

W/S

## MEDICAL ECONOMICS

(largely based on Herbert E. Klarman, "Economics of Health")

### General

Most health and medical services are personal services. This fact has important implications for an economy that grows largely through gains in productivity rather than through expansion of the labour force. Thus, hospitals, which compete with other industries for some classes of employees, have not been able to offset the same proportion of salary increases with productivity gains. As a result, the costs and prices of hospital care rise faster than the cost and prices of most other goods and services.

The list of distinctive economic characteristics of health and medical services can be summarized as follows: the irregular, uncertain and sometimes communicable nature of illness; special attitudes of the public towards health and medical care; certain unusual characteristics of the inputs and outputs; and, finally, unusual forms of organization in the provision of such services.

### Factors influencing Demand

Different prices may be charged on a sliding scale since a medical service is not transferable between persons. Separations between consumer markets with different price elasticities of demand can therefore be maintained. It is likely that a general demand is inelastic with regard to price changes because most visits to physicians and hospitals are for curative services. Greenfield<sup>1</sup> includes within the scope of health economics the population problem; the quantity and quality of resources allocated to the health area; the medical care industry's efficiency; losses due to illness, disability and premature death; possible economics of scale (lower cost associated with increased volume of services); and relationships between the organization and financing of the industry and its function. Greenfield has suggested that health and medical care expenditures should be viewed as neither investment nor consumption but as repair and maintenance of the human machine.

Klarman finds that the quantity of physician services and hospital services is not very responsive to price changes.

## The Case for Public Intervention in Provision and Financing of Health and Medical Services

The case for public health services and medical research to be supplied by government rests essentially on three grounds: (a) the special characteristics of so-called collective (or public) goods; (b) external relationships in consumption; and (c) declining unit cost of production. Collective goods (or public or social) are the ones which do not diminish for others by the consumption of an individual. The essential characteristic is that there be no way of excluding individuals from enjoying the goods (for instance, a fluoridated water supply). In medical research new ideas may be used over and over without being consumed. Under strictly private auspices, basic medical research would be under-financed. There is in general a preference for voluntary ownership over profit organizations. However, D.S. Lees<sup>2</sup> writes in his book, "Health through Choice", that most health and medical services are not public goods, in the sense of being consumed equally by all; rather, health services can be enjoyed by consumers separately and increased consumption by some does imply reduced consumption by others.

With regard to the availability of health services, Jerome Rothenberg<sup>3</sup> states that in each area sufficient and accessible resources must be allocated to health and medical services to permit at least caring for all serious conditions. He defines such conditions as characterized by an almost perfectly inelastic demand for medical care, or by important neighbourhood (external) effects, or by both.

Pigon<sup>4</sup> points out that neglect of the interest of future generations by not supplying the necessary services may be one of the most serious disharmonies in a market economy. Klarman points out that the consumer's need for guidance is money spent for medical care. In summary, the economic basis for public intervention in public health services is stated as follows by Klarman: the nature of collective goods; the presence of external benefits; the decline of unit costs with increases in output; and society's preference for non-profit forms of organization within the health field.

With regard to personal health services, the reasons for intervention are given as follows by Klarman: to assure the presence of some health personnel and facilities in the locality; to assist the sick poor, including

the medical indigent; to protect certain groups who are government wards by tradition; to offset the working of consumers' choice, which is not reliable; and to increase employment outlets in the economy.

Pervading both sets of arguments is the possible divergence in time preference between individuals and society, reflecting a difference between their attitudes toward the need and succeeding generations.

Klarman estimates that on an average the physician allots one-eighth of his time to free care. It is estimated that a government's share of total health and medical care expenditure is about 25 per cent. In 1957, the United States Social Security Administration, a component of the United States Department of Health, Education and Welfare, began to publish Merriam's<sup>5</sup> annual series on the total health and medical care expenditures by object, such as physicians, dentists and hospitals, for private payment and by programme, for example, veterans, public assistance and school health for public payment.

Depreciation on capital is one of the elements of gross national product (GNP). When health and medical care are related to the GNP, they should include an allowance for depreciation. When related to the net national product (NNP), they should not include depreciation. In view of the increasing willingness of insurance plans and government agencies to pay for depreciation, especially if the payment is set aside for capital purposes, it is reasonable to suppose that more hospitals are entering larger depreciation charges on their books and that the amount of depreciation embodied in reported hospital expenditures is rising.

#### Supply of Personnel

The supply schedule lists the alternative prices at which various quantities of a good or service will be offered at a given time (i.e. over an interval). It is evident from Klarman's description that it is almost impossible to get a figure for the number of hours worked by a physician. This is one of the great problems in planning in the market economy countries. In the Soviet Union, exact figures for working hours of the different health personnel are available and are adhered to.

Supply of labour to a particular medical specialty is more elastic than to the profession as a whole for there is greater mobility within medicine than between medicine and other professions. Intensive specialization raises the cost of medical services. There is less

specialization amongst dentists. While there are considerable and important differences amongst nurses this is not so much in the field of specialization as in the level of administrative responsibility. The average duration in the United States of graduate medical education (internship plus residency) was in 1956, 3.5 years. Klarman points out that the ensuing income postponement is an important item. Today's sophisticated analysis of professional income is largely derived from the work of Friedman and Kuznets<sup>6</sup>. They state that the average annual income of physicians exceeds that of dentists by 32 per cent. However, when allowance is made for the higher cost of physicians' training this percentage is reduced to about 17 per cent. Friedman and Kuznets conclude that the persistent income differential between the two professions can only be explained if there are barriers to entry into medicine, either limitations on the capacity of educational facilities or impediments to the granting of licences by states, or both. They calculate that there should be roughly three times as many physicians as dentists in order to eliminate the excessive income differential between the two professions. At the time of their study the ratio of physicians to dentists was 2 to 1.

The classic attempt of estimating the need for physicians is contained in a monograph written for a Committee on the Cost of Medical Care. Lee and Jones<sup>7</sup>, drawing on the best then current information (1933) on the expectancy (incidence or prevalence) of diseases and injuries, estimate the number of physician hours required to prevent, diagnose, and treat each major disease and injury category according to the prevailing consensus of leading members of the health professions. Requirements for physician hours were converted into requirements for physicians on the basis that the average physician devotes 2,000 hours a year to caring for patients. It was found that a population of 100,000 would require 135 physicians for the individual care of patients.

Klarman is rather critical of this monograph and states that this approach would be applicable if we had the technical knowledge for translating figures on the expectancy of diseases and injuries into requirements for services; if we could agree on the number of services, or even hours of service, rendered per physician per year; if we accepted health as an absolute goal of society and physicians' services as a fixed factor in promoting this goal; and if we were willing and able as individuals, communities or as a nation, to underwrite financially uniform

standards of adequate (or minimum) medical services throughout the country, without regard to other objects of expenditure, necessary or desired. Klarman feels that none of these provisos can be said to obtain today.

Klarman is very hesitant to accept the use of physician-to-population ratio by applying any specific standards. Attempts have been made in the United States using all 50 states, the top 12 states, 120 trading areas, etc. Klarman rightly points out that unless the area selected as standard is representative it cannot be used as valid criterion.

The National Manpower Council<sup>8</sup> in 1953 analysed the quantitative estimates of physician requirements calculated by public health authorities and found them wanting. It listed and discussed the factors, pointing towards the increasing demand for physicians' services and concluded that specific shortages were evident in certain specialties such as psychiatry, public health and pathology. Moreover, the Council concluded that regardless of actuarial calculations, physicians' incomes were obviously high enough to enable them to exercise some discretion in choosing the time and place of practice, giving the less advantageous rural areas a poor chance of getting medical manpower.

Klarman discusses the different solutions to the manpower situation, amongst these the possible increase in the number of medical schools, versus the more effective use of the existing medical schools.

#### Supply of Hospital Services

Since there is no simple way to measure the volume of other types of equipment in a hospital, the bed is treated in a manner analogous to a division slice in the military, standing for both a part of the nursing unit accommodating patients and a proportionate share of all the other facilities. For an understanding of the supply of hospital services, Klarman recommends a study of the general series on "shape and level of supply curves in economics". He also discusses the question of "economics of scale". At sufficiently small output, efficiency increases with size, owing chiefly to the specialization of labour and equipment. At sufficiently larger outputs, efficiency declines with size because of increasing complexity of management.

Paul Feldstein<sup>9</sup> in his "Empirical Investigation of the Marginal Cost of Hospital Services" points out that since hospitals are not, as a whole,

subject to the profit motive, there is the possibility that the hospital industry is not organized on an efficient basis. It is necessary to investigate whether hospital care is provided at minimum cost and if not, what changes can be made to allocate hospital resources in a more efficient way. The main questions are: 1) What number of hospitals can best serve an area? 2) Would changing the price of hospital services according to peak and off-peak periods reduce the variations in occupancy rates and thus reduce costs? 3) What cost information is necessary for administrators to operate their hospitals as efficiently as possible? One of the most important problems in hospital administration is the determination of the size of hospital for which average total costs are at a minimum.

Klarman discusses the different types of hospitals; proprietary hospitals, voluntary hospitals and government hospitals. He feels, as Feldstein, that voluntary hospitals are often not forced to ensure efficiency. Klarman points out that the superior quality of care associated with group practice is usually related to the advantages of an organized form of practice which includes the salutary effects of peer discipline, informal consultation within the staff, systematic record-keeping and continuity of care. Klarman states that "little formal evidence exists to substantiate this claim in terms of final outcome, that is to say, the effect on patients' health and survival". It has been found that the turnover is often high in group practice. In the United States, by 1959 group practice embraced only 12,000 physicians, that is to say 6 per cent of all physicians in private practice.

#### Relationship between the Physician and the Hospital

The practising physician depends on the hospital for two types of opportunity. In the first place, it makes him able to continue his post-graduate education for the rest of his career. Secondly, he is, in many cases, earning a considerable part of his living there. In 1958, in the United States, 40 per cent of physicians' income from patients and insurance was earned in hospitals.

### Planning and Co-ordinating Hospital Care

Since the 1960's, there has been a widespread movement towards external planning and co-ordination in the hospital field. It is generally expected by experts, officials and the public that planning and co-ordination will be able to reduce the cost of hospital care, or at least to curtail its rise in the future. It is thought that control over cost will be accomplished by: a) limiting the number of beds; b) avoiding (or limiting) duplication of expensive facilities that are rarely used or required for operation by a highly trained staff, as for instance, cobalt radiation therapy and heart surgery; c) using the costly hospital bed to maximum advantage by establishing cheaper substitute facilities and services in adequate numbers.

The economic bases of the drive to control and limit the number of hospital beds are: 1) the low proportion of marginal to average patient day cost in the short run, which makes a vacant bed costly; 2) the possible effect of the supply of beds on hospital use, which, if confirmed, would indicate that attempts to fill gaps in hospital care will come to nought and can only result in incessant increase in total expenditures, and; 3) random fluctuations in admissions to short-term hospitals which render costly the segregation of any category of patients and the specialization of facilities of small size.

With regard to the problem of avoiding vacant beds, most formulas for estimating hospital bed requirements reflect the belief that a simple and one-way relationship exists between hospital use and a population need. With admissions or patient days serving as the dependent variable, early formulas commonly used size of population and the death rate as the independent variable. In recent years consideration has been given to including additional demographic and socio-economic variables in calculating a population's bed requirements, such as marital status, health insurance, educational level and race. The delimitation of boundaries for planning areas for hospital services is a particularly difficult step in the planning process. Another difficulty in planning pertains to the choice between need and demand as a basis for recommending in favour of or against the provision of beds. It is generally accepted by planners today that the supply of beds does influence use. Peak patient loads seldom occur

simultaneously in every hospital. Accordingly, fewer beds are required to furnish a given level of protection if hospitals co-operate than if they act independently. It is considered that the optimum size for a general hospital is about 700 beds.

In examining hospital planning, one is struck by the absence of a distinction between planning as the exercise of detailed controls and planning as the design and development of a framework within which social and individual interests are brought into closer accord. The first is retail regulation of which many economists tend to be sceptical. The second is akin to the employment of broad fiscal and monetary measures and incentives to promote specified policy objectives.

Klarman explains the application of the "medical care price index". The price index is a measure of the change in price between two years for a given basket of goods. Dickinson<sup>10</sup> in his "The Cost and Quantity of Medical Care in the United States" (1948), has calculated productivity by the following method: each year he divided consumer expenditures for physicians (as estimated by the National Income Division of the United States Department of Commerce) by the physician price component of the Consumer Price Index. He then divided the quotient by the number of physicians in independent private practice. The result was adjusted (implicitly) to allow for the rise in the percentage of physicians charges collected, and, secondly, for the decline in the volume of free care. The downward adjustment was warranted, for expenditures had increased without a commensurate increase in services.

#### Cost and Benefits of Health Programs

Health and medical services may represent an investment in human capital or final consumption. This distinction between consumption and investment has serious implications for policy. If health and medical services are consumer goods, the best way to go about getting more of them is, first, to invest in those things that raise the national output, and, then, to devote part of the increment to buying additional health services. Conversely, if health services are investment goods, it may be practical to buy more of them directly.



Weisbrod<sup>11</sup> suggests that information on the economic benefits expected from various health projects would serve as a useful, meaningful guide to demand, and hence, to expenditure decisions. Weisbrod shows that for certain diseases, some of the most important economic losses can be measured and the data used to make a priority listing of health projects according to anticipated economic benefits. He suggests that such a list can serve as a guide to the allocation of health funds amongst competing programs. We shall meet this approach in the Santiago methodology of health planning.

Klarman points out that costs of a disease comprise at least two elements: the direct costs and the indirect costs. The direct costs are the medical care expenditures associated with a disease. The indirect costs are the loss of output attributable to the disease, that results from premature death and disability. Direct costs can be avoided by failing to provide service. Indirect costs are unavoidable. The total cost of a disease may, as discussed by Weisbrod, serve as the measure of benefits derived from preventing that case. In the Santiago methodology only the direct costs are used.

In a cost benefit calculation, the comparison is between contemplated additional expenditure for health and medical services, on the one hand, and the anticipated reduction in costs (direct plus indirect) on the other hand. This is the essential framework. Actually there is little difference whether one focuses on costs or on benefits. Thus Fein,<sup>12</sup> in his study of the economics of mental health, states that the focus is on costs, and Weisbrod, in his study of TB, cancer and polio, states that it is limited to benefits. However, both deal with the same problem in similar fashion. When economists view medical services as consumer goods primarily the calculation is reduced to a comparison of expenditures for alternative programs that promise the same degree of health improvement. Actually, few (if any) health services are either pure investment goods or pure consumption goods. It should be kept in mind that the calculation of costs and benefits properly compares the present value of proposed costs and of expected benefits. If the time span is longer than one year, the two streams should be discounted to the

present by means of an appropriate rate of interest. The reason for discounting is as stated by Banks and Kolz<sup>13</sup> in their study, that a given sum is normally worth more today than an equal sum at some future date, because the money (or resources) can be profitably invested (or consumed) in the interval between today and the future. Interest is the premium paid to reflect the fact that any given sum or resources can be put to profitable use over a period of time. It follows that the value of money which is not currently available, but which will become available (or spent) some years hence, must be discounted for the interest which would be earned in the interim, which is why the present value of the dollar to be received in the future is always less than 100 cents.

## REFERENCES

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