

Defining, Measuring, and Assessing the Quality of Health Services

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RESEARCHERS attempting to measure the quality of health services have identified increasing complexities related to the provision of services, and some have asserted that these complexities preclude the establishment of a workable measure to assess quality. Complexities include, for example, the various organizations through which services are provided, the different schemes for financing such services, the broad spectrum of illness and injury which requires a range of responsive services, and the multiplicity of complementary, competitive, overlapping, or—in some instances redundant—governmental and nongovernmental activities related to planning the organization and delivery of health services.

This very complexity of health services compels the development of new methods to assess their quality. The key to the assessment is the identification of the impact of services on the health of the people served and comparison of actual impacts with desired impacts in accord with established goals. To examine this approach in detail, it is necessary to define both

health services and health. Health services are all personal health services performed by physicians, dentists, nurses, and all other health personnel in hospitals, offices, clinics, at home, or elsewhere to maintain or restore health. Health services are divided into two categories: (a) preventive services to maintain the health of the individual person and (b) curative or restorative services to return sick and injured people to health.

For this discussion, health is defined as the absence of illness, impairment, or injury. Although positive health and well-being are not measurable within the terms of this simplified definition, we maintain that the impact of health services can be measured in terms of the absence of illness or injury. The purpose of health services is to prevent or otherwise influence illness or injury.

In viewing assessment from the perspective of impact, it becomes apparent that the individual person is an appropriate focus for measurement. Health services exist only to affect the health of the individual, the paramount variable in the entire process and the common denominator in the ultimate calculations of the quality of health services.

The uniqueness of the individual is especially notable when multiple varying factors are examined. For example, health services are provided through various administrative and organizational arrangements and at facilities that vary from vast, expensive, and modern

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medical center complexes to outdated clinics with minimal equipment. Equipment ranges from inexpensive basic tools to complicated devices spawned by technological progress achieved through research. Scores of different types of health professionals and semiskilled workers deliver services. Financing and payment mechanisms used to purchase and reimburse for health services are diverse in nature, dissimilar in scope, and many in number. Yet, with all the variables to consider in the equation for ascertaining the quality of health services, the health of the individual, as the end target for all services, is the one constant.

Measurable impact of curative and restorative services may be that the individual either gets better or worse or that his health is unchanged. The impact of preventive health services may be demonstrated by whether he is afflicted by more or less illness or disabled by more or fewer injuries than his fair share, as assessed by historical precedence which shows, over time, the degree to which his population group is affected by various health threats.

Need for Measurement

Although the need to be able to measure the quality of health services may be evident to planners of the organization and delivery of health services, it seems appropriate to describe the major focus of that need. Current budgetary restrictions and the increasing demand for the best health care for all the people in our nation require new methods for measuring and assessing the impact of health services on the health of the people.

Planners and policymakers responsible for setting national health goals can establish realistic and appropriate goals only if they have the information that will permit assignment of priorities to programs on the basis of their impact on health. Program evaluations, long characterized by quantitative assessments tending to emphasize the statistical compilations of various program inputs (number of dollars, training programs, hospital beds, research grants, and the like), can more realistically measure progress toward goals if evaluators use outcome measures that show the quality and impact of health services.

The establishment of goals, assessment of accomplishment, and modification and re-establishment of goals require knowledge of the needs of the people, the extent that programs are responsive to those needs, and information about the impact of health services. Not only is this information required by health planners if they are to set appropriate goals and to measure progress, but it is desirable if health services are to be optimally arranged to respond to individual needs—an objective of intimate concern to the individual but one which he is unable, as an individual citizen, to control.

Present and anticipated costs of health services are the dollars-and-cents reason to identify the most economic ways of investing health care funds, as well as the common sense dictate to assure the most effective services for the money. In fiscal year 1967, a total of \$47.9 billion was spent for health and medical care in the United States, \$4.6 billion more than in 1966. In fiscal 1968, expenditures jumped to \$53.1 billion. The health services cost base continues to rise dramatically, with no indication of impending reversal or even leveling off.

Quality of Life, Health, or Services?

The multidimensional characteristics of health status (of individuals), health level (of the nation), and health services currently discussed at top planning levels in this country led us to attempt to distinguish between attributes that many feel comprise "quality of life" and attributes of "health level or status." Further, these are compared with the factors that make up "health services."

Paralleling our society's heightened emphasis on the rights of the individual is the health planners' and policymakers' broadened concern for the entire life style of the individual. Persons engaged in the health endeavor are purported to worry not only about the number but also about the quality of man's years. Attempts have been made to derive social indicators that include such characteristics of individual life style as educational and cultural achievement, employment, housing, and so forth, as well as health.

Figure 1 depicts various dimensions and relevant factors if one seeks to measure or even define the quality of life. Choosing but one seg-

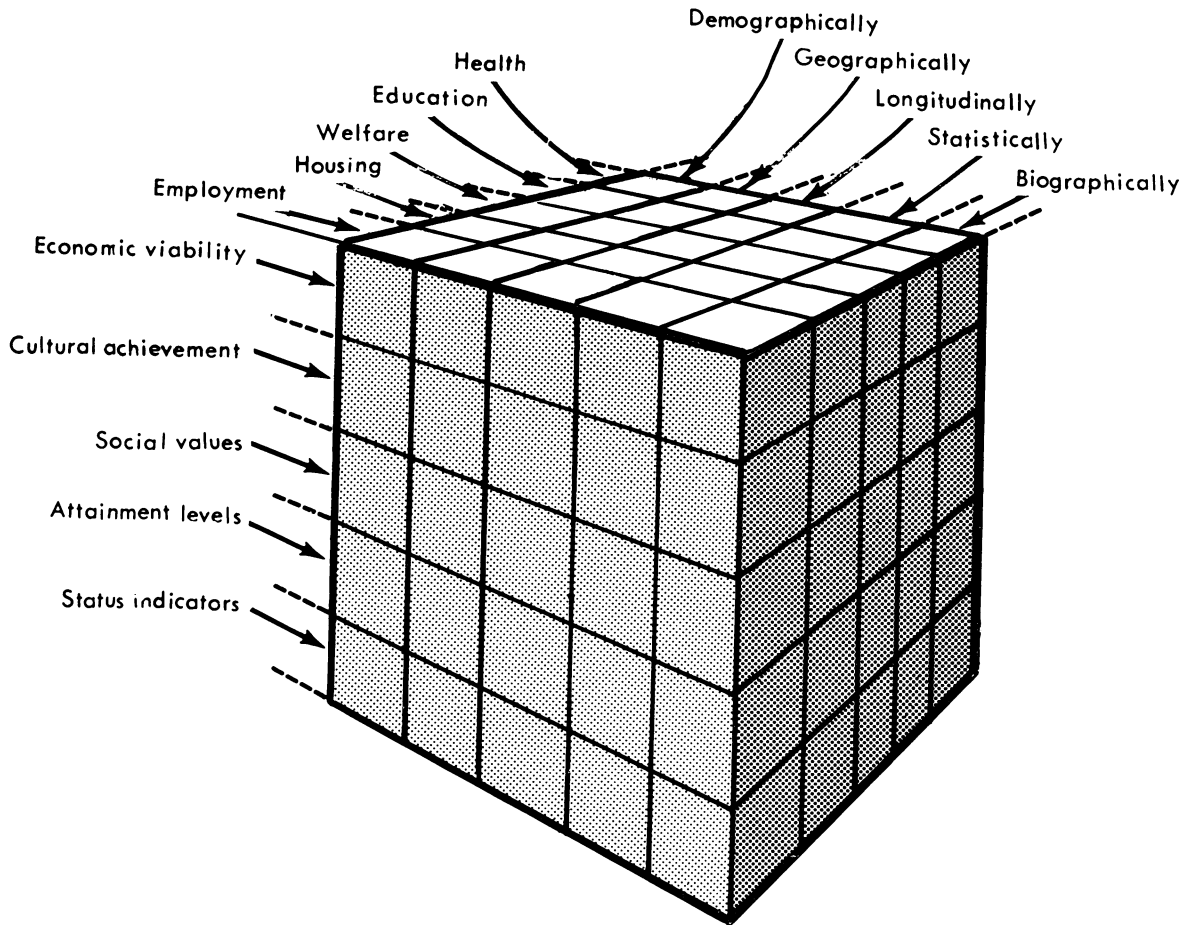


Figure 1. Dimensions and strata of some factors relevant to quality of life

ment, health, of those in the figure that contribute to the overall quality of life narrows the scope of interest to a manageable level.

A number of factors, however, impinge directly upon the health status of the individual and the health level of the nation. For some time the national level has been measured by overall morbidity and mortality rates. More positive measures are sought by many investigators. They contend that the usual negative measures—disease, disability, discomfort, dissatisfaction, and death—do not permit identification and measurement of positive well-being. To many, health means more than survival or absence of disease. To some, health is marked by vigor and vitality as well as freedom from physical and mental impairments, disease, and illness. Dimensions and strata of the health status factors of individual persons are shown in figure 2. While identification and measure-

ment of all of these factors are important and should be studied, we will explore only the quality of health services.

Figure 3 shows the multidimensional aspects of health services. The diagram of representative components reaffirms that the individual person is the most appropriate and meaningful focus for measurement of the quality of those services.

In this context, "quality" is viewed as a combination of the quantity of services, types of resources used, timeliness of the provision of services, organizational arrangements through which the services are delivered, and so forth. Since a certain level of quality can be ascribed to each component and since each component can be expected to contribute some affect to the ultimate impact of services on the individual's health, aggregation of the components into one measure of quality is appropriate. Aggre-

gation does not negate the importance of assessment of each component of the services; only by such activity can the components worthy of emulation or in need of modification be identified.

Although we view the impact on the health of the individual as the key to measurement, assessment of the quality of services goes beyond that impact to the overall health status of the individual. Putting health status above health services casts a somewhat different light on the problems of assessing quality. Viewed from the perspective of different levels of priority, maintenance and restoration of health can be studied within a set of broader and more significant factors than merely those events occurring at the actual time of the provision of health services. This viewpoint requires consideration of aspects other than the combined attributes of quality

discussed before (quantity, type of resources used, organizational arrangements through which services are delivered, and so forth). These aspects include, but are not necessarily limited to, the adequacy, availability, accessibility, and acceptability of health services resources; cost of services; response capability of the entire system as it is organized to provide these services; and others.

To facilitate study of the quality of health services in this light, the evaluator must first concede that an achievable goal, when planning the organization and delivery of health services, is a system that will be able, within certain constraints, to provide all the required health services to all of the people all of the time. Presently, it is contended that the health services system is capable of providing almost all the required health services to some of the people

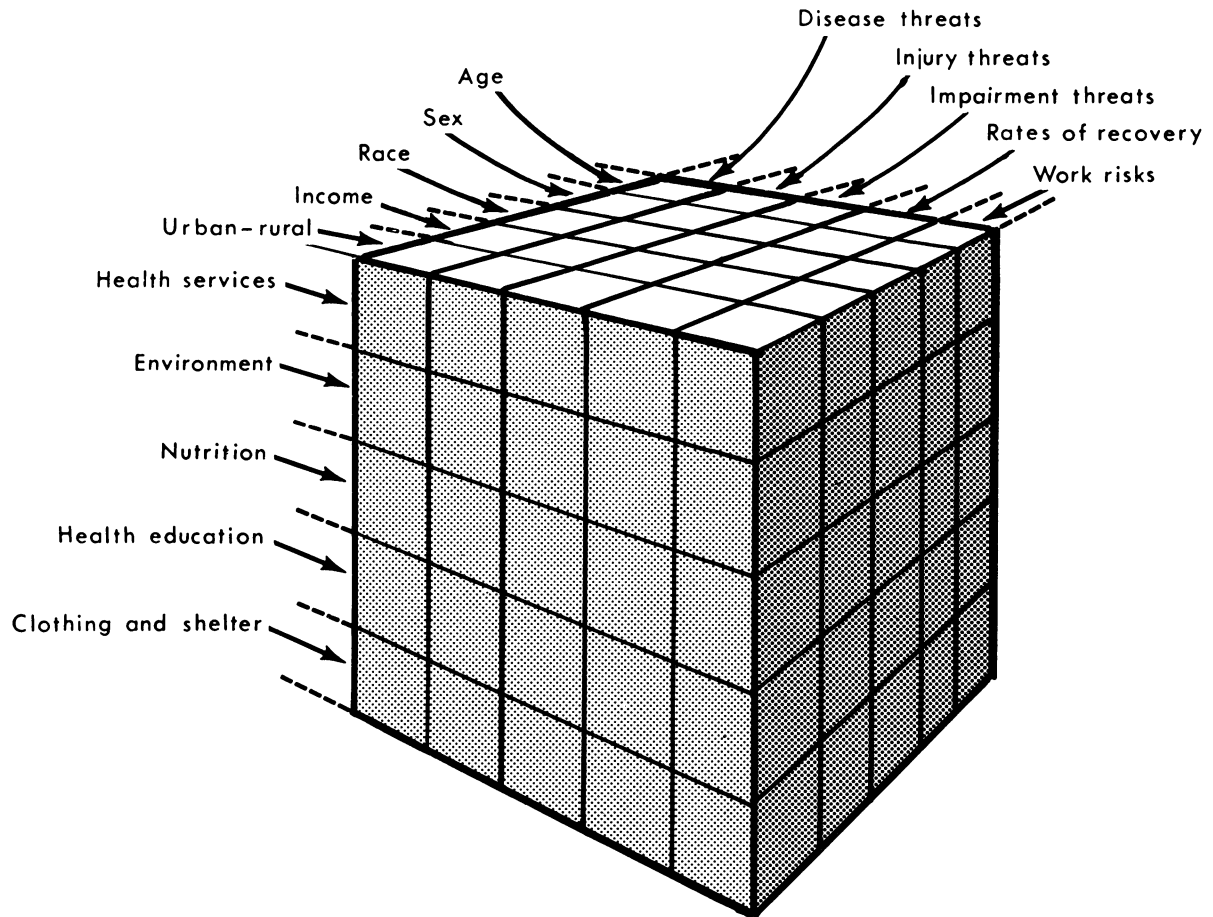


Figure 2. Dimensions and strata of some factors relevant to quality or level of health of the individual

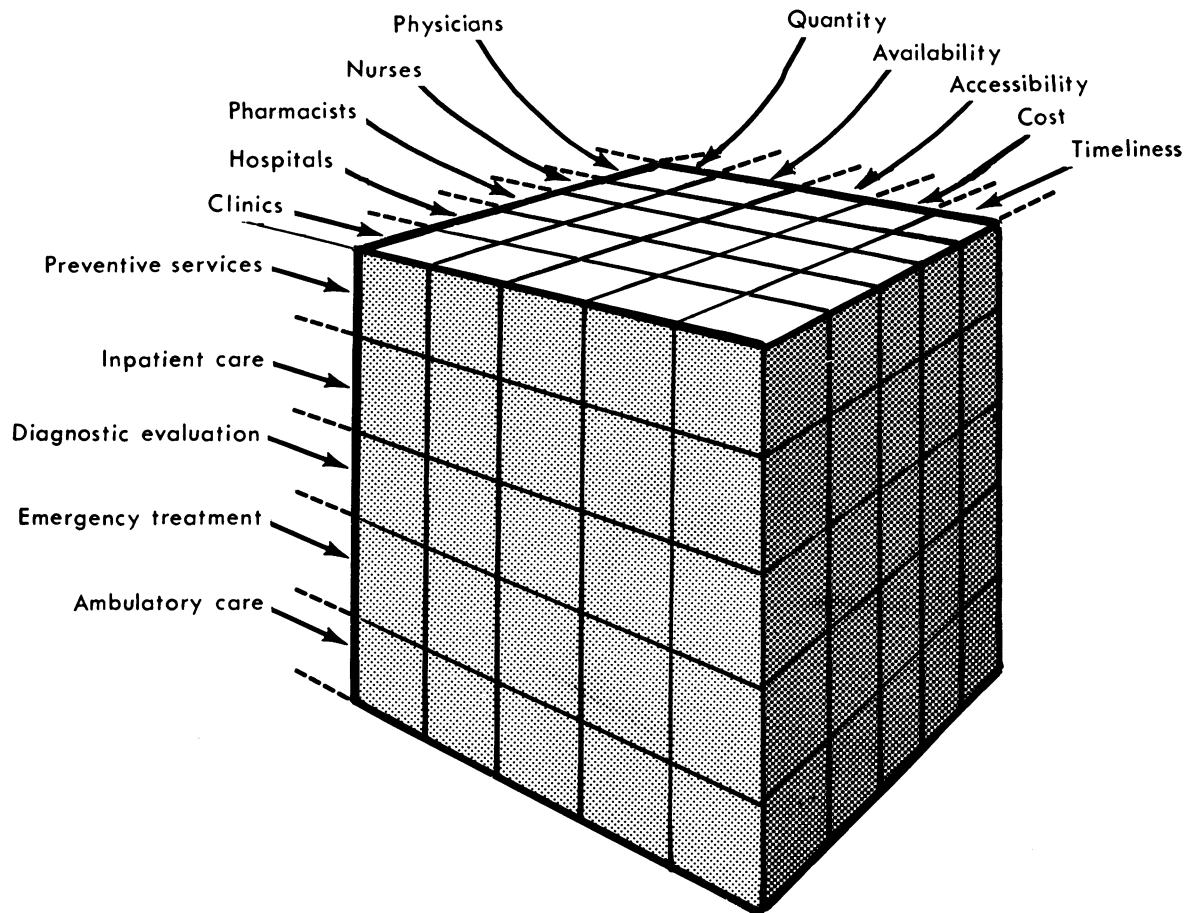


Figure 3. Dimensions and strata of some factors relevant to quality of health services

almost all of the time, and to almost all of the people some of the time.

We suggest that the quality of health services might be measured by the extent to which the system approaches the capability to provide all required services to all people at all times—within certain constraints dictated by adherence to rules of optimality to prevent misallocation and maldistribution of resources.

These rules of optimality stem from the notion that it is desirable to assure resource capability sufficient to provide almost all required services to the majority of the population with minimal waste of resources. It is less desirable to assure provision of all required services to all people (if this were possible) if excessive quantities of resources are wasted; that is, manpower and facilities are idle while awaiting the volume use generated only by catastrophe or epidemic. System optimality also must consider

allocating available resources so as to be able to respond most effectively to needs in the order of health goal priorities.

The Quantification of Quality

A number of significant variables in the health services system have attributes of quantifiability and measurability. Certain relationships among these variables can be identified and, to the extent that these relationships can be quantified, a measurement of the quality of the health services can be derived. This measurement is based on the hypothesis that the quality of health services may be assessed by ascertaining the relationships among the potential of a given population to use services, the capability of the system to respond, and the impact produced on the health of the people by the response services.

While the overall plan seeks to assure quality

of life style for the individual in his total environment and incorporates concerns for educational and cultural achievement, economic viability, and other social and material aims, we concentrate on only that portion of the plan involved in actual health services. Nor are we concerned, at the other end of the scale, with in-depth study of the actual person-to-person provision of health services on what has been termed the quality control level. Medical audit and utilization review activities, among others, are employed at this level.

Figure 4 shows the different perspectives from which health planning and quality assessments may be considered. Our perspective is health services planning—assessing for planning purposes the quality of health services by measuring their capability to respond to people's needs.

The first likely area for quantification of variables that may be used in assessing quality of health services (in the absence of immediately useful information about the impact of services on the health of the people) is defined by the characteristics of the people to whom services are delivered.

The process begins by grouping people according to geographic regions or areas, and then further dividing them into urban and rural categories. Additional demographic categories are age, sex, race, education, occupation, income, and whatever other factors are determined to be significant. By analyzing this information in conjunction with current and expected birth rates, employment trends, and by urban-rural movement, the demographic characterization of the population groups can be projected for future years.

Such groupings should permit resolution of history and expectation of disease for each demographic category, based on epidemiologic statistics currently available or planned for collection. A basic example of the results of such correlation would be an estimate of the requirements for obstetrical health services based on birth rate information and the number of females of childbearing age within a given population group. Information on incidence and prevalence of diseases as related to age, sex, and other factors may enable delineation by demographic groups of the potential

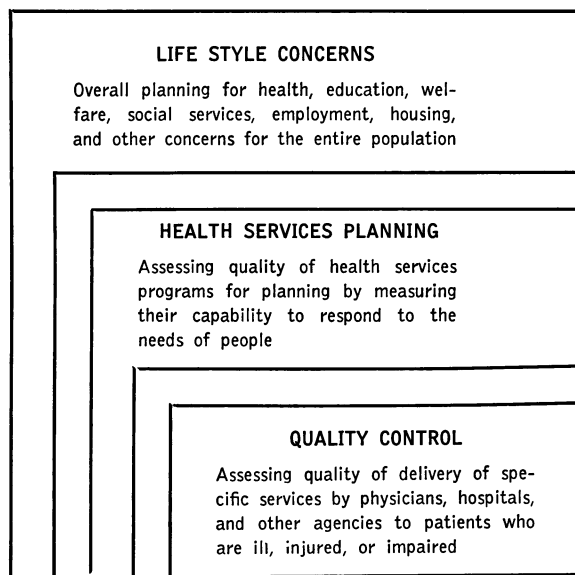


Figure 4. Three perspectives in health planning and quality assessment

use of health services, thereby permitting estimates of the volume of health services requirements and predictions for future periods. Such estimates, of course, can be made only if sufficient data are available to permit correlation of epidemiologic events with the resources required to respond to them, that is, the number and types of hospital bed days, physician and nurse hours, and so forth, by specific disease entities. Some combination of demographic and epidemiologic characteristics produces the primary indicator of potential use.

Among other factors in the determination of potential use are the individual's ability or willingness, or both, to pay for health services and sufficient knowledge to enable him to take advantage of programs that will pay such cost for him. Another factor is the individual's perception, or perception of a child's parent, that he requires services. Lack of perception can lead to initial nonuse of services followed by complications that may result in a disproportionately increased use at a later time.

Although the words are often used interchangeably, it may be important to assign precise meanings to "need," "desire," "demand," and "requirement." Need is the physical or mental condition of the individual, perceived or not, indicative of the necessity to use health

services to maintain or restore health. Desire is the individual's wish to use health services, whether the need is real or imagined. Demand occurs when both need (real or not) and desire are coupled with the willingness and ability to seek and pay for the services or to find them through programs that will provide them without direct cost. Requirement follows from combining the need, desire, and demand of the individual with the decision by personnel in the health services system as to what services are necessary for the individual because of his health condition at the initial contact.

Bringing together data related to potential use of health services—demographic, epidemiologic, ability and willingness to pay the cost, perception of the need, and so forth—will provide information for construction of a basic model. Using this model, further study of the relationships of these characteristics should yield insights necessary to predict potential use of health services by given demographic categories of people.

The second area for quantification of variables to be used in assessing the quality of health services is that of the resources available to provide services. Quantification requires not only a complete inventory of all health facilities and personnel but an assessment of the capability of resources within a given geographic area to respond to the health needs of its residents. Numbers and types of facilities, that is, hospitals, clinics, extended care facilities, offices, laboratories, convalescent homes, and so forth, are counted and classified, but their capacity for response also must be ascertained. The number of beds, operating rooms, dental chairs, X-ray machines, and so forth should be obtained.

Numbers and types of health services personnel are part of the inventory. The number of hours spent by each kind of professional person in the provision of health services is needed, because some members are engaged exclusively in research rather than in health services. Physicians, dentists, nurses, pharmacists, dietitians, nutritionists, physical therapists, X-ray technicians, and others should be inventoried by geographic area and response capacity.

Relating facilities and personnel to classification of their activities will provide important information, especially when analyzed in light

of the services provided, that is, inpatient care, ambulatory care, preventive services, diagnostic evaluation, health education, family counseling, acute and emergency treatment, home care, rehabilitative and chronic extended care, and so forth.

The cost to the user of various services and the ability and willingness of the individual to pay it are critical in determining both potential use and response capability. Other factors in response capability include geographic distribution and physical location of facilities and, in some instances, the residence of the personnel who work in them. Still others are the amount and type of use, continually changing inputs that diminish the response capability for additional use. The extent of this diminution must be ascertained continually to determine the remaining resources available.

The combination of all information about the ability of health services resources to respond to demands should provide the basic data necessary to construct a model which, for the health services system of a geographic area, will be able to show the response capability at any point in time.

The third area of quantifiability is a population's actual use of health services, classified by demographic groups, by epidemiologic categories, and by the types and amounts of services used. Determining actual use calls for manipulability of information from the first two models, along with information on actual responses, and combining these into a third model. This combination will provide the means of going somewhat beyond a determination of the precise potential use of services by a given demographic category and the exact response capability of a given health services system. Using this third model, comparisons can be made of the actual use of health services with the potential use and the actual response with the response capability. The differences shown by such comparisons can be used to identify problems that require attention.

Preliminary Data Collection Tasks

A number of preliminary tasks of data collection are necessary to obtain input information for the construction of models to be used in planning the organization and delivery of health

services, and especially in measuring and assessing the quality of those services. Certain data have been collected for varying lengths of time in one form or another, but compatibility and commensurability of these data have been lacking. Coordinated efforts should be initiated to insure compatible, commensurate data. Such data are a necessary foundation for measuring and assessing.

Demographic characteristics. Classification of individuals into demographic categories by characteristics related to their potential use of health services should be refined. These characteristics include age, sex, race, education, occupation, income, and others.

Threat history and expectation. Identification of types and nature of illness, injuries, and impairments should be correlated with incidence and prevalence, including correlations by diseases and combinations of diseases. Relating this incidence and prevalence information to demographic categories should permit estimation of future threat, coincident with prediction of the makeup of such groups.

Health service requirements. Information about the types and amounts of facility and manpower time required to respond to needs of people as they become ill, injured, or impaired should be compiled. Requirements may vary from place to place and should be related to the geographic area of the health services system under study as well as to the demographic characteristics of the people.

Other outcome-affecting variables. There are many variables other than health services, demographic characteristics, and epidemiologic classifications that have an impact on the health or return to health of the individual. Health-affecting variables before, as well as after, ill health occurs are nutrition, housing, hygiene, occupation, and others. When ill health begins and before services are received, important variables are communications capabilities, transportation, knowledge of the location of facilities, individual health education, and others. Health-affecting factors after services are initiated and before return to health are the attitude of the individual, adherence to rules of recuperation, capabilities for care at home, and others. Study of the impact of these outcome-affecting vari-

ables is important if these impacts are ever to be distinguished from impacts of the health services themselves.

Besides obtaining information for model building, these preliminary tasks should also yield direct insights into the ultimate activity, the precise identification and measurement of the impact of health services.

One other important preliminary effort is the identification and measurement of the impact on the health of individuals caused by lack of health services. In certain instances the lack of health services may simply result in an additional day or two of bed rest at home to accomplish recovery that receipt of health services could have hastened. In other instances lack of health services would result in a far different impact on health, such as death. Ability to categorize circumstances under which the impact of lack of services is minimal should assist in assigning priorities to health service needs. Unfortunately, experimental design for studies that could yield this information has been hampered by several factors; not the least important one is the moral obligation not to withhold services intentionally from individuals when the services are providable.

Critical to the data collections and to the ultimate task is the establishment of a comprehensive information network that will provide comprehensible data on a continuing basis, with built-in flexibility to accommodate changes in the processes of providing health services. Compatibility should be assured among national, regional, State, and local information networks.

Comment

Many Federal agencies spend billions of dollars in health activities. Obvious benefits would accrue if these agencies pooled resources to assess the quality of health services from the perspective of measuring response capability to accommodate the needs of the people. Similarly, regional, State, and local health planners would find mutual benefit in joint activities.

It seems appropriate that Federal health planners and policymakers should lead in coordination. Not only does Federal policy affect the organization of arrangements to deliver health services for the entire nation, but the direct health services to Federal beneficiaries

could serve excellently in pilot demonstrations to stimulate this approach in the nongovernmental sector.

The very necessity for studying the quality of health services within a framework that depends on inventorying health services resources and identifying demographic elements within a stated geographic area, however, makes it desirable for government levels other than the Federal establishment and nongovernment groups to use this approach. In fact, better data resolution at regional, State, or local levels would permit a more facile manipulation of the variables in the models that describe potential use and resource capability.

Until adequate data collection mechanisms are established, precise measurements of the impact of health services on the health of the individual are not possible on a continuing, up-to-date basis. Nevertheless, preliminary collections to provide necessary information to measure impact should themselves result in an impact of measurement; that is, the very activity of collecting and analyzing information required for the preliminary models can generate changes and modifications. For example, aspects of the system that are especially effective or deficient may be identified for appropriate action.

We recognize that changing methods and organization for providing health services, epidemiologic trends, and changes in demographic characteristics all require constant updating and modification of the framework we suggest. As these changes affect the potential use of services, the response capability of the system, and the resource time necessary to provide services, so should the models be updated to reflect new inputs.

Conclusion

We have reviewed from several perspectives the need for a new approach to the definition, measurement, and assessment of the quality of health services for the purposes of health planning and policymaking. The key to our approach is the ultimate determination of the impact of health services on the individual. Preliminary development of this approach depends on defining quality of health services as a measure of the capability of the health services sys-

tem to respond to the needs of population groups. Such characteristics as quantity, availability, accessibility, timeliness, adequacy, cost, and so forth are used as criteria. This approach recognizes that individual providers achieve varying levels of performance, but our working assumption was that these variations average out in any given area.

Three models to apply as a base for this approach are discussed; one for ascertaining the potential use by population groups, a second for measuring response capability, and a third for detailing actual use of services. A number of preliminary data collection tasks are necessary to this approach, which itself is preliminary to being able to measure the quality of health services by assessing the impact of services on the health of the individual.

We suggest that, although this approach seems amenable to application at regional, State, and local levels, the major efforts be undertaken by the many Federal agencies involved in health planning for the nation. Especial benefits may result if this approach is applied by those agencies charged with providing direct health services to the millions of people who are beneficiaries of health programs of the Federal Government.

Summary

The definition, measurement, and assessment of the quality of health services can be viewed from several perspectives. From the perspective of health planners and policymakers an approach to this task is to define quality of health services as a measure of the extent to which the health services system in a geographic area is capable of responding to the needs of its population groups. These needs are determined by ascertaining potential use, largely on the basis of demographic and epidemiologic data that define population groups.

A basic working assumption is that differences in individual provider performance levels are expected to balance out within any given geographic area. Recognition that variances in personnel performance and in facility capability—by whatever measure—exist among health services is tempered by the anticipation that these variances will be minimized through exercise

of quality control activities such as medical audit, utilization review, licensure, accreditation, and others. Therefore, problems of individual provider performance and adherence to facility standards are not considered.

Previous and ongoing efforts to examine the quality of health services from different perspectives are reviewed. A definition of quality of health services is suggested, and three models for use in beginning to measure and assess quality are outlined. These models deal with system characteristics that comprise criteria appro-

priate for viewing quality of health services, such as quantity, availability, accessibility, timeliness, adequacy, cost, and so forth.

BIBLIOGRAPHY

An annotated bibliography was prepared by the authors during their search of the literature on quality of health services. Fifty-five items deal with philosophy and background, 40 items with developmental activities and study applications. Copies may be obtained from Don J. Trantow, Institute for Interdisciplinary Studies of the American Rehabilitation Foundation, 1800 Chicago Avenue, Minneapolis, Minn. 55404.

Air Quality Criteria Announced

Air quality criteria on the levels at which sulfur oxides and particulate air pollutants are considered harmful to health and welfare and recommended control techniques applicable to these pollutants have been announced by Secretary Robert H. Finch of the Department of Health, Education, and Welfare.

Standard setting mechanisms that were established by the Air Quality Act of 1967 were set in motion with these announcements. Under the act, State governments will be responsible for setting and enforcing air quality standards within the air quality control regions designated by the Secretary.

Air quality control regions have been designated in six major metropolitan areas: Washington, D.C., New York, Chicago, Denver, Philadelphia, and Los Angeles. These regions include the District of Columbia and parts of 11 States—Maryland, Virginia, California, New York, New Jersey, Connecticut, Illinois, Indiana, Colorado, Pennsylvania, and Delaware.

Upon receipt of criteria and control techniques, the D.C. Commissioner and the Gov-

ernors of these States have 90 days to notify the Secretary that they intend to adopt air quality standards for sulfur oxides and particulate matter and plans for implementation and enforcement of the standards in and for those parts of the air quality control regions that lie within their jurisdiction. They have 180 days to adopt standards and another 180 days to adopt plans for implementation and enforcement of the standards.

The standards and plans must be submitted to the Department of Health, Education, and Welfare for review. If the standards are found to be consistent with the air quality criteria and recommendations pertaining to control techniques, and if the implementation plans assure that the standards will be achieved within a reasonable time and provide a means of enforcement by State action, then the standards and plans become effective.

The Air Quality Act requires that the States hold public hearings in the air quality control regions in conjunction with the development of standards and enforcement plans for the regions.