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**Methods for Assessing  
the Cost Effectiveness and  
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The preceding chapters illustrate some of the complexity of assessing the outcomes of psychotherapy. Although such assessment is undoubtedly difficult, it nevertheless seems possible to evaluate psychotherapy using scientific methods of analysis. Assessing the costs and benefits of psychotherapy, and developing comparisons among effects, costs, and benefits—that is, conducting cost-effectiveness and cost-benefit analyses (CEA/CBAs)—is a natural next step in this research process. To conduct such CEA/CBAs encourages the explicit analysis of the resources used in psychotherapy and the effects (positive and negative) of different resource allocation decisions.

Potentially, CEA/CBA is a set of procedures that can aid in decisionmaking about the use of psychotherapy. Increasingly severe economic constraints, as well as the call for an expansion of mental health services (see 219), make it especially important to understand how the effects of psychotherapy are related to the resources it consumes. There are a great number of competing pressures for health care resources, and, ideally, CEA/CBA applied to psychotherapy can serve as an aid to resolving these conflicts. Although the application of CEA/CBA is, perhaps, not as well developed in psychotherapy as in other areas (see 203), the current policy controversy about mental health treatments has created increased interest in its use. The present chapter describes the methods underlying the conduct of CEA/CBA in psychotherapy and indicates both the potential for its use and the problems associated with its application to mental health treatments.

It is important to note that many of the issues of CEA/CBA of psychotherapy are closely re-

lated to the problems of assessing efficacy. Economic analyses of psychotherapy are dependent on the quality of research data pertaining to psychotherapy's effects. The unique problems of CEA/CBA of psychotherapy have to do with the difficulty of comprehensively assessing and valuing the effects of psychotherapy (see 98, 157,206). Such effects include the reduction of pain and suffering and enhancement of "well-being." These effects are very difficult to measure and even more difficult to value in monetary terms. This difficulty may result in CBAs of psychotherapy consistently undervaluing the benefits of psychotherapy. CEA, in contrast to CBA, does not require that such effects be expressed in monetary units, but does rest on the premise that they can be valued in some manner. Such difficulties restrict the usefulness of cost analyses.

The methodological issues involved in the development of CEA/CBAs of psychotherapy are described in the following sections. For a more complete description of CEA/CBA, the reader should consult OTA's main report on CEA (203).<sup>1</sup> The present analysis begins with a discussion of the methods for assessing costs, and that is followed by a discussion of the methods for assessing benefits. In the third section, the actual conduct of cost analyses is described. The discussion below emphasizes the relationship of CEA/CBA to efficacy assessments and the usefulness of CEA/CBA in aiding policymaking about psychotherapy.

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<sup>1</sup>In addition to the main report of OTA's assessment of CEA, *Background Paper #1. Methodological Issues and Literature Review* describes, in detail, the use of CEA, CBA methods.

## COST ASSESSMENT

For the purpose of CEA/CBA, the cost of psychotherapy may be conceptualized as the value of various resources consumed in the process of therapy (see 6,157,173,237). These costs include the value of a variety of resources used to provide treatments, such as the value of the therapist's time and the value of the use of the treatment facility. They may also include the value of the patient's time. Inevitably, decisions are required about whether to include or exclude costs and how to value resources appropriately. These decisions often reflect the subjective judgments of different interest groups involved in the cost analysis (see 203,277) and the purposes for which the analysis is being conducted. Just as different theoretical perspectives on psychotherapy may result in different measures of therapeutic effectiveness, so too may different perspectives yield alternative ways of defining therapy costs.

### General Considerations

There are a number of general considerations relevant to assessing the costs of resources used in psychotherapy. Some of these general issues have to do with the data that are used in developing cost estimates. Others concern the use of procedures to transform available data into useful indices of resources consumed. In a later section, the application of these procedures to the collection of specific cost data is described.

**Accounting Methods.**—The most readily accessible source of data to assess the costs of psychotherapy are the entries in the accounting records of a treatment facility (e.g., a practitioner's office, a mental health center). Because they are usually highly organized and accessible, accounting records give a ready definition and a reasonably reliable record of the moneys required to deliver therapy. These direct costs are the ones that are most often referred to in simple cost analyses of psychotherapy. A caveat that should be noted, however, is that the costs that result from accounting tabulations may not include all or even most of the resources used by therapy. Costs from such tabulations, therefore,

may not be an accurate reflection of the resources consumed.

In addition, a number of costs may not appear in accounting records. Thus, for example, volunteered time and donated facilities may play a large, but unaccounted for, role in the provision of psychotherapy. Therapies that attract more volunteers owing to location or type of patient treated may appear less costly than therapies located in areas where volunteers are scarcer (e.g., in impoverished neighborhoods) or than therapies treating less "attractive" persons (e.g., sex offenders compared to children who are autistic). Resources contributed to therapy by the family or others connected with the patient may also be considerable, but would not be recorded in an accounting system.

**Opportunity Cost.**—A more correct approach to assessing the costs of psychotherapy than using accounting costs involves the opportunity costs concept. In using opportunity costs, one calculates the value of a resource as if it were applied to a best alternative use. For psychotherapy, determining opportunity costs allows one to consider more completely the value to society of various resources consumed by psychotherapy treatments and significantly alters the analysis (25,40,283,305). Consideration of opportunity costs avoids problems created by different accounting procedures and, at least conceptually, the problems due to the use of volunteers and donated facilities.

**Discounting.**—The actual calculation of opportunity costs involves the use of discounting procedures, which provide a present value of future costs. Thus, if costs will be incurred at a future time, they will appear to be less costly if valued in the present. The discount rate is usually based on the prevailing interest rate. Probably, discounting procedures are more important for properly valuing benefits (which are more likely to occur over time) than for valuing costs. Obviously, though, discounting procedures are necessary when dealing with costs such as those for a treatment facility.

## Methods for Cost Assessment

The valuation procedures used to assess the most common cost elements in psychotherapy are considered in this section. The use of opportunity cost procedures and the complete assessment of relevant cost elements are emphasized. Also discussed is the assignment of costs to specific treatment.

**Personnel Costs.**—The cost of personnel is usually the largest therapy cost (between 60 and 80 percent, according to Levin (157)), Personnel costs can usually be estimated simply by multiplying the sum of salaries and benefits of the personnel employed in the therapy process by the time involved. Personnel may include professional therapists and paraprofessionals, as well as support staff. In cases where salary data are difficult to analyze or where time is volunteered (e.g., a therapist donates time in a teaching facility), personnel costs can be estimated by other means. Thus, for example, hours of therapy can be multiplied by standard hourly salary figures.

Several “time accounting systems” have been specifically developed to collect personnel cost data in mental health treatment facilities (30, 150,205). Some of these data are available in accounting records, but oftentimes they are not available in sufficient specificity (i. e., broken down by tasks). In the time accounting system described by Carter and Newman (30), all personnel, including volunteers, patients, and salaried staff, were required to keep daily records of time spent in therapy-related activities. This information formed the basis of a cost-accounting system.

**Facilities and Equipment Costs.**—Also included in the valuation process are the costs of operating facilities, most correctly expressed in terms of market rent, plus overhead such as cooling and building maintenance costs. Market rent is used in order to value the resource in terms of its “opportunity cost,” discussed above. This procedure corrects for the problem of valuing donated facilities and for valuing government facilities which may be leased (to the treatment agency) at artificially low rents. The procedure would include the estimated val-

ue of donated or loaned rooms and buildings. It would also adjust the rent or mortgage to assess their true, rather than paid-for, value.

Costs for the equipment and materials used in psychotherapy also have to be calculated. These costs, which are usually available in accounting records, include such resources as office supplies, food, laundry, and telephones. They may also include the value of such specialized materials as psychological tests and computer scoring services. Usually, the difficulty with assessing the cost of these specialized resources is the lack of records as to their use.

**Other Costs.**—In addition to personnel and facilities/equipment costs, some analysts include the costs of the patient’s time and/or the costs of therapy to a patient’s family. Although such costs can, alternatively, be considered as a negative benefit (i. e., subtracted from benefits), it is sometimes useful for them to be included with the actual costs of providing therapy. Thus, for example, when a patient loses time from work activities or when an employer has to give release time to a patient for therapy, it may be useful to value the patient’s time and consider it as a cost.

Assessment of the costs of the patient’s time is similar to the way other personnel costs are calculated. Usually, an accounting can be made of the amount of time that the patient spends in therapy. Assuming that this time could be used productively, it is multiplied by the patient’s salary. Parallel calculations can be made for family members who become involved in the therapy or are required to spend time with a patient as a result of therapy. One problem with this aspect of the costing process is the problem of equity, since some groups of people earn more than others and, thus, their time could be valued more highly.

While a number of other costs could be included, such as the psychological cost of therapy, there is no agreement as to whether they should be included or how they can be valued (see, e.g., 126,172). The development of psychological cost measures would involve the assessment of the suffering or pain of a patient as a result of therapy. However, such costs, as

well as the costs of mental illness are usually considered as a reduction in the benefit of a treatment.

**Specifying Costs.**—For a simple CEA or CBA, the sum of personnel, facilities, equipment, and materials costs may be adequate. For an analysis which seeks to identify the procedures, therapists, patient types, or settings that consume more costs than others, however, procedures have to be devised for assigning costs to individual components of therapy. Analyses of this type may become even more complex when distinctions have to be made among various types of costs (157,248).

Cost data that can be used for analyses of the resources used for specific components of therapy can be collected either during therapy or after it is completed. If collected after therapy, the analysis requires summary data to be broken down into different costs corresponding to therapy components. Because many assessments of psychotherapy have been introduced only after a therapy program has begun, the breakdown method has received considerable attention. Analyses that examine the cost effectiveness of treating individual patients may divide overhead costs such as salary, rent, and basic supplies equally among patients, according to the amount of their therapy (e. g., number of therapy hours).

Some cost assessment procedures assign therapist costs to patients according to the amount of time that therapists spend working with different patients; then, the costs of overhead, personnel, and other resources are divided equally across patients (e. g., 30,149,199,305). To compare the relative cost, cost effectiveness, or cost

benefit of different components of therapy programs, the difference in direct costs of the various treatment components is calculated. In such analyses, the overhead costs that are the same for each component are ignored. These direct costs are then used in CEA/CBAs, as described below.

## Discussion of Cost Assessment

Despite some longstanding interest in assessing the cost of psychotherapy (e.g., 76) and the apparent ease of applying standard valuation methods to psychotherapy, the assessment of psychotherapy's cost is not widespread, nor has such assessment been evaluated. Certainly, techniques for the measurement of effectiveness are much better developed than those for measuring costs. Most psychotherapy research—perhaps 95 percent—neglects the cost of the treatment. The implications of this neglect for CEA/CBAs of psychotherapy are important to consider (16). It should be noted for example, that no standards as to what should be included in cost analyses have been developed. More importantly, the available studies may reflect a narrow range of treatments (probably those treatments which are either very costly or very low in cost). In addition, cost data may be derived from existing studies even if not explicitly included in the original analysis. Usually, the available information on numbers of therapists, patients, and treatment length is detailed enough for rough cost estimates to be made. Combined with secondary analysis procedures, the availability of these data may provide a promising opportunity for further R&D of psychotherapy CEA/CBAs.

## BENEFIT ASSESSMENT

The valuation of “benefits” resulting from psychotherapy which can be used in CBA, unfortunately, is even more problematic than cost assessment (e.g., 140,237). The translation of effects into benefits is necessary to provide a common metric for comparing resources used with effects. The problems of benefit assessment have

to do with selecting effects to be valued and determining appropriate ways of translating effects into benefits (i.e., valuing effects in monetary terms). Below, these problems are discussed in terms of the types of benefits produced by psychotherapy—to patients, to those associated with patients, and to society.

**Benefits to Patients.**—The most obvious benefits of psychotherapy accrue directly to the patient, although different effects of therapy have somewhat different problems attached to their valuation. Thus, while a change in earnings may be valued in a relatively straightforward way, other benefits of psychotherapy, such as a reduction in pain or anxiety, are more difficult to measure and value. Because these intangibles are so difficult to quantify in monetary units, any CBA of psychotherapy may undervalue the benefits. It is also possible that some of the negative benefits of psychotherapy (perhaps, the effects of stigmatization of being a patient) will not be calculated. To avoid this problem, many studies separately analyze tangible and intangible benefits, comparing only tangible benefits to costs.

From the perspective of some economists (e.g., 251), it is argued that a patient's willingness to pay for psychotherapy reflects its value to the patient. Thus, that which patients are willing to pay for therapy is the net value of the expected health, social, and economic benefits, minus the psychological suffering, lost time, and personal costs that are incurred as a result of undergoing psychotherapy. Underlying the use of the "willingness-to-pay" concept is the assumption that the patient has made an informed decision to pay the required fee. However, the willingness-to-pay assumption, while theoretically possible, assumes that the mentally distraught person has made a rational decision. Since such individuals seldom have access to clear information about psychotherapy's costs and benefits, this assumption is probably unlikely and has not really been applied.

Some economists, for example, Weisbrod (296), recognizing the inherent problem with applying the willingness-to-pay criterion to psychotherapy, have proposed more direct assessment of patient benefits. In Weisbrod's research, the variety of effects of treatment are identified and, to the extent possible, transformed into monetary values. For some effects, such as improved quality of life or absence of mental illness, no pecuniary value can be assigned. These factors are therefore not included in an assess-

ment of benefits, but can be contrasted with the costs of particular therapies.

Aside from such problems of valuing certain effects, there is also a problem of identifying which effects should be attributed to psychotherapy. This is accomplished by comparing treatment and control group data. To the extent valid control group data are not available, resulting benefit estimates may be in error. While the availability of appropriate effectiveness data is a problem for the assessment of any type of benefit, it is a particular problem for assessing the effects on a patient. For most effects, there will be a variety of other possible causes which will be difficult to separate without control group data.

**Benefits to Those Associated With Patients.**—The effects of psychotherapy may extend beyond the patient. Thus, the family and friends of a patient may have their own quality of life improved if therapy is successful. In a more tangible way, they may also achieve more productivity in their own work and have more time available for their own needs. The opportunity value of their improved productivity and time can be calculated and, where appropriate, considered as a benefit of psychotherapy.

As a result of therapy, patients may also be more productive workers, and the benefits of this productivity may accrue to their employer (over and above the wages paid to the employee). Absenteeism may be reduced, accidents be fewer, and a host of other benefits are potentially the result of psychotherapy (e.g., 138). These benefits, of course, must be reduced by costs for an employer to provide psychotherapy or to allow employees release time to undergo psychotherapy. As noted earlier, however, these costs can either be considered a direct cost or subtracted from the benefits. It is important to ensure that an analysis uses consistent procedures. It is also important that the same benefits are not counted twice; thus, for example, the analyst must be careful not to count the same wages as a benefit to the patient and to the employer.

**Benefits to Society.**—Some of the most tangible benefits of psychotherapy may accrue to so-

ciety. Thus, the maintenance of employment or a reduction in criminal activities may yield a savings directly to society. These effects, reflected in such savings as reduced unemployment payments, may be over and above the benefits to patients and employers. Although such outcomes may be relatively easy to value, a problem is that the benefits, if they exist, probably accumulate over a long period of time. In most cases, these benefits would have to be very large to offset the impact of discounting their value over the time they are received.

It should be noted that most often the benefits described above will be in the form of expected cost savings. Therapy-related benefits, such as reductions in work absenteeism, physician visits, drug abuse, and arrests, have each been considered in CEA/CBA studies (e.g., 51,228, 244,245). In these studies, the cost of each unit of service is estimated from average rates or from accounting records, and the reduction in use of units of social services is multiplied by the

unit cost to estimate monetary cost-savings benefits. Usually, the validity of control group data to estimate these savings is critical in order to separate the effects of psychotherapy on these variables from other causes.

**Discussion.**—In several ways, developing benefit measures is more difficult than the comparable procedures for cost assessment. Because of the problems associated with using willingness to pay as the basis for valuing benefits, methods have to be developed to transform effects into benefits. If errors are made, they will probably result in some analyses' not taking benefits (especially the psychological ones) into account and, thus, understating the benefits of therapy. In addition, it is probably easy to err by not including some benefits. Because benefits potentially accrue to a large number of people and societal agencies, often more so than the number of people or groups who incur costs, problems in analyses may result.

## **METHODS FOR CEA/CBA**

The purpose of carefully measuring the costs, as well as the benefits, of psychotherapy is to be able to conduct CEAs and CBAs. CEA differs from CBA and it is essential to recognize the difference (see 203). Cost-effectiveness studies require only that the costs of psychotherapy be valued in dollars. In CEA, the effects are not valued in monetary terms and can be expressed in any units. In contrast, CBA requires that both the costs and outcomes be valued in monetary terms. (Theoretically, costs and benefits need only be expressed in the same unit for CBA, but this unit is nearly always monetary. ) It should also be noted that informal cost analyses can be conducted where a researcher selectively pays attention to some aspects of resource use or benefits.

Although CEA usually requires a simpler set of procedures and yields less comparative information than CBA, CEA is often considered a more appropriate tool; in other cases, when certain comparative information is necessary and when valuation problems can be overcome,

CBA is better suited to the problem (see, e.g., 98,157,206,305,307). In still other cases, when comprehensive data are not available, actual CEA/CBA is not done, but the costs and benefits are compared informally. Most commonly, CEA and CBA have been used to compare the "worth" of different psychotherapies as provided in different settings. Also frequently employed are formal and informal CEA/CBA studies designed to yield information to those directly responsible for the therapy. Such analyses often try to assign costs and outcomes to specific treatment processes, so that the optimal mixture of processes can be obtained (see 305). Below, some procedures associated with the conduct of CEA and CBA studies are described.

### **Cost= Effectiveness Analysis**

When benefits and costs cannot be valued in the same units, or when the outcomes of a treatment seem more valid when expressed in their natural units (e.g., reduction of an anxiety), then CEA is probably more appropriate than CBA

(e.g., 157,237). In addition, when treatments are compared that have similar goals, CEA may provide an adequate and appropriate methodology. In conducting CEA, outcome data are divided by costs to form cost-effectiveness ratios. The procedure allows, for example, the comparison of several therapies to determine which therapy produces the greatest amount of change for the least cost. A variety of examples of this procedure are given in chapter 6.

**Tabulation and Matrix Methods.**—One of the simplest ways to analyze effectiveness and cost relationships is to display the data in an array. A simple tabulation model described by Krumholtz (150) provides a rudimentary example of how the basic direct cost, processes, and effectiveness can be arrayed in a useful way. A table is developed with the sideheadings “Problem Identification,” “Method,” and “Outcome.” Under a supraheading, “Cost,” are the headings “Activity,” “Hours,” and “Dollars.” Cost breakdowns, problems to be worked on further, and the other essential information for simple analysis are contained here.

Newman (30,198) has developed a CEA procedure that has been adopted in a number of psychotherapy settings. An instrument is used to measure level of functioning along a range of dimensions. Newman arrays his outcome data in a matrix, using dimensions such as level of functioning before treatment and level of functioning after therapy. The cells of the matrix are completed with the number of patients who functioned at that level before treatment and who moved to another level of functioning by the end of therapy (or who stayed in the same level). Next, the cost of treating each patient in that cell of the matrix is summed, and divided by the number of patients whose functioning change is described by the cell. The resulting cost-per-patient ratio reflects cost effectiveness in terms of its position in the matrix (see also 270).

**Linear Functions.**—To describe and predict relationships between effectiveness and cost, it is possible to develop equations that describe cost-effectiveness relationships (see 305). The techniques that would achieve a given level of effectiveness also can be chosen from this

graphic model of the cost-effectiveness relationship. Not only can effectiveness be predicted, but the effectiveness of particular techniques for different costs can be determined. In an actual situation, a number of possibilities exist for a function to describe this relationship (e.g., linear or exponential). Ideally, if this method were chosen before therapy, several plausible models would be chosen, such as the linear and exponential, and the average of predictions generated from them would be used in decisions until further information supported one model over the other.

**Linear Programming.**—Finally, some applications of CEA techniques attempt to incorporate information on cost limits, as well as on the factors that determine the effectiveness of psychotherapy. The basic concept underlying linear programming is to consider not only the factors that contribute most to therapy outcomes, but also the cost of less effective factors and budget restrictions. Linear programming is a statistical procedure used to find the exact mixture of the most contributory factors that are possible within budget constraints.

The equations for linear programming bring together information on which therapy techniques, delivery systems, or therapists work best and on the amounts of each resource needed to implement each technique or delivery system, or to hire each therapist. Equations can be used to minimize the total costs of achieving a prescribed degree of effectiveness or benefit. The equations can also be manipulated further to discover which cost constraint could be fitted to yield the maximum improvement of effectiveness or benefit. A number of psychotherapy researchers have advocated use of these and related techniques to conduct cost analyses in the human services delivery such as psychotherapy (e.g., 1,14,72,115,193,310).

### **Cost= Benefit Analysis**

In CBA, benefits are summed using the same units (e. g., dollars, person-hours) and costs are summed using the same units as benefits. A ratio is then derived by dividing total benefits by total costs. If benefits exceed costs, the ratio is larger than 1, and if benefits are less than

costs, the ratio is less than 1. Such benefit/cost ratios provide a convenient economic index of the net benefit of an activity.

One reason that CBA may be more useful than CEA is that decisions which compare benefits to costs of a treatment program are seldom made in isolation. Often, benefits and costs of a given treatment are most useful when compared with benefit/cost ratios of other treatments competing for the same funds. Thus, an alternative treatment program may be available which could generate superior benefit-to-cost ratios. The important factors are the difference in the costs of alternative treatments, the difference in benefits of alternative treatments, and the ratio of benefit to cost. An argument can be made that effectiveness measures should be used, in some cases, instead of benefit measures, because effectiveness data probably retain more accurate and valid information on treatment outcomes. That very much depends on the situation, however, and it may be necessary to present both types of data.

To illustrate the problem, consider the applications of CEA methods to psychotherapy by Halpern and his colleagues (22,113,114). Their approach views improvement in therapist ratings of patient functioning as a monetizable increment in the economic value of the patient. This increment is contrasted, in simple benefit/cost ratios, to the monetary cost of treating the patient. Potter, Binner, and Halpern (216) have made their models somewhat more sophisticated by considering benefits according to the amount of time the patient stays in the community as well as the improvement noted by the end of therapy. Although perhaps useful, this method suffers from potential bias in therapist ratings of improvement in patient functioning and in assignment of a somewhat arbitrary value (e. g., \$10,000) to each functioning unit improvement. It may be more accurate to use the actual functioning unit scores in a CEA.

Despite such problems, there are still reasons to prefer benefit measures, especially when the units in which benefits have been measured are more directly meaningful than those used by Halpern, et al. (22). Ratios of effectiveness divided by cost may not provide as much infor-

mation as benefit divided by marginal cost, because if the latter is greater than 1, the additional benefits of one of the alternative treatments can be said to be "worth" the additional costs it requires. It is difficult to make a similar statement about effectiveness/cost ratios.

Fishman's research (77,78), developed to assess the effects of a community mental health center, illustrates the use of similar CBA procedures. Fishman views CBA as an experiment in which outcome and cost data are gathered using the research designs for assessing efficiency described earlier. If the effectiveness of one program or program component is shown by statistical analysis to be significantly superior to the effectiveness or benefit of another program, and the costs of the two do not differ significantly, then the program with superior effectiveness is more cost effective. If the costs of alternative programs differ significantly, but their effectiveness or benefit does not, then the least costly program is adopted. Fishman acknowledges that his model breaks down in situations where the significantly more effective or beneficial program is also significantly more costly. The question as to whether the increment in effectiveness or benefit is "worth" the increment in cost is, as noted earlier, a question for marginal benefit-cost analysis.

Net Benefit Analysis.—It should be recognized that ratios of benefit to cost or effectiveness to cost do not really yield information about the absolute amount of benefits and total costs involved. This information may be important in decisions that must deal with limits on the maximum cost allowable and on the minimum benefit that should be produced. The amount that benefits exceed costs also may be of concern. A benefit/cost ratio of 2 can be produced by a benefit of \$200 and a cost of \$100 for one program, or by a benefit of \$200,000 and a cost of \$100,000 for another program, but these two programs are not the same. If no more than \$2,000 can be spent, the former treatment program is the only feasible one; if benefits must exceed **\$2,000**, then the second treatment program is the only one possible. To aid in maximizing benefits, analysts often calculate net benefits, which are present-valued benefits minus pres-

ent-valued costs. This is one of the advantages in expressing outcomes and costs in the same units. If the net benefit is negative, then the program is not worthwhile; if net benefits exceed zero, the program is worthwhile. This information may be more useful than ratios in many instances, although it might also be desirable to consider calculations of net benefit per patient.

**Sensitivity Analyses.**—In any CBA, it is important to consider the impact of alternatively valuing benefits and the impact of measurement error. For example, if a benefit of \$100,000 is in error by + 10 percent and the cost of \$90,000 in error by + 10 percent, the benefit/cost ratio might vary from 0.91 ( $\$90,000/\$99,000$ ), to 1.36 ( $\$110,000/\$81,000$ ), instead of the 1.11 ( $\$100,000/\$90,000$ ) calculated originally. Providing these alternative calculations would give the interpreter of the CBA an idea of the possible error.

## SUMMARY

There exist a variety of methods to assess the costs and benefits of psychotherapy and to compare the data generated by various studies. Although in the case of psychotherapy, unique difficulties arise (in particular, having to do with the valuation of benefits), the problems of conducting CEA/CBAs are not necessarily unique to assessments of psychotherapy. In every instance, the usefulness of such analyses is very

Statistical analyses can also be applied to such problems. Thus, for example, one can calculate standard error scores which provide a precise statistical measure of error (see, e.g., 201). Statistical procedures can also be used to test the significance of different cost/benefit ratios (30). These ratios are typically calculated for the treatment as a whole, in which case possible error in measurements of costs, effectiveness, and benefits cannot be treated as variance about a mean, but instead as an absolute error. In such analyses, the degree to which measurement error may influence the benefit /cost ratio can be investigated only by first establishing a reasonable range of possible error and next calculating (benefit given error) / (highest cost given error), and (highest benefit given error) / (lowest cost given error). Some of these procedures are also applicable to CEA.

much dependent on the quality and availability of outcome data. It would seem, however, that much more methodological development needs to take place with respect to CEA/CBA before these techniques can be used with known reliability and validity in psychotherapy assessments. The substantive literature describing the application of these methods to psychotherapy is examined in the next chapter of this report.