

1. Introduction

In most of the conceptual work regarding evaluation techniques to be employed on this project, the Panama Nutrition Evaluation Project, the approach has been to focus the evaluation in either of two areas: Impact evaluation or Process evaluation. In this paper, we will introduce an alternative conceptual framework which will not necessarily expand the data needs for evaluation but which will hopefully permit greater specificity in the analysis. The "new" conceptual model is drawn from the field of medical care evaluation.

In the field of nutrition evaluation, the approach heretofore taken involved analysis of the impact of nutrition programs upon nutritional status, and analysis of the process of operating these programs. The theoretical arguments behind impact evaluation were essentially that programs designed to improve, e.g., child nutritional status, ought to include in the evaluation an assessment of the child's nutritional status. Such evaluations ideally involved measurement of nutritional status before implementation of the program, followed by subsequent measurement after introduction and sufficient operation of the program. In this way, it was argued, comparison of baseline nutritional status with post-treatment nutritional status would reveal any observable change or impact. Statistical techniques or adequate experimental design were required in order to isolate program causes of nutritional change, and for this reason, control or comparison groups, as well as identification of sufficient control variables were usually required.

Process evaluation of nutrition programs, on the other hand, has focused heretofore on the characteristics of program implementation and operation, as well as on the quantity and quality of program inputs. Process evaluation considers such factors as the number of visits to nutrition education programs, the type and amount of food distributed to program beneficiaries, the magnitude of several ratios such as population to food distribution centers, number of program personnel to program participants, as well as such factors as travel distance to distribution

centers, etc. All of these measures usually provide some indication of program operations and potential for program success, but at best they are indirect measures of program impact on nutritional status.

Evaluations based on the process approach can be useful tools for program management, and should be included in policy options regarding the allocation of program resources, etc. The ultimate validity of the method, however, depends on its relationship to the impact of such programs on the nutritional status of targeted populations. If the linkage is weak, or misunderstood, between program operations and nutritional impacts, then evaluation at the process level may be inadequate or require new measurement criteria and techniques. Similarly, impact evaluation without understanding the linkage to program operations may result in misinterpreted consequences of such operations, either in the form of undeserved benefits or failures accredited to the programs. Both forms of evaluation require considerable information on outside factors which can influence program variables and/or nutritional status. Confusion caused by outside phenomenon and/or misunderstanding process-impact linkages will detract from the accuracy of the evaluation.

2. Evaluation in Health Care

Evaluation in the field of health care delivery has been undergoing a process of refinement since the turn of the century. Numerous techniques and conceptual models have been developed for assessing the effect of medical treatment on the health status of patients. Much of this work is found in health care literature under the titles of, Measurement of Health Care Quality, or Quality Assessment, or Quality Assurance, etc. Some of the developments in the field of health care quality evaluation can be of benefit to evaluative efforts in nutrition.

The following material on evaluation in health care is drawn from, William M. Wadman, "The Medical and Economic Concepts of Quality: Problems of Measurement and Implications for Efficient Health Care Delivery,"⁽⁵³⁾ which summarizes much of the work on quality evaluation models and techniques in health. The remaining sections of this report will outline how this material may be utilized in nutrition evaluation models.

3. Structure, Process, and Outcome in Health Care Evaluation

In 1966, Avedis Donabedian, a physician who has devoted his career to assessing the quality of health care, summarized the work previously undertaken in the field (10) (11) (12). In order to provide a better understanding of these earlier efforts at medical care evaluation, he introduced three conceptual models or approaches to evaluation, these are: the structure approach, the process approach, and the outcomes approach. All subsequent discussions of health care quality assessment have essentially followed Donabedian's format. He defined his three categories as follows:

- a. The structure approach assesses the quality of health care through study of "the settings in which (care) takes place and the instrumentalities of which (care) is a product. This may be roughly designated as the assessment of structure, although it may include administrative and related processes that support and direct the provision of care. It is concerned with such things as the adequacy of facilities and equipment; the qualifications of medical staff and their organization; the administrative structure and operations of programs and institutions providing care; fiscal organization and the like." The assumption is made that given the proper settings and instrumentalities, good medical care will follow." (10, p. 170)
- b. Another approach to assessment is to examine the process of care itself.... This is justified by the assumption that one is interested not in the power of medical technology to achieve results, but in whether what is now known to be 'good' medical care has been applied. Judgments are based on considerations such as the appropriateness, completeness and redundancy of information obtained through clinical history, physical examination and diagnostic tests; justification of diagnosis and therapy; technical competence in the performance of diagnostic and therapeutic procedures, including surgery; evidence of preventive management in health and illness; coordination and continuity of care; acceptability of care to the recipient and so on. This approach requires that a great deal of attention be given to specifying the relevant dimensions, values and standards to be used in assessment. (10, p. 169)
- c. The outcome of medical care, in terms of recovery, restoration of function and of survival, has been frequently used as an indicator of the quality of medical care.... Many advantages are gained by using outcome as the criterion of quality in medical care. The validity of outcome as a dimension of quality is seldom questioned. Nor does any doubt exist as to the stability and validity of the values of recovery, restoration and survival in most situations and in most cultures, though perhaps not in all. Moreover, outcomes tend to be fairly concrete and, as such, seemingly amenable to more precise measurement. (10, pp. 167-68)

Although some refinements have been suggested (9), Donabedian's three approaches represent essentially the general format for research in health care quality evaluation. Within each approach, there are several subcategories, and between each category or approach there are areas of overlap. Each approach has its strengths and weaknesses, and all three approaches should probably be utilized in a coordinated fashion rather than relying upon a single model.

4. Definitions of Health Care Quality

Although the concept of "quality" in health care may seem somewhat remote from the topic of evaluation of nutrition programs, there are nevertheless several important connections, especially at the conceptual level. In view of this fact, it will be useful to briefly discuss some of the conceptual work on the topic of health care quality before a more indepth discussion of Donabedian's three evaluation models.

It will be useful at this juncture to consider the definitions of quality employed by the medical profession. Although considerable effort has been expended by health care providers to measure the quality of care, little material is available on a definition of quality.

In the material that follows, the discussion will focus on definitions of the quality of health care (specifically, professional health care) and not definitions of the quality of health. The two definitions are related in the sense that good health care may contribute to good health. However, the definitions are also separate in the sense that one may have good health (due to genetic, environmental, social, cultural, educational and economic factors, etc.) and never enter, or need to enter (over some time interval), the professional health care system. Hence it is necessary to separate definitions of the quality of health care from definitions of the quality of health. (Similar arguments can be made in comparing nutritional programs with nutritional status. Specifically, it would be useful to compare four segments of the population: (1) those individuals whose nutritional status is adequate and they do not need nor receive the services of a nutritional program; (2) those individuals whose nutritional status is inadequate, they need the services of a nutrition program, and they receive such services; (3) those individuals whose nutritional status is inadequate, they need

the services of a nutrition program, but they do not receive such services; and (4) those individuals whose nutritional status is adequate, they do not need the services of a nutrition program, but they receive the services anyway.)

Probably the best definition of the quality of medical care, prior to the contribution of Donabedian, was that produced by the Lee-Jones report (28). The approach utilized by Lee and Jones was essentially a process approach, e.g., "Good medical care is the kind of medicine practiced and taught by the recognized leaders of the medical profession..." etc. In the interim between Lee-Jones and Donabedian, most attempts to measure quality, or establish quality standards, emphasized one of the three approaches--structure, process or outcome--but failed to provide a definition of quality.* In most instances, the authors left the concept or definition of quality to the reader's intuition, or implicitly assumed that the definition would fall out of the measurement techniques described.

Since publication of the Lee-Jones report the next author to attempt an explicit definition of the quality of health care was Donabedian. His first major article on the subject (10) introduced the three approaches to assessment discussed earlier, and also identified many of the difficulties associated with measurement. In this article, Donabedian presents a section titled, "Definition of Quality," but only reiterated the Lee-Jones contribution and generally apologizes for the difficulty to define his subject.

In a subsequent article (11), wherein he limited his discussion to the process approach, Donabedian provides a more thorough consideration of the definition of quality and methods for its measurement. In a second section titled, "The Definition of 'Quality'" (11, p. 182), he again argues the importance of definition, as well as the difficulties to obtain the same. In this article, however, he attempts a definition,

* See, for example (8) (26) (29) (32) (33) (34) (43) (45) (48) (49) (51) (54).

Quality...is rather, the evaluative dimension of the elements and interactions in the medical care process. It is a judgment of what is 'good' or 'bad'. It is necessary, therefore, to specify what elements or interactions are the objects of concern of any process of quality review and what characteristics, relevant to these, constitute 'goodness'. (11, p. 182)

In an appendix to his section on Definition, Donabedian presents an enlarged definition of quality as well as his recommendations for measurement (11, pp. 196-201). The definition in his appendix is essentially an expansion and updating of the Lee-Jones criteria. For a complete listing of the elements in Donabedian's definition of quality, see Appendix A.

Besides producing a definition of quality, the author also provided a set of recommendations for the measurement of quality (see, "Some Indicators of the Quality of Care" in his Appendix B (11, pp. 199-201)). Included among his indicators are such items as physical structure, facilities and equipment, administrative organization, fiscal method of payment, geographical factors, diagnostic activities, extent of consultation and referral, general mortality, morbidity and disability rates, patient satisfaction, etc. His complete list of measurement indicators is given in Appendix B.

Subsequent work by Donabedian (see particularly (12)) has introduced further material on the methods of quality measurement and their limitations, but has not expanded his earlier work on definitions. Other authors have suggested additional definitions for health care quality, for example,

Quality is the "level of excellence produced and documented in the process of diagnosis and therapy, based on the best knowledge derived from science and the humanities, and which eventuates in the least morbidity and mortality in the population". (1, p. 241)

and

Standards of quality of care should be based on the degree to which care is available, acceptable, comprehensive, continuous, and documented, as well as on the extent to which adequate therapy is based on accurate diagnosis and not on symptomatology. (15, p. 122)

Most recent'y, increased emphasis has been placed on end-results or outcomes as the definition of health care quality. This trend represents a move away from the earlier process-oriented approach of Lee and Jones. The change in emphasis also underscores the subjectivity behind quality definitions. One of the leading proponents of an outcomes approach to the definition of quality has been the InterStudy organization, particularly Walter McClure and Paul Ellwood. According to McClure, we may assume,

the primary measure of quality of health care to be the health levels of the population cared for. More specifically, high quality is characterized by the degree to which preventable deaths, preventable functional impairment and preventable suffering are minimized over time. In the case of unavoidable illness we mean minimization of the duration and severity of impairment and suffering. (35, p. 1)

(Within the context of nutrition evaluation, the notion of preventable ill health, as suggested by McClure and Ellwood, may also be useful.)

With this brief review of the definition of health care quality, we may now return to our earlier discussion of Donabedian's three approaches to the evaluation of quality. The next three sections will present both the strengths and weaknesses of each approach, as well as their relationships to each other.

5. The Use of Structure in Health Care Evaluation

According to Donabedian, the structure approach--which assesses quality from the point of view of evaluating the training and qualifications of medical staff, inspection of facilities and equipment, etc.--has the advantage of dealing with concrete and accessible information, but it also has "the major limitation that the relationship between structure and process or structure and outcome, is often not well established" (10, p. 170). What evidence is available suggests a weak but positive relationship between structural assessment techniques and the quality of health care. Peterson and Clute (42) (6), for example, found a weak relationship between the length of hospital training and the quality of care rendered by General Practitioners. This weak relationship further deteriorated with the passage of time subsequent

In these cases, the concept would apply to "preventable morbidity"

to training. The same two studies also show, however, a positive relationship between the quality of care and the use of "better" office facilities, the presence or availability of laboratory equipment (except for X-ray equipment which revealed no relationship), and the establishment of a patient appointment system. No relationship could be established between quality and physician membership in professional associations, physician income, physician workload, or hospital affiliation.

Other studies have found board certification of physicians weakly correlated with the quality of care (13), physician scores on medical training examinations to have little correlation with the quality of practice actually rendered (55), and hospital accreditation to have little if any correlation with several process measures of health care quality (39). The relationship between physician licensure and the quality of care also has been argued to be extremely weak, and in some instances possibly deleterious to high quality care. Paul Ellwood, et al., (14), for example, lists the following defects in professional licensure:

- (1) There is little evidence of a strong reliable correlation between the possession of a license by a professional and the provision of quality care.
- (2) Licensure, because it operates only at the inception of practice by a professional, can only assure competence at inception; it offers no guarantee of continuing competence.
- (3) Licensure, like other input measures, operates as a barrier to entry of resources into the health field.
- (4) Because of the constraints in licensing statutes on the functional tasks which can be carried out by various professionals, matching of skills with tasks to be performed is often frustrated.
- (5) Ineffective enforcement of licensure sanctions is prevalent for at least three reasons:
 - a. Licensure boards are either wholly controlled or dominated by professionals.
 - b. The lack of a graduated set of sanctions very often results in no sanction being invoked at all.
 - c. In no state is a licensing board empowered to initiate disciplinary proceedings against the practitioner on the grounds of professional incompetence to provide quality services. (Proceedings may be initiated for mental incompetence, unprofessional behavior, moral turpitude, drug addiction, or criminal conviction, etc.) (14, pp. 30-31)

(For additional comments on the licensure aspects of the structural approach, see, Milton Friedman, Capitalism and Freedom (18, pp. 149-160).)

Some authors have recently suggested means to increase the effectiveness of the structural approach to quality assessment. Henrik Blum (2), for example, has developed a structure evaluation technique that utilizes frequent committee reviews combined with outcomes feedback that attempts to establish a closer relationship between structure and health care outcomes. His discussion of the subject acknowledges some difficulties, generally ignored in the past. For example, he acknowledges that the method of payment will have a bearing on the quality of care, a point generally dismissed in the past under the rubric of medical ethics, viz.,

A knowledgeable evaluating organization would be aware that if fee for service is the mode of payment to physicians and others for their services, it should expect pressure for excessive services from those providers. If capitation or salary is the basis for payment made to physicians for their services, evaluators can expect pressure for too few activities and procedures. Criteria for good structure would acknowledge these possibilities and seek evidence that excessive or insufficient services would be excluded by the presence of various kinds of utilization reviews, whether these are pre-admit, concurrent, or postreviews of services rendered (2, p. 1009; see also 23).

(Similarly, it may be worthwhile to study the effect of financial arrangements on the delivery of nutritional services.)

Blum acknowledges that structural quality controls can be carried out in a superficial or biased manner, and hence the need for outcomes feedback to assure impact on the quality of care (2, pp. 1008-90). He also identifies an important linkage between the structure approach and a possible bias toward unnecessary cost increases. According to Blum,

Structural control logic, since it is not checked specifically against outcomes (as generally practiced), often has one very sad effect: it can promote costly changes euphemistically described as improvements which may never have been needed. (2, p. 1009)

Other studies utilizing the structure approach have attempted to relate health care resources to population health needs (25), have regressed a quality index on health care resources (41), and have endeavored to establish weights for the opinion of diversified health professionals and patients in order to obtain an aggregate index for the evaluation of institutional care (50). Hulka, et al. and Vertinsky and Uyeno have undertaken studies to directly incorporate patient assessments of quality into the criteria for structural evaluations of staff and facilities (24) (52). (The author of this paper is unaware of similar activities to include patient perceptions of quality in nutrition program evaluations.) And, a number of additional quality indexes have been produced based on the structure approach. For example, J. Miller's "Q" index, which ranks diseases according to productive time loss due to incapacitation, was originally produced to assist program management of the U.S. Indian Health Service (38). Similarly, the "G" index, introduced by M.K. Chen, attempts to rank diseases so as to facilitate decision making regarding resource allocation in health care planning programs (5).

Although the structural approach continues to be a major tool of health care quality evaluation, increasingly arguments are advanced that justification for the approach must be based on evidence that "good" structure results in "good" outcomes (see 2, pp. 1007-09 and the footnote below). The usefulness of structure as an evaluation technique derives primarily from the fact that structure is relatively easy to measure. The value of the technique, however, depends on the structure-outcome relationship, or more appropriately, the structure-process-outcomes relationship. At this date, no one is suggesting total elimination of structure as an assessment technique. Recommendations, however, for additional evidence of the impact of structure on outcomes are frequently heard. Similar recommendations have been advanced regarding the applicability of the process approach. We turn now to consider the strengths and limitations of process evaluation.

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"The effectiveness of care as has been stated, in achieving or producing health and satisfaction, as defined for its individual members by a particular society or subculture, is the ultimate validator of the quality of care" (10, p. 186).

6. The Use of Process in Health Care Evaluation

As explained by Donabedian, the process approach "is interested not in the power of medical technology to achieve results, but in whether what is now known to be 'good' medical care has been applied" (10, p. 169). Where the structure approach is concerned with the presence and preparedness of medical technology (both labor and capital inputs), the process approach seeks to determine whether the appropriate inputs were utilized in a manner "known to be 'good' medical care." Note that ultimately the justification for both process and structure depends on their ability to positively influence good health or outcome. This justification is implicit in Donabedian's statement regarding "good" medical care.

Evaluation of medical care processes is a much more difficult task than evaluation of structure. There exist many different methods for obtaining information about medical processes, as well as many different methods for evaluating the information. Unfortunately, the results of one method may not agree with those of another, and, as should be expected, the method of data collection can influence the evaluative results (3).

Before one commences the process approach to quality evaluation one needs to decide what to evaluate, how to do it, where and when? Frequently, the most difficult problem is that of obtaining accurate information. As indicated by Donabedian, there are essentially three methods, or sources of information, for evaluating medical processes, viz., medical records, direct observation of process, or sampling of professional opinions and behavior (10, pp. 170-74). (Some current authors would also give emphasis to patient opinion.) In the discussion that follows, all comments with regards to process evaluation of health care also seem appropriate for consideration of process evaluation of nutrition programs.

a. Records

The review of records (medical audit) presumes their existence, their accuracy and their completeness. Medical records are usually more accurate and complete in hospitals and group practices than in the office of the individual practitioner. Clute (6) and Peterson

(42) have suggested that high quality care includes high quality record keeping (see also (45)). Some investigators have attempted to surmount the difficulty of sketchy records by supplementing them with physician interviews. Unfortunately, poor memory and the desire to enhance or maintain one's professional standing place limits on the reliability of information obtained through such interviews (8) (17) (33) (39). (Similarly, nutrition program evaluations in developing countries will likely encounter inadequate health care ^{and nutrition} ~~administration~~ program records, and interviews with nutrition program staff will probably encounter similar forms of defensive or self-enhancing behavior and reporting.)

b. Observation

The limitation of inadequate medical records can be overcome, in part, by use of direct observation of the physician by a well qualified colleague. Under such circumstances the observer can directly evaluate physician performance and obtain timely answers to questions regarding any unique or unusual procedures. Such procedures often times arise as a result of unusual family circumstances for the patient, the patient's medical history, income, educational or employment factors, etc. Similar circumstances can arise in the review of medical records, but the physician may not be available to explain the situation or lapse of memory may interfere.

A major limitation of the direct observation method is the possibility that the physician may perform differently while under observation. If the observer is present for an extended period of time, however, there is an increased probability that the physician will inadvertently revert to his or her usual performance level. There is also the difficulty that the observer may not be neutral in judging physician performance, and two observers may reach different conclusions in their evaluation of the same physician. (In nutrition program evaluations, the focus of attention for "direct observation" would be any and all staff responsible for administration of a nutrition program. Limitations of staff resources to conduct the evaluation, both in terms of their cost and time, will place constraints on the extent to which this technique can be utilized. The approach should be employed, nevertheless, as part of a process evaluation of nutrition program.)

c. Sampling Professional Opinion

A third method of process evaluation is by sampling professional opinion, etc., regarding the competence of colleagues and the quality of hospital staff, facilities and equipment. Using such an approach, sometimes called a sociometric approach, Maloney, et al., (34) sought to evaluate the quality of physician care by analyzing the methods whereby physicians seek care for themselves and their families. The results of his study indicated that the physicians selected to provide care were those who were recognized in their community for long-standing professional excellence, were recognized specialists in their field, or had graduated from one of the more outstanding medical schools. Unfortunately, the study also revealed that only 40 percent of all physicians actually had selected a personal family physician (although they all recognized the importance of the availability of such a physician), and only 20 percent had seen their personal physician within the previous year.

d. Additional Problems

In addition to the problems already identified above, the evaluation of process has encountered several other difficulties. For example, the possible heterogeneity of care rendered by a single physician. That is, the quality of care rendered by a physician may be high for some dimensions of care (e.g., diagnosis) and low for other dimensions (e.g., therapy). If the quality of care is not homogeneous across all dimensions of care, how does one obtain an aggregate assessment of the physician involved? This is obviously a weighting problem, but one that has not yet been resolved (10, pp. 174-77). Some authors have found preliminary evidence that indicates the existence of homogeneity of physician care (6) (23) (39) (42) (45).

Other problems include the use of academic standards (those developed in medical schools and research hospitals) to evaluate, for example, rural health care delivery. This poses the question of "which" standards, and "who" should decide. The selection of the dimensions of care to evaluate and obtaining agreement regarding the priority of each dimension, and the issue of who should decide: the physician, the

patient, the community, the third-party payer (private insurance, government, etc.) are further examples of the subjectivity present in quality assessment. The problem of non-reproducibility of evaluation results, i.e., not only can two investigators reach different conclusions regarding the quality of care rendered by a given physician, but the same investigator at two different points in time may not reach similar conclusions in his/her review of the same medical records (10, pp. 183-85), (8), (39), (42), (45). And finally, there is the problem of a weak relationship between process and outcome. This difficulty is reflected in the age-old statement: "The operation was successful, but the patient died!"

The relationship between process and outcome has received increased investigation. The findings of some studies, however, have suggested the relationship to be weak, if not non-existent. For example, Fessel and van Brunt found little association between process and the outcome of care in their study of appendicitis and myocardial infarction (16). In pilot studies at the School of Medicine, UCLA, Charles Lewis indicates, "We have also failed to find significant associations between quality of the processes and outcomes of care" (31, p. 804).

Possibly the two most severe criticisms of the usefulness of the process approach are the studies by Goran, et al. (21), and Hare and Barnoon (22). The Goran study compared physician performance on a simulated problem of urinary tract infection with their actual performance for the same illness condition in day-to-day practice. The study found that with most physicians their performance was better on the simulated illness than in their actual practices. In addition, they found that the physicians that performed best in the simulation case did not consistently perform better in actual practice. The study by Hare and Barnoon also found little or no correlation between a physician's training and theoretical approach to an illness and his actual performance in practice. In simple terms, they concluded that physicians knew what to do, but did not do it. (Can similar statements be made with regards to nutrition program personnel, and/or with regards to parents of malnourished children? This evidence from the medical field holds significant implications for nutrition education programs and for the Knowledge and Attitude components of KAP.)

All of these limitations notwithstanding, the process approach to quality assessment should not be eliminated as an evaluation tool. As will become evident in our discussion of outcomes, frequently there are factors beyond the physician's control which can affect outcome; under such circumstances, it would be unfair to place responsibility for outcome exclusively on the medical profession. If the physician did his/her best in terms of the application of medical technology, and the patient refused to follow instructions or other uncontrollable environmental factors came into play, a second-best assessment of quality might be the evaluation of process. (For precisely the same reason, process evaluation is important for nutrition program evaluation, viz., there are frequently outside phenomenon which influence nutritional status of program recipients but which are beyond the control of program management and personnel.)

7. The Use of Outcomes in Health Care Evaluation

Careful review of the work by Donabedian reveals that he did not provide an explicit definition of outcome, but left the concept at an intuitive level. Other authors have attempted more specific definition of the subject. For example, Costanzo and Vertinsky (7) define outcome as follows:

As a result of the intervention of the health care delivery structure in a state of health imbalance, it is expected that some beneficial result is incurred. This may take the form of a restoration of health equilibrium or an amelioration of the conditions of imbalance--dissatisfaction, discomfort, disease, disability, and death. Outcomes can thus be subdivided according to whether they reflect changes in the pathophysiological state (disease, disability, death) or changes in the psychosocial state (dissatisfaction and discomfort) although these subdivisions are not necessarily mutually exclusive in that the intervention of the health care delivery system more often than not affects both states. (7, pp. 419-20)

John Williamson (55) has taken a more relative approach to outcome by employing a Delphi technique in which physicians are queried as to, e.g., the acceptable frequency of a specified illness within a given population or the acceptable percent of misdiagnoses of certain illnesses, etc. Their actual practice is then compared with their recommended ideal. If their actual outcomes are inferior to their recommended goal, then adjustments are made--either in medical procedures or in the goal--in order to bring the actual and ideal more into agreement.

One of the difficulties in defining "outcome" is the dependence of the approach on an adequate (workable) definition of health. The problem is usually surmounted by specifying quantifiable cure rates or recovery times, etc. Difficulties remain, however, and outcome measurement tools become particularly subjective in cases of disability, pain, mental health, etc. The definitions utilized by Williamson and McClure appear most workable. (See also Sanazaro and Williamson (47).) They generally avoid, however, the subjective problems mentioned above.

Another limitation to the use of outcomes as the means of quality assessment has been alluded to earlier, viz., the fact that other factors beyond the physician's control may impact the health and recovery of the patient. Such factors may include the patient's genetic inheritance, accidents, weather, working conditions, patient refusal to adhere to the regimen, governmental fiscal constraints, former health care, etc. There is also the problem of defining the time-frame for measurement, e.g., 5-year cure rates for cancer, and the fact that with some illnesses, recovery has not as yet been defined. There is also the difficulty that in a polycultural society what is an acceptable outcome for one patient may not be for another. McDermott, et al. (37), for example, found that fixing a congenitally dislocated hip joint in a certain position for white patients was considered good medicine, but for the Navajo Indian, who spends a considerable amount of time seated on the floor or in a saddle, the same fixed position could be crippling. (Similar cultural questions exist in defining optimal nutritional status.)

Many attempts to measure outcome have assumed that the appropriate measurement tool is some form of health status index (17) (19) (20) (27) (29) (40) (44) (46) (48) (54) (57) (58). In a very general sense, there exists some difficulty with this assumption. Except under certain conditions, or definitions, outcome and health status are not synonymous:

In dealing with the concept of health status, the first issue is, how does this term differ from the term 'outcome' (used above in the context of quality of care)? Outcome refers to events that occur after a service has been received. Use of this term is confined to those people who receive a service. Health status refers to a defined population regardless of whether the people in that defined population received any personal health service. (4, p. 6)

As indicated earlier, other factors can affect outcome besides health services. Such factors should be excluded from the evaluation of outcome, but included in the measurement of health status. The appropriate index for outcome should relate the services of illness-remission (including accurate diagnosis) to recovery from the specified illness or illnesses. All factors beyond the control of the attending physician (and supportive health and administrative personnel) should be discounted from the outcome measure. Probably the best, currently available technique to measure recovery is that obtainable through the Williamson Delphi technique. Under this arrangement one could have a group of physicians, familiar with the health needs and treatment characteristics of a given region, establish via a Delphi procedure the optimum measure of recovery for specified illnesses and the expected average time necessary for recovery. The outcome of individual physician care rendered in that region could then be compared against these standards. In the development of recovery norms and duration intervals, consideration would have to be given to the referred patient, particularly where previous misdiagnosis and substandard therapy are involved. (Similar use of a Delphi procedure might be considered for evaluation of nutrition programs at the regional level. In this case, however, it would be necessary to also include several social and economic variables since many factors over and above food, nutrition education and health care services can affect a child's nutritional status.)

Although the outcomes approach to health care quality evaluation has its limitations, in the final analysis it is the ultimate source of validation for all aspects of health care delivery. Structure and process approaches should be utilized in conjunction with outcomes, but they too receive their validity only to the extent that they favorably affect outcomes.

During the last 20 years, research utilizing outcomes as the technique for quality assessment has grown considerably. Moreover, physicians of recognized professional stature have suggested the central, even critical role played by outcome in any final evaluation of quality, or as indirect support to other secondary assessment techniques, e.g., "Outcomes of care constitute the final criteria of effectiveness of physician performance"

(47, p. 123) and "Outcomes, by and large, remain the ultimate validators of the effectiveness and quality of medical care" (10, p. 169).

Notwithstanding current limitations in the outcome approach (limitations frequently shared with the other approaches), reluctance to employ the technique can introduce opportunity costs, both to the health care professions and to consumers of care. McClure (36) has identified some of these costs:

A basic principle of quality engineering holds that in a system, it is not enough to check how each individual worker is performing his or her tasks; rather a random sample of final products must be taken from the end of the line and tested against standards. (36, p. 332)

The better idea is to build systems that are self-correcting, e.g., in cybernetic terms, systems with feedback. A system is self-correcting when it can specify its objectives, measure performance against objectives, and apply the information on any discrepancies between performance and goals to improving performance. Such a system can constantly improve itself over time. On the contrary, no system can correct itself if it cannot measure its performance against goals. If the goal of quality is improved outcomes, then a most grave defect in the health care system is its continued inability to measure itself on the basis of outcomes performance (36, pp. 336-37)

Significantly, the major factor in the failure of care in these and other studies was not unconcern or incompetence of medical care professionals and leaders--they were usually quite competent and concerned--so much as ignorance that the poor results were occurring at all. Outcomes were simply not routinely measured. (36, p. 335)

Continued experimentation through the actual implementation of outcome assessment systems, combined with further statistical analysis of the structure-process-outcomes relationship, are required in order to understand the efficacy of health care on health. Although empirical analysis will be required to validate the relationships of structure to process, process to outcome, etc., Donabedian has suggested a theoretical relationship that might exist between the three:

An approach particularly favored by students of medical care organization is to examine relations between structure and outcome without reference to the complex processes that tie them together.... Clearly, the relationships between process and outcome, and between structure and both process and outcome, are not fully understood.

With regard to this, the requirements of validation are best expressed by the concept, already referred to, of a chain of events in which each event is an end to the one that comes before it and a necessary condition to the one that follows. (10, p. 188)

The chain of structure to process and then to health outcomes, is similar to the economic and engineering concepts of inputs leading to a production or black box process, which itself results in output. The research Donabedian alludes to is verification of these linkages or steps in the health care production process. What is important at this juncture, as far as this paper is concerned, is not the empirical estimation of these health care linkages, but the application of this conceptual model to the evaluation of nutritional programs.

8. The Use of Structure, Process and Outcome in Nutrition Program Evaluation

Heretofore the evaluation models in nutrition have usually included only two general approaches: evaluation of the impact of nutrition programs and evaluation of the process of operating the programs. The purpose of this paper is to recommend that the three-step conceptual model utilized in health care be given serious consideration as an additional evaluation methodology for nutrition. There are several reasons for this recommendation.

In economics there exists the notion of production functions, where inputs of various types are combined in production processes in order to produce some form of output. With the development of human capital concepts in microeconomic theory and the incorporation of Becker notions of time and intra-family decisionmaking, the production function concept has been enlarged to include the production of individual health, especially as a dimension of child quality, as well as the production of nutritional status. The value of this approach is the identification of nutritional status as something other than a random phenomenon, that is, economic theory posits that there exists a causal model wherein human decisions can affect nutritional status and that many of the factors or inputs in this decisionmaking process can be explained in terms of household production functions. The theory does not suggest that all phenomena which affect nutritional status are necessarily included as inputs in the economic model, however, such phenomena can be introduced as exogenous variables, possibly explained by other professional disciplines, but taken as givens in the economic household production model.

The identification of hypothesized causal factors in a household production model suggests that manipulation of these factors can result in a change in the output, in this case a change in child nutritional status. Of particular importance to the issue of evaluation, is the ability of this model to relate directly to the structure-process-outcome evaluation model in health care. Although Donabedian's three approaches to health care quality assessment were originally intended as a supply-side or producers perspective to evaluation, and clearly the

model did not emphasize the linkages of these approaches in the essence of a production function set of relationships, nevertheless his model can be incorporated into a family perspective on household produced health care, and specific to this paper, it can be applied to a causal model of household production of child nutritional status.

For either the professional producer or the household producer of health care services, there are production function relationships involving inputs, an hypothesized black box or unspecified production transformation of inputs into output, and the actual output itself, in this care child nutritional status. If we assume that evaluation of the inputs used in a production function is that set of activities carried out under the rubric of Structure, that evaluation of the black box or the transformation of inputs into output is Process, and evaluation of output itself is known as Outcome, then linkages of the Structure-Process-Outcome steps of evaluation is tantamount to evaluation of the production function at various stages of production, i.e., assessing the quality of the inputs, monitoring the transformation process, and evaluating the quality of the output.

The production function described within the context of economic models is comparable to models in engineering. One particularly useful dimension of engineering models is the emphasis placed on feedback systems, which are frequently part of an overall quality control system. The value of the Structure-Process-Outcomes approach to evaluation, especially when each step is viewed as linked to the next in a fashion comparable to input-transformation-output in a production function, is that evaluation and information monitoring concepts similar to feedback loops in engineering are easily incorporated (conceptually) within these models. Of particular interest is the ability of such a system to provide feedback loops, based on outcomes assessment, which can be evaluated in terms of quality control standards, and if unacceptable outcomes are being produced, the quality of the inputs and/or the use of inputs in the transformation process can be evaluated and necessary changes incorporated in order to guide outcome to the desired standard. The monitoring of outcomes could be done on a sampling basis, where,

e.g., outcome values greater than two standard deviations from (above or below) the mean are tested for statistical significance, and if found significant, then corrective actions are taken.

Another value of this methodology is that the cost of corrective action can be assessed and compared against the "value" of the change (i.e., improvement) in outcomes. Conditions could exist where the cost of corrective action is determined to be greater than the value of the improved outcome. Or, effort could be directed at improved efficiency of the input-output transformation in order to improve outcomes without increasing the quantity and quality of inputs, or in order to reduce the use of inputs and their corresponding cost.

In addition to the capability to provide feedback, the combination of a linked Structure-Process-Outcome evaluation system within a production function framework introduces the possibility of evaluation at three points: At the point of evaluation of inputs; at the point of evaluation of the production process, or transformation inputs into output; and at the point of evaluation of the output. In health care the output is called outcome. In nutrition evaluation the output or outcome are usually identified as "Impact," as, for example, the impact of a school lunch feeding program on the nutritional status of children.

The major difference between Donabedian's evaluation framework and the traditional approach to nutrition evaluation is the fact that Donabedian provides two additional points of evaluation, viz. Structure and Process, whereas most nutrition evaluation models provide only one additional point of evaluation, i.e., Process. What constitutes Process in nutrition evaluation, however, usually includes much the same items of information as Donabedian's Structure and Process. The value of Donabedian's more disaggregated format is that it helps conceptually in the identification of problem areas. From a theoretical, empirical and management point of view the separation of the nutritional notion of Process evaluation into the health care notion of Structure evaluation and Process evaluation is extremely useful. From the point of view of management, an evaluation methodology which is capable of separating problems in the transformation of inputs into output from problems in the inputs themselves is a methodology that permits specific focus on a given problem and, consequently,

has a greater chance at resolution of the problem. For all of the above to apply, however, it is obviously necessary that Structure-Process-Outcome be linked (or linkable) to the production steps of input, production transformation and output.

Not only does the Donabedian three step approach permit more specific identification of points of evaluation, i.e., three points, but it also fosters the development of three separate sets of evaluation standards. In the traditional Impact-Process approach to nutrition evaluation it would be necessary to only provide two sets of standards, and such Process standards would probably confuse or merge input standards with transformation standards.

We have suggested that it is conceptually possible to relate the three steps of Structure-Process-Outcome to the three production stages of inputs-transformation-output. It is the major recommendation of this paper that the Structure-Process-Outcome methods, linked together in the sequence of a production function, be utilized to evaluate nutrition programs. It is recommended that the separation of Structure from Process is superior to combining the two under the single title of Process. Finally, the linked steps of Structure-Process-Outcome, when combined with the conceptual notions of feedback loops and quality control systems, is a useful conceptual model for the development of information monitoring systems of nutrition program operations.

Under such a system, nutrition programs would be viewed as outside phenomena which affect nutritional status production functions. These production functions involve inputs, the transformation of inputs into output, and of course, the final product or output.

Inputs in a nutritional status production function are food, knowledge of food preparation technology, food storage capability, and the human beings that consume the food (in our analysis, the population of pre-school children is the group of targeted consumers), etc.

The transformation of inputs into output requires the inputs just described, plus human and other forms of capital, and energy. Some items of human capital are factors such as the use of nutrition education by the parents or guardians of children, the use of food preparation

technology, the nature of the intra-family food distribution system, etc. Other factors which can affect the transformation of inputs into output are diseases which reduce the ability of the body to absorb and retain the nutrient value of food, a heavy work load of physical labor which consumes nutrients which might otherwise have been used by children for growth, etc.

The output of a nutritional status production function is the nutritional status of an individual or a group. In most previous work on nutrition evaluation this output has been called "Impact." For this paper, impact is understood to mean output, as in outcome in health care, and is measured by anthropometric, biochemical and other traditional measurement concepts.

The value of this approach is that three sets of evaluation criteria can now be specified, along with three separate sets of measurement tools. In addition, responsibility can now be localized to factors where human action can have an effect, as against phenomena where forces are beyond human control. What is more, goals can be identified within Structure and measured within Structure criteria to determine success within the inputs. Similarly, goals can be identified within Process and measured within Process criteria. In this fashion, as against the earlier arrangement of combining the two, it becomes possible for management to more tightly specify tasks and identify people who are responsible for completion of the tasks. The Structure and Process tasks, and measurement criteria to determine when these tasks have been successfully completed, are more easily quantified and evaluated than output or impact criteria. Nevertheless, many of the limitations to Structure and Process identified in the literature on health care evaluation likewise apply in the field of nutrition. In the remaining portions of this report we will discuss the use of the Panama Nutritional Survey data within the context of this new approach to nutrition evaluation and we will present suggested procedures and criteria for the Structure-Process-Outcome approach to be utilized as the basis of a nutritional status information monitoring system.

APPENDIX A

Donabedian's Definition of Quality

The following set of specifications has been developed as a synthesis of the approach formulated by Lee and Jones and the model of the medical process as developed in this paper. It is presented by the author primarily as a basis for further discussion and refinement.

I. Physician behavior

A. Technical management of health and illness

1. Adequacy of diagnosis

- a. Skill and discrimination in obtaining appropriate and complete information using the requisite clinical, laboratory and other diagnostic techniques
- b. The use of valid information (accurate diagnostic tests) or inferences (e.g., from physical examination)
- c. Sound judgement in evaluating the information obtained
- d. Completeness in evaluating the information obtained
- e. Validity of diagnosis

2. Adequacy of therapy

- a. Choice of effective and specific therapeutic regimen prescribed with due regard to expected risks arising from therapy and the condition to be treated
- b. Adequate management of pain, discomfort and distress without undue prejudice to the diagnostic process
- c. Informing the patient about risks and side effects associated with treatment
- d. Maintaining adequate surveillance with the object of reducing risks and maximizing benefits

3. Parsimony or minimum redundancy in diagnostic and therapeutic procedures

(The issue of efficiency in terms of the economic use of resources, although an important factor in the organization of medical care, will not be considered here. The emphasis will be on the logical necessity to have certain items of information and the therapeutic necessity to use certain treatments.)

4. Full exploitation of medical technology

- a. Maximum effectiveness in applying existing technology; knowledge of the technology and skill in its application
- b. Discrimination in the introduction and utilization of new technology
- c. Discrimination in discarding old methods

5. Full exploitation of professional and functional differentiation. Recognition by the physician of his own limitations and the use of other specialists and of other professions where the need arises

B. Socio-environmental management of health and illness

1. Attention to social and environmental factors, especially within the family and at work, having relevance to the following:

- a. Identifying and eliminating barriers to seeking and maintaining care
 - b. Arriving at the professional definition of need
 - c. Adjusting the frequency and content of the periodic review of all well persons
 - d. Obtaining and evaluating information in the diagnostic process
 - e. Planning and recommending treatment
2. Use of larger social units (usually the family) as the units of care wherever appropriate in terms of:
 - a. Therapeutic manipulation of social and environmental factors in the interests of the individual patient
 - b. Using the larger unit as an object of care: for example, in considering the family epidemiology of infectious disease and the social impact of long-term illness on the family
 3. Use of community resources on behalf of the patient
 4. Attention to broader community interests, for example in the reporting of communicable diseases
- C. Psychological management of health and illness
1. Attention to psychological and emotional factors in:
 - a. Identifying and eliminating barriers to seeking and maintaining care
 - b. Arriving at the professional definitions of need
 - c. Adjusting the frequency and content of the periodic review of well persons
 - d. Obtaining and evaluating information in the diagnostic process
 - e. Planning and recommending treatment
- D. Integrated management of health and illness
1. Periodic review of "well" persons with special attention to promotion of mental and physical health, the early detection of physical and emotional deviations, through the use of appropriate screening mechanisms, and the use of appropriate primary preventive techniques for illness, accidents, injury, behavioral and emotional problems, etc.
 2. Using visits for the care of illness as occasions for the management of health
 3. Adequate follow-through on suspected abnormalities or health problems
 4. Identification of "high-risk" situations and appropriate adaptation of the amount and content of health management and medical care to such risk
 5. A developmental and anticipatory or interceptive orientation in the management of health and illness with due attention to preventive management. Attention to preventing physical, social, and behavioral breakdown
 6. Attention to rehabilitation and restoration of function
- E. Continuity and coordination in the management of health and illness
1. Continuity and coordination of care for individual patients through either the establishment of a personal relationship with one physician or the coordination of care provided by several physicians and/or both mechanisms

2. Adequacy of the individual patient record and its ready availability as the major tool of coordination and continuity of care
3. Continuity and coordination of care for several or all members of a family and the availability of family health records to the treating physician

II. The client-provider relationship

It is possible to select a subset of normative goals to define the dimensions of quality in clinical care because there is some consensus here as to what is "good." When one considers the interpersonal process one is less certain as to what the dimensions of quality should be....We are faced with the possibility, or even the likelihood, that the dimensions of quality in the interpersonal process may be viewed differently by physicians and by patients. We may partially sidestep this problem by deriving a set of normative dimensions from generally accepted values in our society; for example, that personal dignity and autonomy be maintained, that decisions be democratically arrived at, and so on. Another alternative is to deduce the dimensions of quality in interpersonal relationships not from any such a priori system but from relationships between dimensions of interpersonal interaction and dimensions of quality in the technical management of care. For example, if participant decisionmaking contributes to patient compliance with physician recommendations, the former becomes a dimension of quality by virtue of contributing to the latter, an already-accepted dimension. The last of the approaches mentioned seems, at present, potentially the most productive. In anticipation of arriving at dimensions of the quality of the interpersonal process through analysis, the following are stated hypothetically as dimensions of quality.

- A. Some formal attributes of the client-provider relationship
 1. Congruence between physician and patient expectations, orientations, etc.
 2. Adaptation and flexibility
The ability of the physician to adapt his approach not only to the expectations of the patient (for greater or less affectivity, for example) but also to the demands of the clinical situation in terms of greater or lesser control, greater or less reciprocation of emotional involvement, and so on
 3. Mutuality
Gains for both physician and patient
 4. Stability
A stable relationship between patient and physician
- B. Some attributes of the content of the provider-client relationship
 1. Maintenance of maximum possible client autonomy, and freedom of action and movement (especially critical for institutionalized patients)
 2. Maintenance of family and community communication and ties (especially critical for institutionalized patients)

3. Maximum possible degree of egalitarianism in the client-provider relationship
4. Maximum possible degree of active client participation through
 - a. sharing knowledge concerning the health situation
 - b. shared decision making
 - c. participation in carrying out therapy
5. Maintenance of empathy and rapport without undue emotional involvement of the provider
6. Maintenance of a supportive relationship without encouragement of undue dependency
7. Maintenance of a neutral, non-condemnatory attitude towards moral and other values of the client
8. Confining provider influence and action within the boundaries of his legitimate social functions
9. Avoidance of exploitation of the client economically, socially, sexually, etc.
10. Maintenance of client dignity and individuality
11. Maintenance of privacy
12. Maintenance of confidentiality

APPENDIX B

Donabedian's Indicators of the Quality of Care

Numerous variables have been used as indicators of the quality of care. The following is meant to give an impression of possible approaches, rather than a complete listing. Selected components of the "medical care process," as described in the text of the paper, are used to classify the indicators listed.

I. Characteristic of the settings within which the medical care process takes place

It is assumed that good care is more likely to be provided when the settings are favorable, and that we know what constitutes a "favorable" setting.

A. Physical structure, facilities and equipment

1. Presence or absence of certain facilities and equipment in relation to specific care functions
2. Space and physical layout in relation to function

B. General organizational features

1. Ownership and auspices
2. Profit or nonprofit status
3. Accreditation, affiliation and residency approval status
4. Other intra-institutional functional relationships (for example, as part of a regionalization program)
5. Group practice, partnerships, "solo" practice

C. Administrative organization

1. Boards of trustees: their composition and activities
2. Administrator: qualifications and relationships with board and staff

D. Staff organization

1. Qualifications: formal degrees, certification, experience, etc.
2. Number of staff related to work load
3. Staff organization and policies governing staff activities
 - a. Educational functions: maintenance and promotion of staff competence
 - b. Control functions: utilization review, various types of audits of staff performance, etc.

E. Fiscal and related aspects of organization

1. Hospital accommodation
2. Source of payment of bill and extent of patient participation in payment

F. Geographic factors

1. Distance, isolation, etc.

II. Characteristics of provider behavior in the management of health and illness

It is assumed that there are acceptable standards of what constitute "goodness," and that good care makes a difference in terms of health outcomes.

- A. Extent to which screening and case-finding activities are carried out
 1. Routine procedures applicable to the older age group: Examples are activities for the detection of glaucoma, diabetes, cervical cancer in women, lower bowel cancer, breast cancer, visual and hearing defects
 2. Screening and case-finding activities related to special-risk situations. Examples are: bleeding from the rectum (sigmoidoscopy); blood in the urine (cystoscopy); indigestion (barium meal and occult blood); hypertension (eyegrounds, urine, catecholamines, etc.)
 3. Follow-up on "red flag" findings with appropriate diagnostic and therapeutic activities. Examples are: bleeding from body orifices; certain abnormal laboratory findings (urine or blood sugar, for example)
- B. Diagnostic activities
 1. Diagnostic work-up
 - a. Frequency of performance of specified test per unit population
 - b. Diagnostic work-up for specified disease situations: volume and nature of tests, etc.
 2. Patterns of diagnostic categorization: completeness, exhaustiveness, specificity, etc.
 3. Validation of diagnosis
 - a. Pathological examination reports on tissues and post-mortem
 - b. Preoperative versus postoperative diagnosis
 - c. Admission and discharge diagnosis
- C. Treatment
 1. Preventive management and supervision of certain diseases. Minimal or optimal standards of number of visits or routine follow up in given diseases such as diabetes, hypertension, syphilis, etc.
 2. Patterns of use of drugs, blood and biologicals in general

Examples:

 - a. Total prescribed drug utilization per capita and per 1000 physician visits
 - b. Use of antibiotics, especially in mixtures
 - c. Use of antibiotics without testing for sensitivity of microorganism
 - d. Use of "shot-gun" hematinics
 - e. Use of multivitamins
 - f. Use of tranquilizers
 - g. Use of blood by amount of blood, age, sex, etc. Incidence of single-unit transfusions
 3. Patterns of use of drugs, blood and biologicals in specified diagnostic situations
 4. Patterns of surgery
 - a. Surgical rates by type of procedure with emphasis on certain operations more open to abuse. Examples: tonsillectomy, appendectomy, hemorrhoidectomy, varicose vein operation; certain gynecological operations including hysterectomy, supra-cervical hysterectomy, uterine suspension

- b. Patterns of multiple operations including second operations suggestive of possible deficiencies in first operation
 - c. Removal of normal tissue at operation
 - D. Consultation and referral
 - 1. Patterns of consultation and referral by category of physician making request, type of consultant, disease characteristics, patient characteristics, institutional settings, etc.
 - 2. Consultations and referrals in specific disease situations, including emotional and psychiatric problems and referral to psychiatrists
 - E. Coordination and continuity care
 - Number of physicians, hospitals and other providers involved in the care of a single patient over a period of time or during a single episode of illness or care
 - F. Use of community agencies and resources
 - Volume and patterns of use, in general and for specified conditions or situations
- III. Other provider behaviors possibly indicative of strength or weakness in the organization of care
 - A. Staff turnover and absenteeism
 - B. Illness rates (for example, among nursing students)
 - C. Use of health services by providers who are presumably informed about sources of good care
- IV. Client behaviors possibly indicative of defects in the organization of care or the client-provider relationship
 - A. Complaints: volume and type
 - B. Compliance and non-compliance: broken appointments; non-compliance with therapeutic regimen (drugs, diet, rest or exercise, etc.); premature termination of care, discharge against advice
 - C. Knowledge
 - 1. About health and illness in general
 - 2. About current illness
 - D. Changes in knowledge or behavior expected after prior exposure to medical care. For example: knowledge about prenatal and well-baby care resulting from having had a child; appropriate institution of prenatal and well-baby care
- V. Characteristics of use of service
 - Studies of the utilization of service have important implications for quality. Inefficient care means poor care. Similarly, unnecessary care is not only costly but can also denote poor quality, in surgery for example. It is assumed that adjustments have been made for factors that influence utilization, other than patient care.

A. Volume of care

1. Levels of utilization in the general population and population subgroups classified by age, sex, race, income, occupation, education, place of residence, insurance status, etc.
2. Components of the utilization rates: "initiation": proportion receiving one or more services; "continuation": number of services for those who receive one or more services
3. Use by place of care: office, home, hospital, nursing home, etc.
4. Use by source of care:
 - a. Type of health professional
 - b. Specialty status

VI. Characteristics of health and other outcomes

It is assumed that adjustments have been made for factors that influence outcome, other than patient care

A. Health outcomes

1. General mortality, morbidity and disability rates. The problems of interpretation would be very severe but one would examine secular trends, geographic variations, etc.
2. Mortality in special subgroups
 - Infant mortality and its components
 - Maternal mortality
 - Other age- and sex-specific mortalities
3. Mortality by cause
4. Longevity
 - Life expectancy -- general and at given ages
5. Composite indices of illness or health giving average number of days lost from morbidity and mortality combined or the average number of remaining days after losses have been subtracted
6. The occurrence of preventable morbidity or disability in the general population. This approach is based on the assumption that given good care, either currently or during years or decades preceeding old age, some of the current morbidity and disability would have been prevented. Examples: prevalence of iron-deficiency anemia; loss of vision due to glaucoma; loss of hearing due to middle-ear disease; rheumatic heart disease; diabetic acidosis; amputations in diabetics and other patients; stage and extent of cancer at time of diagnosis
7. The occurrence of certain complications of, or failures in, therapy. Examples: Decubitus ulcers; cardiac decompensation; incomplete control of diabetics
8. Case-fatality rates and operative mortality rates, by type of illness or operation and type of provider, with corrections for demographic and socioeconomic characteristics of patients
9. The occurrence of specified complications during the course of care or following surgery -- for example, post-operative infection
10. The restoration of physical function following certain traumatic or neurological diseases. Examples: recovery after fractures; residual disability following strokes

11. Social restoration following mental illness. Examples: ability to remain in the community (as indicated by readmission rates); ability to find and maintain employment
- B. Satisfaction
1. Patient satisfaction is not necessarily, nor even usually, an indicator of the technical quality of care, but attention to patient needs is an important aspect of care and patient satisfaction an important objective in addition to technical performance
 2. Satisfaction of the health professionals providing care. While this is a dimension that is seldom mentioned, it is reasonable to assume that the best technical care cannot be maintained if the persons who provide it are unhappy with the work they do and the conditions under which it is done.

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