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Evaluating Costs and Benefits in Health Care

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INTRODUCTION

A substantial share of the health policy community seems to perceive cost-effectiveness analysis/cost-benefit analysis (CEA/CBA) as a potentially significant aid in the attempt to reduce health cost inflation and inefficient resource allocation. Officials of both public and private sector third-party payers have cited their desire for CEA/CBA to assist them in reimbursement decisions. Recent conferences on medical technology issues, attended by experts from academia, Government, and the private sector, have focused on the need for technology assessment, given its presumed significant potential role in reimbursement decisionmaking (427). In addition, the Federal Government is building the institutional machinery to guide, support, and possibly use analysis.

More generally, the health care literature exhibits a growing interest in the cost effectiveness of health care. * Further, a wide variety of health care organizations have demonstrated concern with the resource allocation and cost containment issues that CEA/CBA is presumed to address. Illustrative of the interest and concern are growth in the teaching of health economics in medical school curricula (18), the separate efforts of the American College of Physicians and the Resident Physicians Section of the American Medical Association to promote cost-effective care, and the work of Professional Standards Review Organizations, medical society cost containment committees, and so on.

The potential of CEA/CBA to contribute significantly to cost containment and improved resource allocation seems to be an article of faith to many officials and health policy experts, but both the potential significance and nature of any

contributions of these techniques remain to be established. Despite the fact that different observers have different kinds of impacts in mind when they discuss these analytical techniques, the several qualitatively distinct kinds of impacts CEA/CBA might have are rarely articulated explicitly.

The purpose of this chapter is to set the stage for later discussions of findings regarding the usefulness or potential usefulness of CEA/CBA.

The public, or governmental,² sector is called upon to make certain decisions that are impractical for the private sector to make. Examples of these are decisions concerning national defense or air pollution control, neither of which is amenable to being traded in the marketplace. The public sector also must make other decisions for social reasons such as assuring equitable distribution of what may be considered essential goods (e. g., health care of the elderly). Although the inherent complexities of these decisions and the uncertainties of the variables involved make it extremely difficult to identify and weigh all the consequences, the quality and validity of the decisions can be greatly enhanced by structuring the process so as to reveal as many of the relevant costs and benefits as is feasible and by evaluating them from a social perspective.

Since conventional private sector techniques such as capital budgeting and return-on-investment analysis are ordinarily insufficient for decisions made in the public arena, special tech-

*See Background Paper #1 *Methodological issues and literature Review*, prepared by OTA in conjunction with this assessment.

²This report uses the term "public sector" to refer to governmental institutions and the term "private sector" to refer to all other segments of society. Some people further distinguish between the for-profit "private" sector and the not-for-profit "private" sector (including, e.g., foundations, universities, or institutions such as the Blue Cross Association). The term "independent sector" has been suggested for this latter sector.

niques have been developed. In the medical care area, two such techniques are CEA and CBA. CEA and CBA are designed to integrate the economic aspects of a decision with the health as-

pects of that decision. Consequently, **they should not be considered simply as economic tools.**

DEFINITION OF CEA/CBA

The terms CEA and CBA have come to refer to formal analytical techniques for comparing the positive and negative consequences of alternative ways to allocate resources. In practice, the comparison of costs and benefits is accomplished through a spectrum of approaches, ranging from sophisticated computer-based mathematical programing using large amounts of epidemiological and other data to partially intuitive, best-guess estimates of costs and benefits. Some analyses may take into account the results of clinical trials of a technology and model the technology's effect on health outcomes. Others may assume that the alternative technologies under study have equal effectiveness and concentrate on the difference in costs involved.

Thus, there is a continuum of analyses that examine costs and benefits. At one end of the continuum are what will be referred to as "net cost" studies. In these studies, the emphasis is on costs; net cost studies in the past have often assumed benefits or efficacy to be equal. At the other end of the continuum are analyses that attempt to relate the use of the technologies under study to specific health-related outcomes and compare the costs of the technologies to the differential health benefits. Thus, CEA/CBA comprises a set of analytical techniques, differentiated by the specific costs and benefits that are considered and the manner in which they are analyzed.

The principal distinctions between CEA and CBA lie: 1) in the method of valuation of the desirable consequences of a decision, and 2) in the implications of the different methods of that valuation. In CBA, all costs and all benefits are valued in monetary terms. In a CBA (simplified for illustration) of an emergency medical system, for example, the cost of the program would

be estimated and compared to the benefits. The latter, which might consist of saving a certain number of lives, would somehow be valued in dollars, and the results of the analysis would be expressed in dollar cost per dollar benefit. Thus, conceptually, CBA can be used to evaluate the "worth" of a project and would allow comparison of projects of different types (e.g., such as dams and hospitals).

In CEA, on the other hand, desirable program consequences are not valued in monetary terms, but rather are measured in some other unit; common measures include years of life saved, days of morbidity or disability avoided, or combination of morbidity and mortality such as quality-adjusted life years (QALYs) saved. The reason for a nonmonetary measure of program effectiveness is either the impossibility or the undesirability of valuing certain outcomes in dollars. Thus, unlike that of a CBA, the "bottom line" of a CEA is not expressed as a net monetary value or a monetary ratio; rather, it is expressed in units such as "dollars per life saved" or "dollars per QALY gained." CEA does permit comparison of cost per unit of effectiveness among competing program alternatives designed to serve the same basic purpose. Unlike CBA, however, it does not allow comparison of programs having vastly different objectives (because the effectiveness or outcome measures differ), nor does it permit assessment of the inherent worth of a program. Is a cost of \$50,000 **per year of life saved acceptable? Obviously, this question requires a social and political judgment; it is not simply a technical matter. Naturally enough, as the state-of-the-art of developing composite indexes of outcome measures improves, the versatility of CEA also advances, because the technique can then be used to compare increasingly divergent programs.**

In this report, the term CEA/CBA is used to refer to the class of techniques that includes both

CEA and CBA. The findings of the following chapters apply generally to both techniques.

IMPORTANCE OF EFFICACY AND SAFETY DATA

As emphasized above, CEA/CBA should not be considered only an economic tool. This point is not negated by the fact that CEA/CBA is described as an efficiency-based technique. Measurement of efficiency depends as much on output as on resources used to produce the output. OTA believes that one of the critical output or outcome measures that are or can be addressed by CEA/CBAs is effect on health status or other health-outcome-related effects. Any CEA/CBA

that attempts to analyze such outcomes for evaluation of medical technology will be only as comprehensive and valid as the data on the efficacy and safety of that technology are. Thus, **health-outcome-related CEA/CBAs are dependent on the existence of an adequate efficacy and safety information base.** As OTA has reported previously, however, the status of such information is inadequate for many medical technologies (465).

HISTORY OF CEA/CBA

The commonsense principles of CEA/CBA have been promoted for centuries, but formal application of CEA/CBA is primarily a phenomenon of the present century. In 1902, the River and Harbor Act directed the Corps of Engineers to assess the costs and benefits of river and harbor projects. In 1936, the Federal Flood Control Act required that “the benefit (of projects) to whomsoever they may accrue (must be) in excess of the estimated costs,” though the Act provided no guidance as to how benefit and costs were to be defined and measured. In the same decade, both the Tennessee Valley Authority and the Department of Agriculture implemented program budgeting systems that included rudimentary attempts at formal CEA/CBA. Official Government criteria for appraisal of river development projects were first enunciated by the Bureau of the Budget in 1952 (585).

Early in the Kennedy administration, the Defense Department, under Secretary McNamara, adopted a program budgeting system that employed CEA/CBA to evaluate alternative defense projects. Success in these endeavors, combined with a burgeoning Federal budget, led President Johnson in 1965 to require the implementation of planning-programing-budgeting (PPB) systems throughout the Federal Government. CEA/CBA represented both the spirit and

the letter of the new initiative to rationalize Government resource allocation decisionmaking (547).

PPB met with mixed and limited success, reflecting a lack of resources to implement it effectively, political and bureaucratic opposition to it, and unrealistic expectations of its role and potential (256, 352). The formal system did not survive for long, though many Washington observers believe it left a legacy of continuing improvement in the use of rational analysis in Government decisionmaking (516). The philosophy and logic of CEA/CBA and PPB have been reincarnated during the Carter administration in the form of zero-based budgeting.

In this assessment, OTA found relatively few sound applications of CEA/CBA in health resource decisionmaking. There are, however, increasing numbers of such studies being performed, particularly in the applied research field, and the results of these studies are increasingly being disseminated. Although it is difficult to know how much effect this type of information has, there is ample evidence that both the private and public health sectors are increasingly cost conscious.³

³See ch. 2 of *Background Paper #1: Methodological Issues and Literature Review*, prepared by OTA.

OTA found two divergent trends in published CEA/CBA studies. One trend, based largely within the academic community but slowly diffusing to research-oriented practitioners, is leading to rapid changes in the state-of-the-art of CEA/CBA. This trend is toward CEA/CBA studies characterized as interdisciplinary, of high quality, and advancing the state-of-the-art of the methods. These studies are also becoming increasingly oriented to concerns peculiar to the health field, such as health status measurement, equity considerations, and the value of health and of life itself. Since the studies are gaining wide readership—being published in the leading journals—and are becoming more understandable to the lay public, they are enhancing acceptance of CEA/CBA.

LEGAL STATUS OF CEA/CBA

Currently, the law explicitly authorizes only one health-care-related agency, the National Center for Health Care Technology, to support CEA/CBA studies, although parts of the National Health Planning and Resource Development Act (Public Law 93-641) require that cost effectiveness be considered in some decision processes. Furthermore, no court rulings or pending cases directly relate to the use of these techniques in health care agencies. In areas

The other trend, which is occurring outside the academic community, is characterized by a rapidly expanding CEA/CBA literature base. Many of the articles are written by practitioners who are increasingly concerned about the general concept of cost effectiveness in medical practice. For the most part, this body of literature is found in general health and medical journals. Although the analyses are not as methodologically advanced or complex as those in the former group—probably because the authors often do not have an economic or other quantitative background—their impact upon physician practice may be substantial. The increasing number of studies, in any case, certainly can be considered an index of practitioners' concerns about health costs.

other than health (e.g., environmental regulation), however, there are immediate and significant judicial and legislative pressures to use CEA/CBA in decisionmaking. In the last two Congresses alone, more than 65 separate bills have included provisions for Federal agencies to use CEA/CBA or risk-benefit analysis in the decisionmaking process. See appendix E for a brief discussion of the legal status of CEA/CBA.

USE OF CEA/CBA IN HEALTH CARE DECISIONMAKING

There are two basic types of health care resource allocation decisions that *in theory* could benefit from CEA/CBA. The first are decisions made within a fixed, constrained, or population-based budget, such as those made by health maintenance organizations (HMOs). The second are decisions made in the absence of a direct budget constraint, such as reimbursement decisions by medicare or certificate-of-need recommendations by local health planning agencies.

In the former—allocation decisions made within a budget—tradeoffs must be made, since not all projects can be funded. The projects that promise to deliver more benefits for the cost

should be more attractive than those projects expected to deliver fewer benefits. In these decisions, an economic constraint already forces costs to be considered. The function of CEA/CBA in budget-constrained decisions, therefore, would be to illuminate the decision process and to require that implicit judgments be made more explicitly, thus forcing external examination of assumptions and of the values placed on the decision variables. Note that even though costs are normally taken into account in these budget-constrained situations, the types of CEA/CBA or related analyses undertaken can still range from analyses on the net cost end of the continuum to analyses where effectiveness is ex-

plicitly related to health outcomes or some equivalent measure.

In non-budget-constrained decisions, direct tradeoffs between competing projects often are unnecessary. Consequently, a function of CEA/CBA in these decisions would be to force economic factors to be considered. In health planning decisions, for example, planners would be asked not only to consider whether a service is needed but also to compare the cost of the service with the expected benefits and perhaps to compare the costs and benefits of the service under study to the costs and benefits of other services that could be assigned higher or lower priorities.

CEA/CBA is viewed by different parties as ranging in usefulness from obfuscating the pertinent issues in a decision process at one extreme to illuminating and synthesizing the issues so well that the technique is used to make decisions at the other extreme. There is, however, a middle position that maintains that the technique could be helpful in structuring information and that **this information should be only one of several components of a decision process. Both extreme positions mentioned above are associated with the use of CEA/CBA as a formal, structured analysis that is oriented toward a bottom-line answer, such as a cost-benefit ratio.** Such a bottom-line, however, may avoid or even hide many important value judgments, thus providing an unambiguous answer which may rest on ambiguous data or assumptions.

Advocates of the middle position propose that CEA/CBA be used within the context of accepted principles of analysis in order to illuminate the costs and the benefits of a decision, but not necessarily to aggregate and weigh them. Warner mentions a similar perception of CEA/CBA as a consciousness-raising exercise: CEA/CBA would have “no direct influence on policy decisions, but its presence in the literature and in policy debates (would serve) to raise the general awareness and understanding of the economic side of health care, particularly among members of the medical profession” (615). When properly conducted, CEA/CBA can serve as a means of raising value and equity issues related to the subjects under study.

Most of the specific findings of this report relate to two major general findings of the OTA assessment. The first of the general findings is that **performing an analysis of costs and benefits has the potential to be very helpful to decision-makers, because the process of analysis structures the problem, allows an open consideration of all relevant effects of a decision, and forces the explicit treatment of key assumptions.** The second general finding is that CEA/CBA exhibits too many methodological and other limitations to justify relying solely or too heavily on the results of formal CEA/CBA studies in making a decision. Thus, CEA/CBA could be useful for assisting in many decisions, but is probably not appropriate as the sole or prime determinant of a decision.