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Economic Aspects of Health Care Functioning *

Ekonomiczne zagadnienia funkcjonowania służby zdrowia

Экономические вопросы функционирования здравоохранения

This paper considers select problems in health economics which have been classified into Section 3 of the World Health Organization Inter-Regional Seminar on Health Economics held in Geneva in July 1973. In the Introductory Note, as well as in the Stimulation Paper, which have been prepared for the Seminar by the WHO Secretariat, some specific contents of the Section 3 have been suggested representing problems selected for discussions, conclusions and recommendations during the Seminar. Basically, we will follow the structure and sequence of the contents suggested in the Introductory Note, but will make some modifications and simplifications. The reason for this is quite obvious. The contents of the Section, put into the program of the Seminar under the heading Economic Aspects of Health Care Functioning, are of such a nature that they are interrelated, and, in addition, their complexity makes it difficult to discuss them in detail within the framework of a short introductory paper. After this explanation, let us turn to the main problems of our discussion.

DETERMINANTS OF HEALTH CARE UTILIZATION

The first problem to be discussed is the utilization of health care. It should be noted that we are interested in the utilization of health care

* Based on an unpublished WHO document presented by the author at the WHO Inter-regional Seminar on Health Economics, Geneva, 2—16 July 1973.

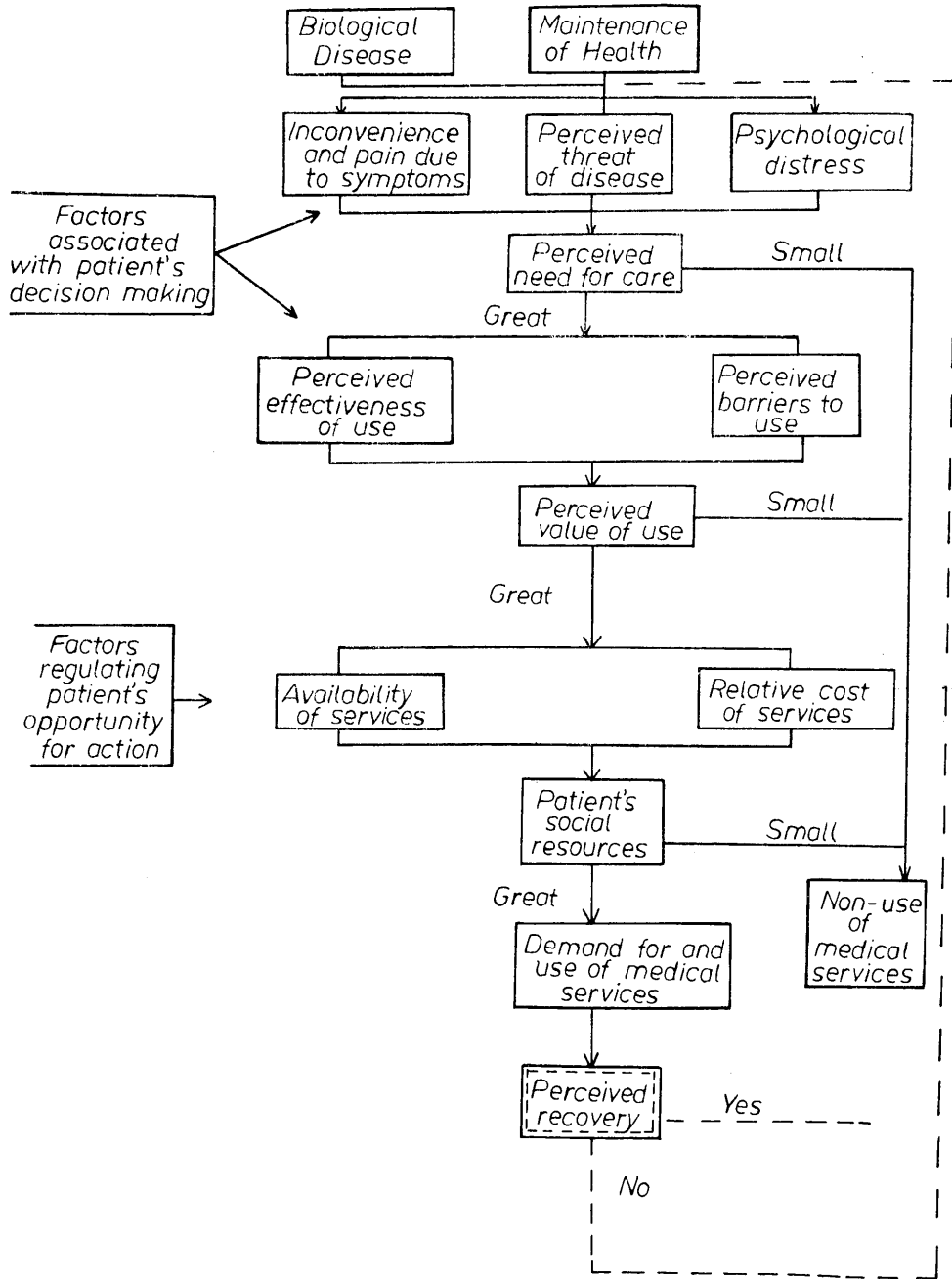


Fig. 1. Model of factors affecting medical care utilization

only in general terms and will not consider any specifications resulting from differences in political, social or economic systems. It seems that such a general overall system approach is fully justified because of the basic similarities in the health care field all over the civilized world. In the Introductory Note, we find three problems associated with the utilization of health care: namely, the need for health care, the decision to seek health care, and the use of health care. All three are supposed to be shaped by different factors.¹ Drawing from Kalimo (1969), Figure 1 gives the graphical illustration of the processes involved. To this Figure the following comment in the *Introductory Note* has been given:

"The perception of need for care is assumed to be stimulated by the occurrence of disease or by perception of the risk of disease. The perceived value of the use of medical services is considered to be based partly on beliefs concerning illnesses and the role of medical services in its cure or prevention, and partly on the barriers to their use as perceived by the patient (in particular, the inconvenience and financial losses entailed). Attitudes and beliefs concerning illness and medical services are of great significance as factors affecting the perception of the need for care and the value of use of medical care (so-called pre-disposing factors). The patient's social resources (so-called enabling factors) are divided into factors determined solely by society (above all, the availability services), and into factors related both to society and to the individual. These latter factors, such as the price of medical services and the income level of the patient, are primarily economic."

Certainly, both the figure and the comment are very interesting and should be viewed as serious attempts to shed light on the problem under consideration. But the figure is too complicated to grasp quickly, perhaps because it is too detailed. Therefore, let us present an alternative which is more general but is easier to comprehend (Figure 2).

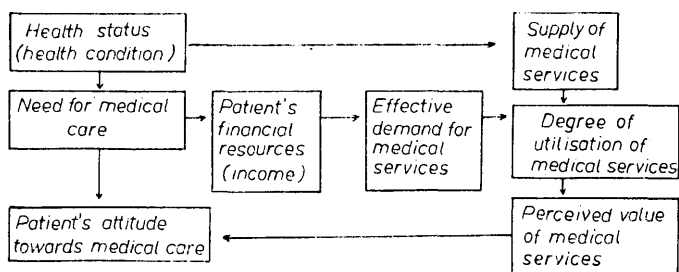


Fig. 2. Model of the health care utilization process

There should be no doubt that the starting point for the process of the utilization of health care is the health status of the people of a given

¹ *Introductory Note* by World Health Organization Secretariat, Geneva 1972, pp. 19—20.

society or community. Since this status can be expressed more or less accurately in well-known biological and physiological terms, it can be measured and expressed in an objective way. Therefore, let us consider the health status as a primary objective factor in the process, subject to change but measurable at any given time. The health status, or rather the existing deficiencies in it, generate the need for medical care. The term need combines an objective element with a subjective one. In our case, the need of a man for medical service depends not only upon his objective health condition, but also to some varying extent upon his feeling and reaction to the perceived and endured deficiencies. So in this stage of the process, not only the biological and physiological, but also the psychological and sometimes even sociological (followness "fashion" of some diseases, etc.) factors are involved. The need for medical care influences in some way the attitude of an individual (who becomes patient) towards the medical care which he receives. But the need for it is only one factor influencing the individual's (patient's) attitude about medical care. Another, and probably more important factor, is the perceived value of medical services which are offered to him and are used by him. In other words, the behaviour of an individual towards medical care partially depends upon the need for such care (e.g. its intensity, direction, etc.) but to a greater extent upon his evaluation of the medical services needed by him and available to him.

Up to this point all the factors considered were of non-economic nature. But in contemporary society, health services² are submitted in one form or another to market processes, that is, they are subject to the laws of supply and demand and they have prices, although not necessarily reflecting their real values. This last statement refers particularly to societies organized and developing according to Socialist principles, where health services are part of social benefits and, therefore, offered to the people with no charge or at prices below the real value. Anyway, no matter what the social and political circumstances, income and financial resources of the people are considered as *par excellence* economic factors complementary to their needs for medical care. These factors, however, may be of varying importance depending upon the political and social system of a society or a community. Nevertheless, the need for medical care plus economic factors form an effective demand for health services, which seems to be one of the two decisive factors contributing to the utilization of medical services.

² Although many of the authors use the term "medical" to refer to a physician only and the term "health" to describe all types of care, in this paper we are using both terms interchangeably.

Another factor is undoubtedly the supply of medical services. This term covers not only the quantity, kind, and quality of medical services, but also their economic feasibility (prices of services) and physical accessibility to the patients (distances, transportation facilities, office hours, etc.). Thus, the degree of utilization of medical services is finally dependent upon two basic factors: the supply of medical services coming from different input resources and the effective demand for medical services whose primary source is health conditions of the people, which generate their needs for medical services supported economically by their financial resources. However, if we confine our analysis only to the above statements, we will overlook the dynamics of the process under consideration. In fact, the patients utilizing the available health services are not passive, they react in a given way to these services. Their reactions include the evaluation of the medical services and their attitudes about medical care. We can say that their attitudes depend mainly upon the perceived value of medical services. Of course, we have to assume that, over time, there are changes in their evaluations and attitudes. These changes are a function of two basic factors in our process; namely, the health status of the population, and the supply of medical services given to them.³ But these two basic factors are also subjects of change over time. Now, if we continue to look at the dynamics of the process, we are facing the questions: what are these changes and where do they come from? The answers lead to input-output analysis which is the second problem under consideration.

INPUT-OUTPUT ANALYSIS

Input-output analysis, originally developed by Vassily Leontief as a means of studying the functioning of an overall economy, provides an approach for analysing interrelationships in large, complex systems. To date, input-output analysis has been used to relate the production and distribution of products throughout an economy. The output of each industry is traced in detail through intermediate states to its final destination. Similarly, the source of raw materials and components as inputs to a given industry are also traced in considerable detail. When arrayed in a large matrix, and given the coefficients which relate the industries directly and indirectly, a change in demand for the finished goods of

³ To narrow necessarily the scope of our analysis we have to drop the question of what could be the impact of changes in the financial resources of the people converted for the purchase of medical services. For a more sophisticated analysis of the total utilization of personal health and medical services by the population of a community or region see: Rita Zemach: *A Model of Health-Service Utilization and Recourse Allocation*, Michigan State University, East Lansing, Michigan 1969.

a particular industry can be traced throughout the system. The technique of input-output analysis has been described ⁴ as follows:

"From the mathematical point of view, it is a variation of linear programming which provides a quantitative framework for the description of an entire economy. Basis to input-output analysis is a unique set of input-output ratios for each production and distribution process. For example, the inputs of coal, ore, limestone, electric power, etc., all enter in the production of pig iron in fixed ratios. Thus, if the ratios of inputs per unit of output are known for all production processes and if the total production of each end product of the economy — or of that section being studied — is known, it is possible to compute precisely the production levels required at every intermediate stage to supply the total sum of end products. Further, it is possible to determine the effect at every point in the production process of a specified change in the volume and mix of end products."

The development of useful matrices for input-output analysis is a laborious and time consuming task. However, as is often the case in developing models of large, complex systems, the process itself can be extremely valuable in understanding the overall system and the interrelationships among its parts.

This short explanation of the nature of input-output analysis and of its techniques is very useful for our discussion. Of course, it is not our purpose to locate the health care field in an overall system of a national economy or to trace the functioning of the health care as a subsystem interconnected and interrelated to other parts of the national economy. This is the task of another Seminar topic dealing with the macroeconomic aspects of health care. What we are interested in is using input-output relations to look at the health care field as a system and to identify the interconnections and interrelations among its basic parts. If we consider this field in a given society or community as a dynamic system, or in other words, if we apply a system concept to the process of health care, then the first question which we have to deal with is what are the inputs and outputs of this system (process)? Let us return to our last figure (Fig. 2). While analysing it, we came to the conclusion that the two primary factors influencing and determining the degree of the utilization of medical services are the health status of the population and the supply of medical services. If we now turn to the input-output concept we can see very easily that the same factors are also of primary importance. The supply of medical services represents inputs, and the health status of the population represents outputs. Let us explain this in a more detailed way.

There is an old principle in economics which says that any production process showing some material results requires material resources. Classical economics speaks of three basic kinds of production resources (pro-

⁴ Franklin A. Lindsey: *New Techniques for Management Decision Making*, McGraw-Hill Book Company, New York, 1958, p. 6.

ductive factors as they used to call them): labour, capital and land. In contemporary economics, as well as in modern management theory, the distinction of human and material resources is more common. Now we can draw a parallel and say that the use of resources is necessary not only to produce any material goods but also to produce services. It would be enough at this point to refer to the production of such services as transportation, communication, education, etc. The medical services are not an exception.

To be available to the potential user, the medical services have to be generated from a specific production process. The characteristic feature of this process is the use of relatively highly qualified human resources and of relatively highly specialized technical equipment. Perhaps in no other kind of services is the combination and integration of highly qualified personnel and highly specialized equipment of such crucial importance as in the health field. This importance is determined by the subject: human health and human life. Among the human resources, we should distinguish between those with higher qualification (physicians in different fields of specialization and with different degrees of specialization) and these with lower qualifications (auxiliary medical personnel). The efforts of both are organized differently but, for the time being, it is not our concern what organizational forms there are, nor in which ways they can be measured.⁵ All that we are interested in right now is to identify the inputs necessary to have health care physically and economically available.

Among the material resources which are inputs to the health production process, we should distinguish between medical facilities with different kinds, sizes and degrees of technical development and sophistication. These resources embody the technical progress made in the course of time in the field of medicine. In the process of producing health care, these resources are used in a physical and economic sense, that is, they lose gradually both their utility (understood in terms of satisfying the human needs) and their value (understood in terms of money). The effort of human resources put into producing the medical services and the use of material resources within the same production process constitute what we call the supply of medical services. Thus, we can say that the supply of medical services is determined by the inputs of resources necessary to produce the medical services.

If we speak about the input-output relations, there is an implicit suggestion about a possible interdependence of these two elements; name-

⁵ For the economic characteristics of the health care process see: A. Griffiths: *Economic Evaluation in the Health Services*, „Ann. Soc. belge. Med. trop.”, 1972.

ly, that the input and the output are two sides of a given production process and that they influence each other in a given way. While the dependence of the output upon the input seems to be quite a logical one (the more and better resources put into a process, the more and better the results should be) the opposite dependence does not seem quite so convincible. However, if we admit the repeatedness of a given production process, we can easily understand the dependence of inputs in a given time period upon outputs in a past period. The interdependence of inputs and outputs is true also for the production process of medical services. However, there appear to be some complications in understanding the input-output relations connected with the output of the health care process. Let us turn to this problem.

We stated very generally that health status is an output of the health care process, that is, of a process in which medical services are implemented and consumed. To this very general statement some additional explanation is needed. First, we mean health status not as an abstract, but as the specific health conditions of those people who have been or still are users of medical services. Hence, the output of the health care process can be expressed by the number of people being medically treated. Second, regardless of the number of patients treated and the number and quality of health services given to them, we are always facing some biological forces and processes predetermined by the nature. For example, let us take mortality rates including accidental deaths. They can never be completely eliminated and for that reason they have to be included in the output of any health care system. The health care can also deliver results which do not mean necessarily the health improvement, for instance, all kinds of health protection and health maintenance (preventive health care). In other words, the output of the health care process can be not only positive (protection and maintenance of good health and improvement of health) but also negative, like the deterioration of health being cured and death. But if we classify the output of the health care process into positive and negative ones, we immediately face additional problems, for example: what time period should be used for a proper evaluation of the output of the health care process and what kind of evaluation should be made (by whom and in what terms)? We know from practical experience that, in some cases, medical services given to a patient yield, in the short run, positive results both in objective (improvement of his health) and subjective (his better "feeling") terms, whereas in longer periods they are not able to prevent the deterioration of his health condition and, finally, perhaps his death. Now the question arises, what is the true output of medical services applied to the patient's cure? Also, medical practice reports cases in which medical treatment had positive

psychological effects on a patient while, in objective terms, it resulted in the gradual deterioration of his health and finally in his death. Again, the question arises, what in fact was the output of the health care process? This will follow later in this paper. All that we are concerned with right now is to demonstrate the complexity of the output problem in the area of health care. Now let us return to the main topic of this chapter.⁶

If we speak about the input-output relations related to the area of health care, we would like to suggest that there is some kind of interdependence between the two elements in the health care process. Certainly, we would be right in saying that the health conditions of the people (in a given area and in a given time period) depend upon the medical services supplied to them (the number of services, their level of specialization and technical equipment, their quality, and so forth). Also, we would be right in saying (although perhaps with somewhat less conviction than in the former case), that the supply of medical services (in a given time period and in a given area) depends upon the health conditions of the people. It would be enough, at this point, to refer to many practical examples of changes or even to the creation of new medical services in order to meet needs of the people. However, it is more difficult to determine whether the larger and better the quantities of health care supplied to a given number of people over a given time period, the better their health status, or the worse their health status over a given time period, the more and better the health care supplied to them. Such ascertainment may not always prove true because of the complexities in the very nature of input-output relations as shown in our last figure and discussed above.

Until this time, we have been dealing with the input-output process of health care as expressed in real values (number and qualifications of medical and auxiliary personnel, number and quality of medical facilities, health conditions of patients). Now, if we would like to express these two basic elements in monetary units, we would have no special difficulties as far as input items are concerned because it is usually possible to express input items in monetary terms. However, something different happens when we try to express the output of the health care process in monetary terms. How should we express in money the value of the health conditions of the population? Although they can be measured in some objective medical terms, they cannot be measured in money, at least not directly. It is possible to measure them indirectly through the expenses incurred by people on improving or maintaining their health. The

⁶ For some other concepts about the output of the health care process see: David D. Dunlop: *The Development of an Output Concept for Analysis of Curative Health Services*, „Social Sciences and Medicine”, 1972, vol. 6, pp. 373—385.

trouble is, however, that not all medical services are paid for by the patients. Depending upon the existing social and political system, some of them are supplied without any charge, and others are financed by the social security institutions. In addition, in certain instances, the patients are paying the much lower prices than their real values. For these reasons the patients' expenses cannot be regarded as a proper measure of the money value of the medical services supplied to them. But a far more important obstacle is that, even if we take all the expenses in a given period of time for purchasing or financing the supply of the medical services, we express the output of the health care process in terms and values of its input. This makes any rational calculation impossible.

The problem discussed above is not a new one. The same difficulties appear when we attempt to measure and express in monetary terms the input and output of all services, satisfying the human needs; in other words, when we try to compare the objective values to the subjective ones in order to carry out a rational calculation. There is a rich literature concerning the input-output ratios in such areas of human activities as marketing and transportation. Health care, for many reasons (some of them have been already mentioned above), especially because it is so closely related to the very substance of human nature, offers an interesting field for investigation. We will investigate this field in the following parts of the paper. But for the time being, let us return to our last scheme. While simplifying it, let us explore it through input-output relations.

As can be seen in Figure 3, we consider health care under a dynamic approach as a functioning system (a process) divided into three main

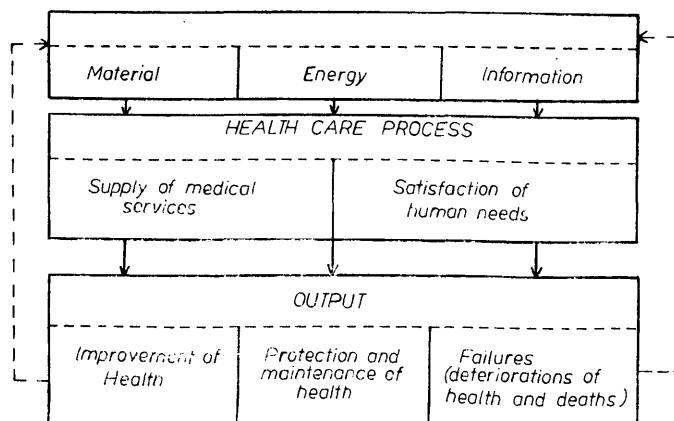


Fig. 3. Model of the input-output system of health care

phases: input, processing and output. Among the input, we differentiate three basic elements according to the concept of any system: material, energy and information.

Material represents all the facilities, kinds of medicines and other physical and chemical means used in health services over a given period of time. Energy represents all the different human resources (medical and auxiliary personnel) necessary to provide health services, and the other kinds of energy used in medical installations, like electric power, water power, fuel etc. Information represents all the knowledge which helps to apply both human and material resources for the sake of health care.

The three elements together contribute to the supply of medical services in a given region, time period and to a given group of people. The application of medical services to the satisfaction of human needs constitutes the health care process, that is, the processing phase of the system. The health care process ends with some results closely related to the health of the people under treatment. These results constitute the output of the processing phase. Among the output of the system, we distinguish between positive results (both in objective and in subjective terms) expressed in the improvement or in the maintenance of the health of the people and negative results (only in objective terms) expressed in the worsening of the health of the people, possibly death. The negative results are considered as failures of the health care process (of the system functioning). Of course, as in every system in a steady process of functioning, the output produced by the system in a given time period serves as a starting point of the input in the following period of time. This also has been shown in our scheme.

After this summary, let us turn back to the measurement problems which we encountered while discussing the input-output relations in the health care process. Let us analyse, in a more detailed way, some questions closely related to these problems.

PRODUCTIVITY AND EFFICIENCY

Productivity is concerned with the question of how much output can be obtained from a unit of input. Immediately one can ask what should be considered as a unit of input in the field of health care. We treated input as a set of heterogenous factors combined together in order to produce health care. How do we go from this combination of different factors to a homogenous unit of input? The answer does not seem to be too difficult. There is no doubt that among the different input factors

the physician is the most important. He may be equipped with more or less facilities, he may use better or worse medical tools, he may be assisted by more or less auxiliary personnel, but still his personal knowledge, training, and experience are decisive factors in any true medical service. Such a well-educated, well-trained, well-experienced physician is still the very scarce resource in the field of health care. For these reasons, it is reasonable to admit as a standardized unit of input of the health care process the average productivity of the physician employed in this process. There remains, of course, the question by which methods does he combine his energy and effort with other input factors to produce a given type of medical service. The methods used by him define production function. But at this point we are not concerned with his production function. It is enough to call attention to the fact that, assuming a constant state of technology in the medical services process (which is a very abstract assumption, indeed) we may expect to find physicians producing at different rates, even within health care organization of similar sizes and specialities. This is due to a number of reasons, for instance: method of work may vary, quality of education may differ, assistants may not be similarly trained, office layout may or may not be conducive to an orderly work flow, information flow may be organized in different ways, etc.

As it has been stated in the Introductory Note, with an improvement in one or any of these factors, average productivity may increase, either because a given physician is moving closer to his optimal production or because a general technological advance has become available.⁷ In the latter case, the assumption of a constant state of technology has to be withdrawn. Now we can turn back to our question and ask what would be a standardized unit of input in the health care system? Our first and very general answer to this question is that this should be a unit of work put in by a physician into producing medical services. But such an answer cannot be satisfactory since we are concerned with the problem of productivity, which can be expressed in the ratio: $\frac{\text{Output}}{\text{Input}}$ which means that to solve the problem we have to measure both output and input and to compare them. Thus, going over to the health care process, our real problem is not an input of a physician but his productivity. In order to solve this problem, we have to measure the work productivity of a physician and the measure necessarily must include input and output. In

⁷ For a more detailed discussion on the increasing productivity of an average physician, see Rashi Fein: *The Doctor Shortage — An Economic Diagnosis*, Washington, The Brookings Institution.

measuring both elements we are facing some difficulties. Let us discuss them briefly. As far as input is concerned, the most appropriate way would be to express it in units of time spent by a physician in producing medical services. Then we could measure it in working weeks, week-days, or what would seem the most practical way — in working hours — which would include both office and hospital hours and house call hours. However, there are two major objections to using such input measures. First, not all of the working time of a physician is spent directly on producing medical services. There are strong indications based on empirical investigations that, in recent years, much working time of an average physician is being spent on unproductive activities, only indirectly connected with the production of medical services. The problem deserves separate attention and discussion. The second objection is that time measures say nothing, or very little, about the use of other input factors in the health care process like medical facilities and equipment, or the assistance of auxiliary personnel. It should be recalled once again that the input of the health care system is a combination and intergation of different factors (of which the physician is the most important one), and that all the others through their numbers, qualities and accessibilities can influence the input of the physician to a varying degree. All the objections seem to be unavoidable if the work input of a physician is being chosen as a representative one for all the input of the health care process and if it is measured in units of working time. But we must admit that this approach does not provide us with a precise tool of analysis.

Now let us turn to the second element of the productivity ratio. If we analyse the output of the physician and if we discuss the problem of its measurement we are facing even greater difficulties than in the case of input. Let us begin with the remark that the output measures which have been used most frequently by health economists include office visits, hospital visits and house calls. But the adequacy of these output measures has been questioned and still is being questioned by many specialists. Some of them argue that no output measure is satisfactory unless it includes an indication of the impact of the medical service on the patient's health, or at least an estimation of the impact on the patient. Others believe that some specific evaluation of the quality of medical service is necessary and that this should be done by health professionals in order to meet certain input standards. Still others want to look at an incident of illness, to measure all the inputs received by the patient in the course of the treatment and to count the recovery from the illness as the final output. It should be noted that the customary output measures focus upon what the physician produces and not upon the effects of his produc-

tion.⁸ We should be very critical at this point. Let us recall what we have said previously about the output of the health care system in general. We have considered the health status of the people as the output of the system, and, more specifically, positive results of the health care process (maintenance, improvement, recovery) as well as negative ones (worsening, disabilities, deaths). The same must be true for the output of a physician. His output is the health status of his patients as a result of his treatment, that is, of medical services produced by him and received by them. It is true, as some want to argue, that the physician does not produce health in a sense that he cannot give to anybody the beginning of his health, but he does produce health in the meaning that he is able to preserve it, to improve it, to recover it. Unfortunately, he can also have a negative effect on human health, that is, damage or destroy it. Another problem is how to measure the output of a physician in such an understanding of the term. There is no doubt that we have some objective medical parameters to measure the health status of a man. In other words, we are able to measure objectively the patient's health status and all the changes occurring in it during a given period of time. But this kind of measurement has two deficiencies. First, it does not include all the psychological reactions of the patients to medical treatment. These reactions are an important factor in the evaluation of health status and its change after medical services have been received. Second, and a still greater deficiency, there is no way of putting together all of these medical parameters and expressing them in a homogenous measurement unit (such as time units in measurement of input). Because of these deficiencies the above approach to the output of a physician's work, although theoretically quite a correct one, does not represent a practical solution to the problem of measuring the physician's productivity.

Simply, there is no way of comparing two basic variables and of defining the input—output ratio, i.e. the productivity ratio. R. M. Bailey sees the problem in another way: for certain analytical purposes, it may be quite legitimate to attempt to measure the success of medical services in restoring the patient's health. Such analyses inevitably evaluate the final product of the medical firm in terms of its ability to contribute to consumer utility. But for the purpose of applying positive economic analysis to the medical services production process, it is inappropriate to muddy the waters with so many variables and relationships that the meaningful factors cannot be identified and isolated... We assume that the patient purchases services from the physician with some expecta-

⁸ Richard M. Bailey: *Economies of Scale in Medical Practice* [in:] *Empirical Studies in Health Economics*, Herbert E. Klarman, (ed). The Johns Hopkins Press, 1970, p. 258.

tion that these services will improve his health, but the physician does not produce health. His output is largely considered to be office visits. Thus measures of average physician productivity are defined as output of office visits: input, of physician man hours.⁹

R. M. Bailey seems to overlook that, even if we assume that the output of a physician (or of a medical firm) are office visits or any other type of visits, the only thing which we can learn from the productivity ratio is how many people (patients) have been treated by a physician (a medical firm) during a given time unit, e.g. one hour. In reality, by using this method of defining the productivity ratio we are comparing almost the same elements, because both the number of visits and the time being spent on treating the patients can be regarded as the input in the health care process. This cannot be considered as a basic solution to our problem. The only thing which remains is to agree that there is no one satisfactory solution to the problem. Instead, one must differentiate between the output of the health care used in a pure economic analysis for instance, to accounting purposes (let us call it economic output) and the output of health care used to a social analysis (let us call it social output). The first one can be limited to measurable terms, e.g. office visits, hospital visits, house calls and — provided both input and output are expressed in comparable terms — can serve to define the productivity (ratio) of the health care. The second one must take into account the impact of health care on the patient's health, expressed in objective terms, and his psychological reaction to the medical treatment (his feelings coming from meeting his needs for medical services). In the latter case, the input and output cannot be expressed in comparable terms, and, therefore, the productivity (ratio) of the health care system cannot be strictly defined.

Let us go now to the problem of efficiency¹⁰ in the field of health care. Generally, efficiency can be regarded as a development of the productivity concept. For many years, efficiency was considered as a general economic principle best expressed by saying: "Achieve the most output as you can with the least input", or expressing the same thing in somewhat different words, "maximize results at the lowest costs". But in recent decades, the concept of efficiency in economics has assumed a more elaborate and logical foundation. At the present, efficiency is understood alternatively as:

⁹ *Ibid.*

¹⁰ For a broader discussion of efficiency principles within the health care process, see: *The Efficiency of Medical Care, Report on a Symposium, Regional Office for Europe WHO, Copenhagen 1967*, and also: B. M. Kleczkowski: *Methods of Assessing the Efficiency of Medical Care, Symposium on the Efficiency of Medical Care, Brussels 1972*.

1) The achievement of a maximum output from a given input of resources (the so-called principle of increasing productivity);

2) The achievement of a given output with a minimum input of resources (the so-called principle of saving input).

Both alternative formulations have equal value in application to the practice. As one can see, the concept of efficiency is a more dynamic approach to the concept of productivity. The principle of efficiency shows the ways of dealing with input-output relation for a longer period of time and within a given set of activities. Although the principles can be used to determine the most valuable and easiest solutions in the field of economy, they can also be followed in and applied successfully to other areas of human activities. Let us briefly discuss ways to follow and implement them in the health care process.

Applying the principle of increasing productivity to the health care process would mean more and more positive results and less and less negative results for a given input. More specifically, this would mean more and more cases of preservation from illnesses, improvements of health, complete or partial recoveries from illnesses and disabilities, and less and less cases of worsening health, disabilities and deaths, all this without increasing the input of resources in the supply side of the market. The application of this principle to the health care process requires the mobilization of reserves hidden in the input of resources, a better, more productive use of medical facilities and equipment, human energy and working time, information, etc. without any increase in input. We know from practical experience that this is a very promising way of achieving greater efficiency in any health care system. It should be noted, however, that this method has definite limits in terms of negative results, which cannot be completely eliminated from the health care process. This means that even the optimal state of efficiency must include a certain number of deaths and disabilities.

The principle of saving input can also be incorporated in the health care process. The principle is directed against the waste of material, energy, and information in supplying health care. We know from practical experience that much can be done in this respect in any care system. While decreasing inputs, it is sufficient to keep the output of a given health care system the same and still be in accord with the principle. However, this method involved in the application to the health care process has also certain limitations. They are determined by the quality of health care supplied to the patients. The output of the health care process may remain the same in objectively measurable terms but patient dissatisfaction may appear because of a perceived worsening of quality of health services resulting from a decrease in the input resources. This is one

of the reasons why earlier we insisted so strongly on including into the output of the health care process the reactions of the patients to the health care supplied to them which, to a great extent, depend upon the quality of the care received. Let us now consider other economic aspects of the health care process.

EFFECTIVENESS AND BENEFITS

Whereas efficiency deals with input-output relations in the broad meaning of the term, effectiveness deals with the relation between the performance and the end objectives of a given activity (program, project or process). Let us explain this more specifically. Any organized human activity is directed toward the achievement of an objective or set of objectives. The objectives of human activities can be expressed in different terms, for instance, in units of output (material products) or only in descriptive terms (services, situations and cases). No matter in what terms the objective is (are) expressed, the decisive factors for effectiveness are: first, awareness of the purpose of a given activity (what should be achieved at the end of this activity), and, second, knowledge of where the activity is in relation to the objective in any period of time. Thus, effectiveness can be defined as a kind of measure of performance related to a given objective. In other words, the effectiveness of a given activity is defined by the degree to which an end objective is being achieved at a given time. This means that the effectiveness of a given activity depends directly upon the nature of an objective and the way in which this objective is formulated. To define the effectiveness of a given activity, it is absolutely necessary to have the end objective formulated in such a way that it can be clearly understood and that the process of its achievement can be located in time in order to be able to define the sequential phases of its performance. If an objective meets these conditions, the effectiveness of the activity leading to the achievement of the objective can be defined at any time of its performance. As we see, the effectiveness of an activity can be graduated — at the beginning of a goal oriented activity its effectiveness may be low — then it is increasing as it approaches the end objective. Thus, we may say that, soon after the beginning of a goal-oriented activity, the activity is not very effective, but as it approaches the end objective, it is more and more effective, and after the achievement of the end objective, the activity can be described as fully effective. Or, we may describe the effectiveness of an activity in terms of the percentage of effectiveness. The graduation of the effectiveness enables us not only to define a given activity in terms of it approaching and

achieving the end objective, but also to compare different activities to each other in the same terms. Owing to these advantages, effectiveness becomes a very valuable tool in evaluating the performance of different kinds of goal-oriented human activities, provided they are clearly defined and there are properly formulated end objectives for each of them.

There is a problem in determining when and how to use this valuable tool. Although we tried to explain effectiveness in a way as simple as possible, we should be aware of the fact that there is no basis to apply this concept to a short-run activity with a simple end objective, and a simple organizational structure. But, when human activities have a set of end objectives difficult to achieve, when they become long-run and when they increase in size and complexity, their effectiveness becomes more and more important. Its application is facilitated when a complex end objective can be subdivided and located in time. Then the whole activity can be divided into phases oriented towards the achievement of partial objectives. In this way, performance can be easily followed and checked as to its effectiveness. In the past two decades, many sophisticated techniques have been developed to support the managerial functions of planning, organizing and controlling a complex set of activities. From the point of view of our discussion, the most interesting seem to be different methods of network analysis. With their help, one can follow the performance of partial activities and the achievement of partial objectives within the whole of a highly structured undertaking (progress, program, or project).

There is no question that the effectiveness (control of approaching end objective) is one of the basic theoretical concepts underlying these managerial techniques. The health care process (system), like many other fields of organized activities, is subject to the practical application of the concept of effectiveness.

First, effectiveness may prove useful in evaluating the daily activities of a physician or of a group of medical and paramedical (auxiliary) personnel in their attempt to achieve routine end objectives, provided these objectives are clearly defined and there is a sufficiently structured and long-run set of activities related to each of the objectives. Second, effectiveness may be especially successful when applied to one time undertakings such as very complicated medical operation (with their usually broad and deep division of work among different specialists and assistants and with the whole set of partial activities each depending upon the other and all closely integrated and oriented towards the end objective). In such cases, effectiveness becomes an important tool in controlling the performance of the undertaking in question. Third, effectiveness can be most successfully implemented in the health care field in planning, organizing

and controlling big projects or programs with complex sets of end objectives.

Again, here the effectiveness can prove to be a most valuable tool in controlling the functioning and performance of a very complex system. In all the kinds of situation, the effectiveness of any activity can be estimated either during its performance (to control the degree of approaching an end objective) or after it has been finished (to control the degree in which an end objective has been achieved). Let us now turn to the second concept which we are treating in this subchapter — benefits.

In the *Introductory Note*¹¹, benefits were defined as an advantageous state or condition, avoidance of costs, expenditures or losses. In addition, a few examples and four classes of benefits in the field of health economics were presented. It is true that in every day understanding benefits means approximately the same as advantage and that, speaking about a beneficial action or activity, we mean in every day language an advantageous action or activity. In our discussion of benefits, however, we would like to admit praxiological point of view and in this way broaden the understanding of the term. In praxiology¹² the benefits are considered to be a supplement to effectiveness. To gain benefits in an action (activity) means alternatively: (1) to achieve positive (favourable) results beyond the scheduled end objectives, that is, ones which have not been foreseen or planned but have been achieved, and which have increased benefits related to the end objectives; (2) to avoid or decrease the unforeseen and unplanned negative (unfavourable) results which might have occurred during the performance of an action (activity); (3) to avoid or decrease the input (costs) which have been foreseen and planned and which always represent the necessary "losses" (i.e. negative results).

The final benefits from a given action result from offsetting the positive and negative results, including those related to the achievement or non-achievement of the planned end objectives and those related to input expenditures. Thus, in the final evaluation, a given activity (undertaking, project or program) can be judged effective with no result in benefits because the negative results outweighed the positive results, including the achievement of the predicted end objectives. And vice versa, a given

¹¹ *Introductory Note* by WHO Secretariat, Geneva 1972, p. 21.

¹² Praxiology is a behavioural science which deals with principles of a rational human action. The name comes from two ancient Greek words, *prakse* and *logos*. The beginnings of the praxiological ideas can be found already in masterpieces of the ancient great thinkers and writers. The most contemporary elaborated presentation of praxiological principles has been given by a very distinguished Polish scholar in philosophy and logics, Tadeusz Kotarbiński, in his excellent book *Traktat o dobrej robocie (Treatise on Good Work)*, Ossolineum, Warszawa 1968, (IV edition).

activity (project, program or undertaking) can be judged ineffective because it failed to achieve the planned end objectives, but nevertheless shows benefits, because ultimately all the positive results have outweighed the negative results (including losses related to the failure to achieve the end objectives). So we can conclude that all human activities which may provide unforeseen and unscheduled results, both positive (favourable) and negative (unfavourable), may or may not yield benefits. But, even activities which have no unpredictable results can be judged in terms of benefits because, as we have said, both the achievement or non-achievement of end objectives and all the input expenditures can be evaluated in these terms. All that we have said about benefits applies to the health care process. Moreover, it seems that this process provides us with many interesting examples of the application of benefits.

Let us take the medical treatment process of a patient. How many times during this process do some unexpected results arise which might be estimated either positively or negatively depending upon their impact upon the patient's health status? And how many times during a medical operation are some discoveries made which were not known before and which might have influenced the whole medical treatment of the patient? Then, there is the problem of how to evaluate a medical treatment in cases where there is a partial recovery of health but some other disease develops because of the care received, or in the case of failures (disabilities, deaths), despite very expensive inputs brought in by the patient and/or by the social medical service? And again the problem, what sort of an estimation deserve large preventive (and very costly) actions undertaken by the health care service to protect the population against very severe illnesses? Or how to estimate from the medical point of view the health care treatment resulting in a better psychological feeling without any improvement in the patient's condition?

These are only a few examples of cases and problems in which the praxiological concept of benefits can be used successfully in the area of the health care system. We see that this concept can be judged a supplement to the concept of effectiveness and that it contributes to a better understanding and evaluation of health care activities.

QUALITY

At the end of the paper a few words should be said about the problem of quality in the health care process. To be consequent in discussing this problem, we should refer to our distinction of the three main categories of inputs in the health care system because the quality of health care is

directly related to inputs. Therefore, we have to differentiate between the quality of the material, energy and the information. The quality of material means the quality of all the medical facilities, medical equipment (machines, instruments) and of all the medicines used in the health care process. In recent years, there has been a tremendous technical progress in this area, thanks to the achievements in the fields of architecture, engineering, chemistry, biology etc. Medical services given to people today are more and more differentiated in the quality of materials used in this process. The quality of energy means the quality of human resources, that is, of the medical and auxiliary personnel. It is closely related to their technical qualifications, professional education and specialization, and also to their approach to the profession and their motivation in performing their tasks and jobs. It seems that health care systems throughout the world are facing a mounting problem of a reduction in the quality of human resources of the younger generation due mostly to their lack of high motivation to the profession. Of course, in this category of quality other kinds of energy are also involved. The quality of information means the quality of medical knowledge (in the broad meaning of the word) which is applied to and used in the health care process.

Tremendous progress has been made in recent years and is steadily being made in this area, thanks to more and more discoveries and advances as well as to richer and richer empirical experiences in the medical and related fields. But it seems that this quickly growing knowledge is not satisfactorily accompanied by the widespread practical use for the sake of human health.

These are just a few problems of quality of medical services related to the classification of inputs in the health care process. There is another problem of quality measurement in the health care systems. This problem was presented briefly in the *Introductory Note* prepared for the Seminar.¹³ It should be stressed that any measurement of quality in the health care field must have its framework of reference, that is, it must rest on a conceptual and operationalized definition of what the "quality of medical care" means. But this term is not at all easy to define. Many attempts of exploring the problem are known from the literature. Perhaps the best known, almost classical one, is that offered by Lee and Jones in the form of "eight articles of faith" based on the concept of "good medical care".¹⁴ Some of these articles can be viewed as attributes or properties of the health care process, and others as goals or objectives

¹³ *Introductory Note*, pp. 22—23.

¹⁴ R. I. Lee and L. W. Jones: *The Fundamentals of Good Medical Care*, Publications of the Committee on the Costs of Medical Care, No. 22, Chicago 1933.

of that process. None of them constitute a determination of goodness of medical care in any particular situation. They do, however, identify what might be called dimensions or criteria of quality of health care.¹⁵ If one looks at these articles, one gains the impression that the dimensions or criteria expressed by them are nothing more than value judgements applied to the medical care process. They are a system of requirements which means that an evaluation concerning quality of health care in any particular situation is not complete unless judgements are made concerning each of these dimensions (criteria). The same is true for all the other indicators of the quality of health care elaborated as sets of variables, no matter in what variables they might be expressed.¹⁶ But, ordinarily, such indicators are a reflection of values and goals existing in a given health care system and in the larger society of which it is a part.

STRESZCZENIE

Artykuł składa się z pięciu części. W pierwszej omówione są, w płaszczyźnie wzajemnego oddziaływania, następujące modelowe czynniki funkcjonowania służby zdrowia w dowolnym systemie społeczno-ekonomicznym: stan zdrowia danej zbiorowości, zapotrzebowanie na usługi służby zdrowia, dochody i zasoby finansowe potencjalnych pacjentów, popyt efektywny na usługi medyczne, podaż usług służby zdrowia, stopień wykorzystania tych usług w danym systemie społecznym, ocena jakości i zakresu tych usług przez zbiorowość systemu, stosunek pacjentów do służby zdrowia.

W części drugiej do modelu z części pierwszej wprowadzono ujęcie dynamiczne, dzięki zastosowaniu analizy systemu służby zdrowia w kategoriach nakładów i efektów (*input-output*). Nakłady potraktowano z podziałem na materiały, energię (łącznie z zasobami ludzkimi) i informacje. Proces przetwarzania informacji i zasileń rozpatrywano jako podaż usług medycznych i zaspokajanie potrzeb ludzkich ochrony zdrowia i leczenia. Za efekty przyjęto poprawę stanu zdrowia ludzi, jego ochronę i podtrzymywanie, ale również pogorszenie i przypadki śmierci.

W części trzeciej omówiony został problem ekonomiczności służby zdrowia w szerokim rozumieniu. Za podstawową jednostkę nakładów przyjęta została wysokość wydajności pracy przeciętnego lekarza. Oprócz tego do nakładów włączono wydatki na urządzenia i narzędzia medyczne oraz na cały pomocniczy personel zatrudniony w służbie zdrowia. Uznano, po głębszym rozważeniu, że brak jest całkowicie zadowalającej, zobiektywizowanej i kompleksowej miary efektów działalności służby zdrowia i że wobec tego niemożliwe jest wyliczenie współczynnika ekonomiczności dla jakiegokolwiek (w jakiegokolwiek skali wielkości) systemu służby zdrowia.

¹⁵ Avenis Donabedian: *Promoting Quality through Evaluating the Process of Patient Care*, Medical Care. Vol. IV, No. 3, Appendix A, *Approaches to a Definition of the Quality of Patient Care*.

¹⁶ Avenis Donabedian: *op. cit.*, Appendix B, *Some Indicators of the Quality of Care*.

W części czwartej omówiony został problem skuteczności i korzystności działania służby zdrowia. Stwierdzono, że dla oceny funkcjonowania systemu służby zdrowia w jakiegokolwiek skali wielkości nie tylko teoretycznie, ale i praktycznie możliwe jest posługiwanie się kryterium stopnia realizacji określonego celu końcowego w danym czasie, jak również kryterium zaistnienia skutków ubocznych, nie przewidzianych, o charakterze pozytywnym lub negatywnym. Wobec tego możliwe jest praktyczne wykorzystywanie w służbie zdrowia prakseologicznych kategorii skuteczności i korzystności działania systemu.

Piąta część została poświęcona problemowi jakości w systemie służby zdrowia. Pojęcie jakości zostało odniesione do trzech wyróżnionych wcześniej składników nakładów: materiałów, energii, informacji. Podczas gdy w materiałach oraz informacjach obserwuje się stały postęp techniczny i technologiczny wpływający na podnoszenie jakości uzyskiwanych efektów, to w składniku energetycznym, a zwłaszcza wśród personelu lekarskiego i pomocniczego dają się zauważyć, obok wzrostu kwalifikacji specjalistycznych, oznaki pogarszania się jakości pracy. Wydaje się, że zjawisko to ma swe główne źródło w słabnącej motywacji pozytywnej, szczególnie wśród młodych pracowników służby zdrowia. Jest to niezmiernie istotny, ale jednocześnie złożony problem społeczny i organizacyjny.

РЕЗЮМЕ

Статья состоит из пяти частей. В первой части рассматриваются с точки зрения взаимного влияния следующие модельные факторы функционирования здравоохранения в любой общественно-экономической системе: состояние здоровья данной социальной совокупности, потребности в услугах здравоохранения, доходы и финансовое положение потенциальных пациентов, эффективный спрос на медицинские услуги, предложение услуг здравоохранением, степень использования этих услуг в данной социальной системе, отношение пациентов к здравоохранению.

Во второй части модель, приведенная в I части, приобретает динамический характер благодаря применению анализа системы здравоохранения в категориях затрат и эффектов (input-output). Затраты делятся на материалы, энергию (в том числе и человеческие ресурсы) и информацию. Процесс обработки информации и ее пополнение рассматривается как предложение медицинских услуг и удовлетворение человеческих потребностей в охране здоровья и лечении. Эффектами считаются как улучшение состояния здоровья, охрана здоровья и поддержание хорошего здоровья, так и ухудшение состояния здоровья и случаи смерти.

В третьей части анализируется широко понимаемая проблема экономичности здравоохранения. За единицу затрат была принята производительность труда среднего врача. Кроме того, в затраты были включены медицинские расходы на оборудование и инструменты, на весь вспомогательный персонал, занятый в здравоохранении. В результате размышлений автор приходит к выводу об отсутствии полностью удовлетворяющей, объективной и комплексной меры эффектов деятельности здравоохранения, что приводит к невозможности подсчета экономического коэффициента для любой (в любой шкале величины) системы здравоохранения.

Четвертая часть посвящена проблеме эффективности и выгодности деятельности здравоохранения. Констатируется, что для оценки функционирова-

ния системы здравоохранения в любой шкале величины не только теоретически, но и практически можно пользоваться критерием степени реализации определенной конечной цели в данное время, а также критерием возникновения непредвиденных побочных последствий положительного или отрицательного характера. Это дает возможность использовать в здравоохранении праксеологические категории эффективности и выгодности функционирования системы.

Пятая часть работы посвящена проблемам качества в системе здравоохранения. Понятие качества было применено по отношению к трем выделенным ранее компонентам затрат: материалам, энергии, информации. Если в категории материалов и информации мы наблюдаем постоянный рост технического и технологического прогресса, имеющий непосредственное влияние на улучшение качества получаемых результатов, то в энергетическом компоненте наблюдается вместе с улучшением квалификации признаки ухудшения качества работы, особенно среди врачей и вспомогательного персонала. Нам кажется, что это явление берет начало в ослаблении положительной мотивировки, особенно у молодых работников здравоохранения. Это необыкновенно важная, притом сложная общественная и организационная проблема.