1980.

Two other dimensions of this manpower resource warrant consideration. During the 1963–1964 academic year, three-fourths of those 17 years old graduated from high school, and during recent years the percentage of young people completing high school has steadily increased. Further increase in this percentage is projected, reaching almost 85 per cent by 1975. Furthermore, approximately one-half of all high school graduates in 1962 went to college (44 per cent of 18- to 21-year-olds were enrolled in institutions of higher education during 1964). Five hundred thousand bachelor degrees were awarded in 1965, and this number will increase to almost 750,000, a 50 per cent increase, by 1975.²¹ The size of this manpower resource is impressive.

The growing proportion of women in the labor force will also be of benefit since, by and large, the health occupations are a woman's field. The proportion of women in the labor force has been increasing steadily during the past several decades, from 24 per cent in 1940, to 27 per cent in 1950, to 32 per cent in 1960. Also, the working wife or working mother is an increasing phenomenon in society. In 1940, one-third of the women who worked were married; in contrast, by 1965, almost two-thirds of women who worked were married.²² In 1960, 70 per cent of workers in the health services industry and 75 per cent of individuals working in hospitals were females.²³ Within the health occupations, of course, the proportion of women varies—ranging from 90 per cent in fields such as nursing and dietetics to less than ten per cent in dentistry, medicine, optometry and pharmacy.

If other nations can be taken as a guide, more women will choose the health professions in the future. Dentistry, for example, is a woman's field in other societies. More than 50 per cent of all medical students in the Soviet Union are women, as are about 25 per cent of those in the United Kingdom. In the United States, women have never accounted for more than 12 per cent of all M.D. degrees awarded in any year. In 1965, only 7.3 per cent of these degrees went to women.

Looking at the resources for health manpower in the context of the total economy, the signs are encouraging. The decline in agriculture as a source of employment—a 38 per cent decrease in manpower be-

tween the 1950 and 1960 census—automation in industry and the development of a productive capacity that exceeds consumption of goods, would suggest a greater availability of manpower for the service aspects of the economy. As has been noted earlier, health and educational services represent the two most rapidly growing segments of the service economy. As the society pursues the policy of full employment, health services will be viewed increasingly as a source of employment.

Attempting to develop health manpower from these basic resources is when problems arise. In the fall of 1960, one first-year medical student was admitted for every 45 baccalaureate degrees awarded the previous June. One first-year dental student was admitted for every 100 baccalaureate degrees. Projecting these ratios ahead ten years, one can anticipate for the fall of 1975 a potential for 16,500 first-year medical students and 7,400 first-year dental students. Can the medical and dental schools accommodate them? Not on the basis of current estimates; these figures exceed the probable school capacity in 1975 by at least 50 per cent.

Federal Manpower Programs to Develop Resources

Action has already been taken by the federal government to avert the full effects of health manpower shortages by promoting efforts to increase the nation's training capacity in the health field, as well as by encouraging health personnel and institutions to accompany this expansion by the most productive use of existing health resources.

Within the past few years, several significant legislative measures have been enacted whose impact upon the nation's supply of health personnel can already be measured. Under the Health Professions Educational Assistance Act of 1963, the federal government has provided grants to certain professional schools—medical, dental and others—to expand and modernize their teaching facilities and to support student loan programs. In 1965, the Act was amended to continue these programs and to add two new categories of assistance: grants to support basic educational costs and student scholarships. Awards made in the first 18 months for which funds were available are adding 2,442 first year places in schools of medicine, dentistry, public health, nursing, pharmacy and optometry. Eight new schools of medicine, one new school of dentistry, and one new school of public health are being established under health professions assistance.

The Nurse Training Act of 1964 has comparable provisions. These include: grants to enable collegiate, associate degree and diploma schools of nursing to strengthen and expand their teaching programs; a

loan program for students of all types of professional nursing schools; and grants for the construction of new schools and the expansion or modernization of existing teaching facilities.

Significant progress has been made also in training allied health personnel. The Vocational Educational Act of 1963 emphasizes support of programs geared to those areas in the nation's economy which have "actual or anticipated opportunities for gainful employment." This Act, which authorized greatly increased federal aid for vocational and technical education at less-than-baccalaureate level, is already stimulating the growth of educational opportunities in high schools, technical schools and community and junior colleges for existing and new categories of technical and supportive health manpower. The Vocational Rehabilitation Amendments of 1965 authorized increased project grants for traineeships, and fellowships to assist with the training of physical therapists, occupational therapists, rehabilitation counselors and other categories of rehabilitation personnel.

The most recent legislation in this area, and perhaps the most responsive to many of the problems produced by current changes within the health occupations, is the Allied Health Professions Personnel Training Act of 1966, passed by Congress on November 3, 1966. The goal of this Act is to fill a critical health manpower gap: meeting a growing need for supervisors of subprofessional workers, for teachers in the allied health professions, for highly skilled technical specialists and for new types of allied health professionals.

The qualitative aspects of this program are important in view of the limited number of people to be trained in relation to the total demand. The legislation encourages the creation of broad, multidisciplinary training programs and the expansion of many high-quality existing programs. Improvement grants will be awarded to selected schools with three or more interrelated allied health professions curricula. Some universities with medical centers have developed comprehensive groupings of health curricula, including medical technology, physical therapy, occupational therapy, x-ray technology. In such coordinated programs, individuals who will later work together in providing health care are trained together.

Traineeships will help prepare teachers, administrators, supervisors and specialists in the various allied health professions. They will permit people with basic preparation or work experience in their field to return to school for limited periods to obtain the further training needed to fit them for teaching or supervisory duties.

Finally, project grants for developing, demonstrating or evaluating new curricula to train new types of health technologists yet unknown will allow educators flexibility and room for experimentation. This is perhaps the most important aspect of the program since the organization and technology of health care will continue to change. New kinds of technologists will both use and develop radically new diagnostic and therapeutic equipment, which in turn will require changes in allied health professions personnel training.

FACTORS INFLUENCING FULL REALIZATION OF MANPOWER POTENTIALS

The improvement in the capacity for training, which the above legislative measures are designed to insure, is a first and vital step, but the full realization of manpower potentials for health services requires consideration of the effectiveness of both the preparation and utilization of professional, technical and supportive health workers. It also requires consideration of the obstacles that will be encountered in improving effectiveness and fully realizing potentials.

Income and Salaries

One of the foremost obstacles encountered is presented by the economics of health manpower. As the opportunity to fulfill humanistic drives has been diffused throughout a variety of social institutions, health services can no longer rely principally on this value for attracting manpower. Consequently, the multiplicity of elements that together constitute working conditions must be considered. For physicians, the opportunity still exists for the satisfaction of both altruistic drives and economic needs. A recent study by the United States Department of Labor reported that physicians enjoyed the highest median annual earnings (\$14,561) of male workers in 321 selected occupations,²⁴ and a survey conducted by *Medical Economics*²⁵ found that the average physician in private practice netted in excess of \$28,400 during 1964, up from \$25,000 in 1963, and ranging from \$26,000 in the East to \$31,000 in the Midwest. Admittedly, the work week is closer to 60 hours than 40; however, this intensity of work is probably not greater than that undertaken by most professionals. For physicians at least, participation in the healing of the sick does not require significant financial sacrifices.

The same cannot be said for the profession of nursing. A survey of the annual salaries received by school teachers, not a particularly high-paid

occupational group, reveals that on the average women with comparable educational experiences can earn \$1,000 per year more in teaching as contrasted to nursing. A 1962 study of 810 selected agencies revealed the median salary of a staff public health nurse to be \$4,442 in a voluntary agency, \$4,902 in an official health agency and \$6,090 with the board of education.²⁶ This disparity has led to a particularly acute situation in which nurses have left nursing practice to take positions with boards of education or school systems, where their knowledge and skills are not fully utilized.

As noted recently,²⁷ this is not the only unfavorable comparison—"In New York City, a nurse starts at an annual salary some \$400 lower than that of a beginner in the Sanitation Department." A 1963 survey of short-term general hospitals revealed average weekly earnings of \$86.50 for general duty nurses, \$98.50 for head nurses and \$110.50 for nurse supervisors.²⁸ The recent demands for higher wages by nurses suggest that the issue of wages and working conditions must be faced realistically in the near future.

Other health occupations do not fare much better. Average weekly earnings in mid-1963 were: dietitian, \$103.50; medical record librarian, \$106.50; medical social worker, \$116.50; medical technologist, \$94.00; physical therapist, \$106.50; and x-ray technician, \$82.50.²⁹ Even though these salaries reflect the disparity in incomes of men and women in society, the figures are substantially below the earnings of individuals with comparable education and training in other fields.

The low earning potentials in health occupations take on added significance if one hopes to increase the attractiveness of the health occupations for men. It has been suggested that a definite association exists between the increasing portion of teachers who are men and the rising salary scales in elementary and secondary education; the \$6,164 estimated average annual salary for a nine-month contract exceeds all of the salaries for the health occupations listed above.

Educational Inflexibility

Restricted opportunities for job enlargement through continuing expansion of the individual's horizons and opportunities present another obstacle. For the most part, a recruit to the health endeavor is expected to select his or her ultimate goal and then enter a highly structured—"locked step"—curriculum that presents first general and then specific information. Once graduated, the individual is supposedly prepared to perform certain functions for the ensuing decades. In general, any

attempt to move from the discipline or profession originally selected—from practical nursing to professional nursing, pharmacy to medicine, social work to clinical psychology, or physical therapy to psychiatrics—requires individuals to return to the beginning of the educational sequence. This is less true among the most extensively prepared members of the health professions; for example, it is not unusual to see interchange in career lines among M.D.s and Ph.D.s in the biological sciences. But since both the individual and the society gain when each citizen achieves the fullest potential within the limits of his innate capacity, this would seem to be ample stimulus to establish a more flexible educational framework.

At the same time a point of entry to the educational continuum commensurate with the individual's general capacity should be considered. At present, is it not ludicrous that a recent college graduate and a middle-age matron who has successfully raised a family of three through adolescence during the 20 years since she graduated from college, require, or for that matter necessarily benefit the most from the same two-year graduate experience? Such is the case in social work, and innumerable similar cases may be found in the health field.

Consumer Expectation

In attempting to modify or change the existing patterns and mechanisms for the preparation and utilization of health manpower or for the delivery of health services, the factors exerting influence on patient acceptance must be identified for consumer expectation will be one of the more formidable obstacles to many contemplated improvements. As noted by George Silver,³⁰ a patient may desire to consult with a physician and only a physician even when the difficulty could better be handled by another professional who has more suitable training—in this instance, a social worker for problems of social and psychological adjustment. Reluctance on the part of patients to settle for a dental hygienist as the most appropriate practitioner to administer dental prophylaxis is another illustration, and use of private-duty nurses by the affluent patient who wishes every whim catered to is characteristic of the inappropriate utilization of scarce manpower.

The prevailing philosophy of allocation and provision of services according to one's ability to pay is another obstacle to rationalization of the utilization of health services. Income and not medical need appears to determine whether one is treated by a psychiatrist or a social worker, an ophthalmologist or an optometrist, an orthopedist or a podiatrist.

The disparity between need and utilization of professional manpower in the case of maternity services was discussed in a recent lay publication.³¹ The authors, in discussing infant mortality in the United States in contrast with other countries, note:

No country on earth has enough obstetricians and pediatricians to supply . . . [the full scientific resources of medicine] to all mothers and all newborn babies. But it is relatively easy to supply top-quality care to the 25 to 35 percent of pregnant women who really need it and to their babies. It is in this selection of high-risk women for high-quality care that the United States lags far behind countries like Sweden and the Netherlands.

The authors inform the reader that Fellows of the American College of Obstetricians and Gynecologists or an obstetrician who is board-certified are qualified to handle "high risk" pregnancies. The logic of the presentation notwithstanding, it is doubtful that the middle-class reader of the magazine will settle for less than "top-quality care" no matter how normal her pregnancies. Thus do many obstetricians become the highest paid midwives in the world.

Professional Conservatism and Isolationism

Health professionals are likewise unwilling to accept modifications of traditional patterns. Most established professions are conservative in orientation—a desirable trait when viewed as an effort to safeguard standards and enhance quality. But professional conservatism produces a natural reluctance on the part of a profession to share functions or responsibilities previously recognized as its sole prerogative. This attitude frequently can create conflicts between the older and newer professions as each seeks the same end—patient well-being—by different means. The resultant "jurisdictional disputes" are comparable to those prevalent in other sectors of the economy. The defenses on the grounds of quality are frequently noteworthy for their lack of supporting evidence. Moreover, these conflicts can be socially devastating when the fight over prerogatives occurs in the midst of a need and demand for health services that surpass the present capacity of health manpower.

Some of the problems inherent in this subject are related to those posed by the educational framework. Frequently, the pressures for annexation of new responsibilities and expansion of the scope of interests results from individuals who have selected a discipline or profession that ultimately fails to place the greatest demand on their intellectual resources. These individuals are prevented from moving up into more prestigious and privileged groups that have greater responsibilities.

In anticipation of encroachment, some professions; e.g., physical therapy, have resisted the inauguration of training programs for assistants. Interdisciplinary relationships within health services are of critical importance. Herein both existing and emerging health disciplines must be considered. As new specialties take form in an effort to cope successfully with the potential offered by scientific and technological breakthroughs, one can anticipate additional careers. Since few, if any, new disciplines confine their activities to new techniques or problems, areas of overlap can be expected.

Resistance to the pressure for change can be even more difficult to overcome when the *status quo* is firmly imbedded in a multiplicity of statutes, accreditation procedures and criteria for certification. Even these can be minor obstacles, however, when compared to the economic vested interests that are supposedly a hallmark of guilds rather than professions. In such situations the forces of logic and rationality may be no match for tradition and vested interest.

The irrationality of many standards that become fixed in state statutes is evidenced by the differing privileges accorded dental hygienists in various states. Almost one-half of the states prohibit a dental hygienist from providing dental prophylaxis that requires scaling beneath the margin of the gum. "Why should a dental hygienist who can successfully scale and polish teeth below the margin of the gingivae in Michigan be forbidden to do so in New York?" asked the New York State Committee on Medical Education.³²

The problems raised in accreditation have been forthrightly reviewed by William K. Selden, former Executive Director of the National Commission on Accrediting and an interested student of the problems associated with the accreditation of professional programs of study. Increasing the supply of health manpower, through both the expansion of existing programs and the creation of new curricula, often faces the dilemmas of quality versus quantity in the arena of accreditation. As noted by Selden:³³

Professional accrediting, most of which is supported indirectly by licensure laws in the various states is intimately related to the desires of individuals to attain a high vocational status. When individuals in a particular group discover that they are using a common body of knowledge . . . inevitably they band together . . . [and] develop an impelling motive to raise individual status by restricting admission to the profession—sometimes with more emphasis on the interests of the practitioners than on public welfare. The issue of control over admission is extremely important to

any profession. This is especially true in the formative stages of a profession as it fights for recognition and struggles against the superior attitude of the established professions.

These comments can also apply to a host of "semiprofessional," "sub-professional" and technical areas in which the individuals in an occupational category share an identifiable common body of knowledge that is transmitted through educational programs.

The issues vary from the "delicate balance between the institutional and the public interest" that are of a general nature and ever present, to the more discrete conflicts in which each of the protagonists claims to represent the public interest, as in the present struggle between the National League for Nursing, advocating accreditation of professional programs, and the American Association of Junior Colleges, arguing for institutional accreditation. Some observers have suggested that inclusion of more generic concerns within the accreditation procedures of individual fields is required.

Since "quality" as a criterion for accreditation has been discussed up to now, a pause is in order to recognize that although the expression "quality of health services" is widely used, discussed and argued, it is imprecise and lacks an accepted definition. The expression usually connotes a value judgment as to whether or not the professional is performing his tasks to the best of his ability and in accordance with some generally accepted standards. Actually, as suggested by the Surgeon General, standards promulgated by a profession are but one part of a notion of quality of health care. The other basic dimensions to any determination of the quality of health services are the criteria established by the consumer and the society. Admittedly some overlapping occurs; nevertheless, each set of criteria has distinct features.

The criteria established by the professional are those of peer judgment and are concerned with diagnostic excellence, the scientific validity of one's decisions and the technical skill manifested in one's provision of service. These are some of the factors with which record audits and comparable approaches to measuring and evaluating standards are concerned. This is also the dimension that is most severely challenged by the growth in scientific knowledge that has resulted in shortening the performance half-life of the practitioner and created an awareness of the need for well-developed and utilized continuing education.

The second dimension of quality of health services is that advanced by the consumer. Although he recognizes the importance of the "science

of medicine," he is also concerned with the "art of medicine." His assessment of quality of health services is subjective and emphasizes the patient's emotional needs. For the consumer, accessibility and compassion are very important elements in determining the quality of health services. That is not to suggest that he is willing to sacrifice scientific quality to have accessibility and compassion; but neither is he particularly desirous of sacrificing them to receive care of the highest caliber.

The third dimension of the quality of health services is that developed by society. In some respects this dimension is concerned with achieving a balance between the previous two. For a society, efficiency, reasonable costs and unit productivity are all extremely important variables. A fair statement would be that the societal dimension seeks the most effective utilization, the lowest cost and the greatest unit productivity without sacrificing the expectations of the professional or the consumer. It is here that conflicts are found as those concerned with the formulation of social policy take cognizance of individual and group expectations and seek to achieve satisfactory resolution of incompatibilities. This emphasizes the importance of seeking an arena in which the interests of both the provider and consumer of health services can bargain over the requirements for preparation and utilization of health manpower.

Organization and Utilization

On the more positive and slightly less problematic side, with the growth in the size and complexity of the institution of health, an increasing organization has been noted in an effort to achieve more effective utilization of skilled manpower. The institution of health has been slower than many of the other institutions in society to adopt the principles of organization and many of its benefits are therefore only now beginning to be reaped.

Also, slow but continuous changes have occurred in the utilization of manpower. Attempting to analyze these changes from 1940 to 1960, Weiss³⁴ grouped health occupations into three levels of job content—high, medium and low—using as measures, in the absence of more concrete data, relative earnings and estimates of educational and training requirements. Comparing employment at each level over this period, he found the largest percentage increases in the occupations with low job content and the smallest increases in the occupations with high job content. This inverse relationship was valid also when the data were analyzed by region and sex. Furthermore, his analysis showed that "if the 1950 job coefficients [earnings and educational requirements] for

health manpower had been maintained [in 1960], an additional 100,000 health jobs with a high level of job content and 113,000 health jobs with a middle level of job content, would have been required to produce the 1960 output of health services. Instead, 117,000 with a low level of job content were substituted for these 113,000 jobs." In addition, analysis of specific groups of jobs indicated improved utilization of health manpower. For example, productivity of dentists has increased from 1950 to 1963, and the evidence suggests that this increase is partially due to additional dental auxiliary personnel. Similarly, the field of nursing has seen an increase in the productivity of nursing care and the proportion of low-level content jobs.

Therefore, although not actively pursued as a policy, in effect improvement has taken place in some fields in utilization and organization of health manpower. But this is only a beginning.

Problems of Under-Utilization

Traditionally qualified manpower has been under-utilized by "capital-poor institutions," such as universities and hospitals, in the service section of the economy. As Ginzberg has stated:³⁵

Partly because we have so many non-profit institutions which tend to be capital poor, productivity tends to be low. . . . The kinds of supporting personnel that even a broken-down business organization would have on the payroll to economize the use of the more expensive personnel are scarce in non-profit institutions. Being capital poor, these institutions squeeze their dollars and try to make them go as far as they can. From a productivity point of view, I think you have a substantial under-investment in capital, with corresponding under-utilization of personnel which on balance gives you a bad result.

Everyone can cite examples of the waste of talent and training in hospitals and other institutions as well as in private medical and dental offices. Hospitals, the major employers of health manpower, generally are unable to afford supportive clerical and administrative personnel in the numbers needed to free their professional and technical staffs from the routine and the repetitious. The result, as they recognize and as Ginzberg points out, is a less-than-desirable method of operation that requires specialized personnel—who must be employed—to function for a good portion of their time at less than their highest levels of capability.

A recent time-motion study of practicing pediatricians by Bergman, Dassel and Wedgwood³⁶ raises many questions concerning the appropriateness of training and utilization of pediatricians. Although the

study included only four pediatricians, the data revealed that 48 per cent of the pediatrician's day was spent with patients, 12.5 per cent on the phone, and nine per cent on paper work. Fifty per cent of the time with patients was spent with well children and 22 per cent with children who had minor respiratory illness. Less than two per cent of the total work week of the pediatricians studied was spent on the types of illnesses that constituted the vast majority of pediatric residency training, namely on the inpatient care of nephrosis, meningitis, inborn errors of metabolism, leukemia, cardiac disease and severe infectious disease. As a result, the authors concluded, "intellectual understimulation seems to arise from spending the majority of time with children who did not require their special talents." One consequence has been a trend to subspecialization in a search for intellectual challenge. With rising demands for child health care and an increasing population, the pediatrician manpower gap will become larger and larger. If current manpower trends continue, it has been estimated that by 1980, 59,000 additional physicians would have to be trained to maintain the current physician-child ratio.³⁷ Obviously, that is not going to be possible. Different patterns of child health care will be necessary.

Ross, commenting on this study, has made some suggestions for new patterns:³⁸

Can we not set up teams comprising trained individuals to interpret normal growth and development, give advice on nutrition, and carry out planned immunization procedures, and reserve to the pediatrician a supervisory role, the performance of physical examination, and the care of illness? As the head of the team the individual pediatrician should be able to provide good care to a much larger number of children and satisfaction not only to his patients and their parents but also to his professional teammates themselves.

The issue—an issue relevant to every discipline—is how long even a wealthy society can rationalize the investment of years of education and training beyond high school in individuals who will subsequently devote significant portions of their time to routine duties that might be provided very effectively by people trained in half the number of years.

ESSENTIALS OF A MANPOWER POLICY

The number and variety of health occupations considered in juxtaposition to society's pool of manpower resources is a challenge to formulate a rational policy for health manpower. A continuum must be

developed in which the preparation and utilization of different types of professional and technical workers are related in an optimum fashion. This will require consideration of health manpower at all levels of knowledge and skill.

The range of skill, aptitude and general interest required of health manpower is as great as that found in virtually any societal endeavor. Careers exist in the health disciplines for individuals with highly disparate backgrounds, diverse levels and duration of preparation and significantly divergent interests and capacities. Moreover, critical shortages exist of highly trained and specialized manpower. Efforts to create jobs that comprise only circumscribed tasks and a limited number of skills can contribute ancillary and supportive activities that aid highly competent manpower to achieve a greater output of health services. Individuals with innate capacities that will enable them ultimately to pursue higher levels of education need to be considered. So do individuals with lesser talents who can be expected to perform work that requires the mastery of only limited skills.

Education Programs

To clarify the various levels of preparation in health occupations is difficult since every group considers itself professional and use of the terms technician and technologist and vocational and technical is interchangeable. The confusion in nomenclature notwithstanding, education and training for the health occupations occurs essentially in six levels or clusters, namely:

1. *Advanced professional*: programs that admit students holding a baccalaureate degree to study at the graduate level; four years for an M.D., D.D.S. or Ph.D. in the behavioral or biological sciences and two-year curricula leading to masters degrees in social work, hospital administration, etc.

2. *Intermediate professional*: programs that require two years of college prior to a four-year curriculum leading to a Doctor of Optometry, Doctor of Pharmacy, Doctor of Podiatry or Doctor of Veterinary Medicine.

3. *Basic professional*: programs based in colleges or universities and leading to a baccalaureate degree. Included are physical therapy, occupational therapy, speech therapy, medical laboratory technology, medical record librarianship, dietetics and nursing. In some instances as much as a full year of clinical or practical work in a supervised

setting is required for professional certification; in the four-year program, the practical or clinical work is frequently accomplished during summers and vacations. Programs for the preparation of cytotechnologists and dental hygienists represent a variation on this level of preparation since six months and one year of practical training respectively follow two years of general education in a college or junior college.

4. *Technical*: programs offered by community colleges, vocational institutions or hospitals, are usually of two-year duration, although less when little, if any, general education is included in the curriculum. Illustrations include programs for associate degree nurses, diploma nurses, x-ray technicians and dental laboratory technicians.

5. *Vocational*: training offered primarily by vocational high schools or hospitals, usually six to 12 months in duration and almost completely practical in orientation. Training programs for licensed practical nurses, inhalation therapists and certified laboratory assistants are illustrations.

6. *On-the-job training*: programs that have virtually no educational prerequisites and are limited to short orientation courses or in-service instruction in limited procedures.

The differences between the technical and vocational clusters are the least distinct. The terminology used is arbitrary and attempts to distinguish between training programs of one year's duration or less and those requiring two years of study beyond high school.

The relations between the two principal types of programs for the preparation of health manpower—educational institutions (universities, colleges, community colleges, vocational schools or departments of education) and service institutions (mainly hospitals)—needs resolution. The recent trend is toward increasing the portion of training sponsored by primarily educational institutions with hospital affiliations for the clinical or practical component of the program. Expansion of this trend will require a major shift of administrative responsibility for technical and vocational training service to educational institutions. This trend is being stimulated by the tremendous growth of two-year community colleges in the United States and a redirection of public, vocational education from industrial trades to those of service careers.

Two benefits of a merger of educational and service institutions with respect to the preparation of health manpower are to be anticipated. A majority of the programs for training health technicians have less than ten students. Many have as few as two. The question is being

raised as to whether or not a program of this size has the necessary "critical mass" to justify the energies of a faculty, no matter how small its numbers or the portion of time devoted to that effort. The character of the training approximates apprenticeship far more than an organized curriculum. Another salutary effect of this merger would be the expanding influence of educational accreditation. Currently, regional accreditation, the main mechanism through which society assesses and acknowledges the adequacy of its programs of formal instruction, is not used for the technical areas.

In any event, an adequate health manpower program should be aimed at obtaining the most effective yield possible from the nation's educational resources, represented by almost 600 junior colleges, universities and other institutions offering four or more years of higher education, augmented for purposes of supervised practical experiences by the approximately 1,000 short-term general hospitals with 200 or more beds.

Theory-Skill Spectrum

Developing new educational programs and changing existing ones will constitute one of the most important avenues to the improvement of utilization. Kinsinger, who has been concerned with developing increasing numbers and kinds of health technicians, has proposed a "theory-skill spectrum in the health field."³⁹ Such an idea with the added dimension of "capacity for independent action," as proposed by Mase,⁴⁰ offers a context in which to deduce the interrelationships among specific disciplines with respect to both their preparation and utilization. Approaching health manpower as an interrelated whole rather than merely an agglomeration of disparate categories of personnel is essential.

The "theory-skill spectrum" suggests a hierarchical continuum in which generalizable academic and experience equivalents are common to several levels of functioning. The technical or professional health worker is faced with the necessity of mastering varying portions, in both range and depth, of biomedical knowledge and specific skills. Flexibility in both the development and use of health manpower requires that educational and experience equivalents must be identified and measured wherever they might exist. This, together with the development of adequate measures of capacity for independent action, is a prerequisite to accomplishing a downward transfer of functions from the higher-trained to the lesser-trained individuals (see below), as well as to de-developing "job enlargement," i.e., assuming increasing responsibility commensurate with one's skills.

It is suggested that the curricula found in the various clusters of health manpower described above (advanced professional, intermediate professional, basic professional, technical and vocational) could be examined both for the common elements within each cluster and the relationships among the hierarchy of clusters. A determination of the portion of each curriculum devoted to generalizable knowledge and to technical skill could assist and enable an individual completing a program in one cluster to receive advanced standing in a curriculum in another cluster located above it in the hierarchy. In addition to facilitating and encouraging each individual to obtain the fullest margin of his capacity, the existence of such a continuum could open positions in the clusters of "basic" through "advanced" health professions to students making a lateral or diagonal transfer.

For example, the nation's medical and dental schools lose approximately ten per cent of their students between enrollment and the start of the third year. It would seem that the possibility of filling these 800 plus vacancies in the third year medical class and the 300 vacancies in the third year of dental school with "transfers" from other programs in the health professions through the vehicle of related curricula is worth exploration. The increasing portion of the medical curricula given over to electives (two of the four years in the new curriculum at the Duke Medical School) increases the options for developing overlaps with curricula in other professional schools. Advanced placement is now a widespread phenomenon in the movement of the student from high school to college. Honors study offered to students of nursing, pharmacy, optometry, physical therapy and so forth to qualify them for advanced placement in a medical curriculum should not be impossible to devise.

At the present time, high school graduates spending three years in a diploma school of nursing in a hospital receive no credit toward a college degree; the assumption is, therefore, that the program has zero academic equivalents. On the other hand, a girl spending two years in a community college qualifies for licensure as a registered nurse at the same time that she receives academic credit, suggesting that the program has fewer technical equivalents. The Bachelor of Science in Pharmacy degree, however, that required five years beyond high school, represented four years of academic equivalents for enrollment toward a Ph.D. in most universities.

Core Curricula

New curricula may well have to be devised and planning and inauguration of core curricula at various levels of health manpower must be pursued. With an increasing number of health professions, relationships among the various members of the health team who will be sharing responsibilities will become critical, and interaction among these health workers must be encouraged. At the same time, consideration must be given to making maximum use of limited educational resources through such mechanisms as the sharing of faculty, which the development of core curricula would facilitate.

Indications are that community colleges will attempt to develop core curricula as they consider initiating programs for a whole range of health technicians.⁴¹ The similarity of the curricula for many of these programs with respect to the biological sciences supports the logic of such an approach. One program in Minneapolis, Minnesota,⁴² using core curricula, currently offers preparation in seven health occupations: 1. medical laboratory assistant, 2. medical record technician, 3. medical secretary, 4. nurse technician, 5. occupational therapy assistant, 6. radiologic technologist and 7. food service supervisor.

In addition, the use of core curricula is found in graduate schools and universities where the basic science faculty provides instruction for students in the biomedical sciences, medicine and dentistry. Some faculty also teach in several clusters by varying the scope and intensity of the subject matter covered—for example, in teaching clinical pathology and medical technology. Efforts to develop core curricula at the basic professional and intermediate professional levels, as well as increasing the effort at the other levels, would appear to warrant careful study and implementation.

Education as a Continuous Process

But the education of health manpower cannot be considered solely a preparatory experience, as it has tended to be to date. The increasing rate at which scientific and technological advances are being achieved indicates the foolhardiness of considering any preparation as terminal. It has been suggested, and advocated, that the intimate relationship between educational and service programs discussed above would enable education to become a truly continuous process. The individual health worker could learn new techniques relative to his or her discipline, and he might also have more chance to enlarge his theoretical knowledge.

Opportunities for the latter—that is, increasing the level of one's mastery of theory and generalizable knowledge—are essential to upward movement on a career ladder.

Career Mobility

Any increase in opportunities for movement on a career ladder will be of paramount importance in achieving the most complete utilization of health manpower. At the present time, mobility is limited in either a lateral or vertical direction among health careers. As noted above, with the present system of education and training an individual has to select one of the many possible health careers prior to enrollment in a specific program. In effect, the student who chooses one health career bars himself from all others, unless he chooses to go back and begin at the beginning in a new course of study that may well repeat what his previous training and experience have already taught him. But, as noted by Ginzberg and his associates,⁴³

A person's occupational choice is not a one-time decision but the cumulative result of many decisions over time. These decisions re-enforce each other until the occupational path open to an individual has been narrowly delineated.

A more flexible system fostering both lateral and vertical career mobility among health disciplines could serve to offset premature restriction or closure of occupational choice.

The absence of vertical mobility among the health disciplines and the restriction of occupational decisions to only one or at most a couple of "points of entry" virtually close the majority of the health careers to the socially and culturally disadvantaged in society. The odds against motivating an impending high school dropout to complete secondary schooling, four years of college, four years of medical school and four years of post-graduate work so that he might practice medicine are beyond his comprehension, his innate intelligence and aptitude notwithstanding. Providing him with a series of short-range goals encompassing a step-by-step elevation in responsibilities—all accompanied by general educational opportunities—might provide the individual with sufficient challenge and motivation to reassess his career aspirations in the light of recent achievements and newly perceived horizons.

Can several of the health disciplines be related in an education continuum to provide multiple points of exit to jobs and reentry for further study preparatory to a higher level of functioning? It seems that combinations of some parts of existing curricula reinforced by the current

thinking about education as a continuous process could produce a plausible first step to truly exciting opportunities. One of the major policy recommendations of the Conservation of Human Resources Project⁴⁴ is that of work-study programs designed to stimulate the "awareness of occupational opportunity," an approach that warrants scrutiny.

A continuum of enlarging experiences through a work-study program could enable an individual to derive motivation from an "awareness of occupational opportunities." Although it is usually argued in educational circles that the general or broad education should precede training for specific activities, this sequence is not always possible and frequently is impractical. A widely recognized example of specific or technical training occurring before rather than after general education can be found in many case histories of "self-made" men. In these situations, so frequently idealized and venerated in folklore, circumstances necessitate the individual's entrance into the labor market through the performance of menial tasks. Energy combined with innate ability and good fortune enables the individual to progress to a point where he can acquire a broadened and general education through the vehicle of life experiences.

Similarly, the opportunity to work in health services, even at a very basic or rudimentary level, could represent the beginning of a broader horizon of basic education, adult education, self-study and similar experiences. It is important to recognize that efforts aimed at adapting jobs to individuals do not preclude consideration of the educational facets of these programs. On the contrary, these efforts ultimately can contribute to the educational enhancement of the individual. Thus, he can grow to fill larger, more complex and more demanding responsibilities in the future. The experience of the armed forces in preparing hospital corpsmen, laboratory technicians and personnel for other health occupations suggests that career ladders in health are feasible, and it should be noted that one-quarter of the medical students in the Soviet Union have had prior education and experience in one of the health occupations.⁴⁵

The widely publicized two-year, post-high-school curriculum initiated recently at Duke University Medical Center to train physician assistants could be used as part of a foundation for construction of a career ladder. This program is aimed at increasing the productivity of medical practitioners by preparing a new category of paramedical manpower to perform a large array of procedures under supervision. The information available to date does not suggest that the graduates of this program

will possess skills that vary significantly from those found in many nurses, but a great contribution of the program may be in establishing new opportunities in the health field for men as an alternative to nursing, characterized as predominantly a female profession. The most far-reaching impact could be achieved, however, if thought is given to devising future educational opportunities, in combination with work experiences, that would permit one of these or subsequent "physician assistants" to move up the occupational ladder to become a physician.

The subject of the "indigenous, nonprofessional" is stimulating the curiosity of many service professions. The idea of career development is included in the thinking on this subject, and the shortsightedness of concentrating on jobs, and therefore failing to look for careers, is recognized. As noted by Reiff and Riessman:⁴⁶

The concept of employing indigenous nonprofessionals calls for the possibility of promotion to various levels of subprofessional and professional positions. For this to occur, both public and private sector requirements will have to accept combinations of work experience plus education which can be acquired concomitantly with employment or intermittently with leaves of absence.

Downward Transfer of Functions

Complementary to establishment of career mobility as an approach to effective utilization is a downward transfer of functions. Giving each service the level of skill it needs, no more and no less, may be the principal challenge to health manpower. Meeting this challenge requires detailed study of health services and a subdivision of specific functions into the component tasks. Then individuals possessing only a limited range of skills and competencies can be drawn into the manpower pool to perform many of the tasks, freeing those more highly trained and skilled for the performance of duties requiring their more advanced level of competency.

Extensive research and analysis to determine the limits of safety is, of course, a necessary prerequisite to this approach. Then, attention must be focused on those services that can be provided by more than one discipline and on the fact that the greatest economy is realized when disciplines in shortage areas are devoting the greatest possible percentage of their time to those services that they, and they alone, are equipped to provide.

Success in programs of "downward transfer of functions" usually hinges on effective organization and supervision of the services per-

formed, and, accordingly, the approach requires an institutional setting for effective implementation. That should not present a problem in the health enterprise, however, since health comprises a variety of institutions and agencies—hospitals, health departments, nursing homes, group practices and voluntary health agencies—located throughout the nation and extensive in both number and kind. Moreover, as was noted earlier, the trend toward institutionalization of health services, in a functional sense, suggests an increased opportunity for new approaches.

The increasing use by dentists of auxiliary personnel is one illustration of a downward transfer of functions. A recent survey of dental practice,⁴⁷ which assumed dentists' incomes reflected productivity, found that their income or productivity increased with each additional dental auxiliary that they employed. Furthermore, the addition of a second assistant increases income more than the addition of the first assistant, and the addition of a third assistant increases income more than the addition of a second. Since most dentists now employ one or two full-time assistants, the study implies the need for further improvements in utilization.

A downward transfer of functions has frequently resulted in the creation of new disciplines and some interesting innovations involving assistants to physicians now being tried may well create more. Of these, the following programs are illustrative:

1. Training of personnel as "medical emergency technicians" for emergency service, being conducted at Ohio State University.
2. Duke University's two-year program for training "physician assistants," comparable to the experienced medical corpsman of the armed forces.
3. The "pediatric public-health nurse practitioner" being trained at the University of Colorado to assume an expanded role in child health.
4. The "unit manager," developed at the University of Florida Health Center, who orders supplies, stocks, medications and linens, handles requests for and records results of laboratory and technical procedures, schedules orderly service and patient transportation and manages meal service, thus freeing nurses for patient care.

Application of Technology

Increased application of technology to provision of health services would also serve to improve utilization of health manpower. In contrast

to other industry, "the health service industry" has substituted technology for manpower to only a limited degree. No doubt, a variety of reasons may be cited, ranging from an inherent distrust of the appropriateness of the extensive use of automation and instrumentation in what must be a personalized, service activity, to the lack of capital for investment in developmental activities and purchase of hardware. Nonetheless, when the health endeavor is viewed as a \$45 billion labor-intensive industry, with labor costs approximating three-quarters of the total, the impetus to substitute technology for manpower becomes inevitable.

Several examples of "labor-saving" developments can be cited: disposable supplies (syringes, needles, transfusion sets and gloves), pre-packaged formula and intravenous solutions, simplified laboratory tests (Clinitest for Benedict's solution) and so forth. The potential of automated laboratories, computer analysis of electrocardiograms and similar developments is suggested by the Kaiser Permanente multiphasic screening project⁴⁸ under development in Oakland, California, since 1962. Approximately 40,000 health-plan beneficiaries are screened annually with a battery of 20 automated and semi-automated tests, including a self-administered health history questionnaire. Only approximately two and one-half hours are required to complete the automated survey and it is conducted by nurses, technicians and other supportive health manpower. Conventional methods would require two days and between four and five times the \$42 cost established in this program.

CONCLUSION

Careful exploration of each of these avenues to improved utilization and application of new ideas and practices encountered in this exploration can profoundly affect the capacity to insure that every individual receives the best in health care. For utilization is a critical variable. As such, it is considered in a new book by Rashi Fein of the Brookings Institution.⁴⁹ Working on the premise that manpower requirements are a function of requirements for services, now considered by some to be the only meaningful and realistic basis for forecasting, Fein asserts:

The 'need' for medical personnel depends on the demand for medical services and on the quantity of services a given amount of personnel can and is prepared to offer. Both the demand and the supply change over time. The former is affected as the health and socio-economic characteristics of the population alter, as research in medicine advances, and as government helps transform medical needs into demand by instituting new

medical services or financing programs. The latter changes as new patterns of medical organization come into being, as new types of personnel are trained and new technology is developed, and as the productivity of personnel changes.

Not all of the variables involved are quantifiable, but estimating the effects of each to the extent possible and using existing patterns of utilization as his base, Fein projects an increase in demand of at least 22 to 26 per cent for 1975, and a 19 per cent increase in the number of physicians. For 1980, he predicts a 35 to 40 per cent increase in demand and a 29 per cent increase in physicians.

Obviously, utilization of health manpower in such a way that the benefits of modern medicine may be made available to all will require much in terms of creative energy and innovative approaches. The introduction to this paper expressed the belief that billions of dollars could be invested in the education and training of health manpower without making a significant impact on the availability of health services, and thereafter, attempted neither a thorough review nor analysis of all the relevant factors. Rather the attempt has been made to suggest issues and to provoke a discussion of health manpower policy.

Planning for the effective preparation and use of health manpower is the subject of the first two of the 23 recommendations of a task force that has spent considerable time in examining the subject of health manpower.⁵⁰ But, as always, the recommendation is easier than implementation. Nonetheless, "plan we must!" As planning proceeds, visualizing the problems and formulating solutions must precede and guide the computerization of the data.

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Biomedical Electronics Technician	Medical Secretary
Dental Assistant	Medical Assistant
Dental Hygienist	Medical Emergency Technician
Dental Laboratory Technician	Food Service Supervisor
Director of Hospital Volunteer Services	Inhalation Therapy Technician
Medical Laboratory Assistant	Operating Room Technician
Nursing (ADN)	Ophthalmic Dispenser
X-ray Technician	Radioisotope Technician
Occupational Therapy Assistant	Prosthetist
Medical Record Technician	Environmental Health Technician
	Ward Manager

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