Workbook 8

Economic Evaluations

WHO
World Health Organization

UNDCP
United Nations International Drug Control Programme

EMCDDA
European Monitoring Center on Drugs and Drug Addiction

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Overview of Workbook Series

This workbook is part of a series intended to educate programme planners, managers, staff and other decision-makers about the evaluation of services and systems for the treatment of psychoactive substance use disorders. The objective of this series is to enhance their capacity for carrying out evaluation activities. The broader goal of the workbooks is to enhance treatment efficiency and cost-effectiveness using the information that comes from these evaluation activities.

This workbook (Workbook 8) is about economic evaluation. Economic evaluations involve the *identification, measurement and valuation,* and then comparison of the costs (inputs) and benefits (outcomes) of two or more alternative treatments or activities.

Introductory Workbook
Framework Workbook

Foundation Workbooks
Workbook 1: Planning Evaluations
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Specialised Workbooks
Workbook 3: Needs Assessment Evaluations
Workbook 4: Process Evaluations
Workbook 5: Cost Evaluations
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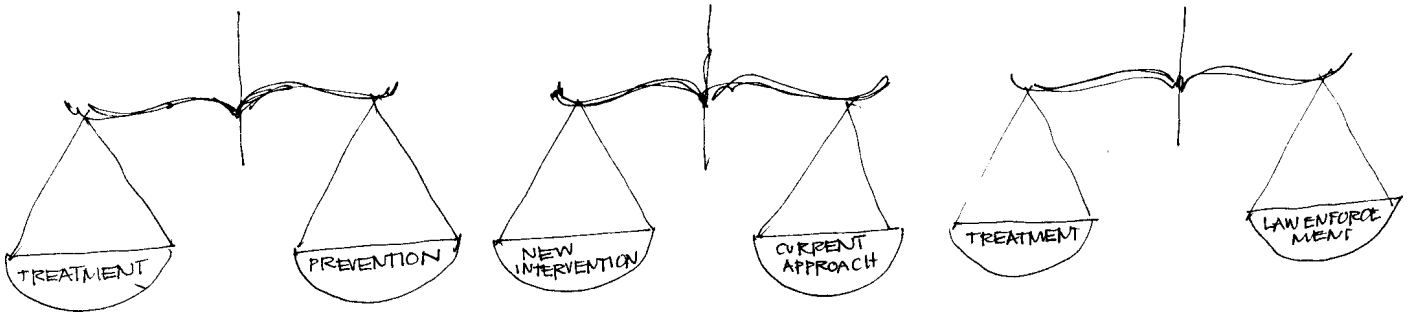
What is an economic evaluation?

Economic evaluations involve the *identification, measurement, and valuation,* and then comparison of the costs (inputs) and benefits (outcomes) of two or more alternative PSU treatments or activities.

In economic evaluations, the costs and consequences of alternative interventions or scenarios are compared to examine the best use of the scarce resources. The specific question being addressed may be:

- a comparison of the costs and benefits of a new intervention to some current therapeutic approach
- a comparison of the costs and benefits between treatment and prevention activities
- a comparison of the costs and benefits between treatment and law enforcement activities

Economic evaluations differ according to their scope and intent. They can have a very narrow focus, whereby evaluators are only concerned about the resource consequences for their agency. In these evaluations, any new intervention which shifts costs to another agency may be preferred. Alternatively, economic evaluations can examine wider social costs. In these evaluations, a new intervention that shifts costs but does not reduce total costs may not have good "value". Similarly, for health agencies, the outcomes of prime importance are likely to be the health of the individual user. From a societal perspective, however, the costs of crime and other social effects may be of greatest concern.

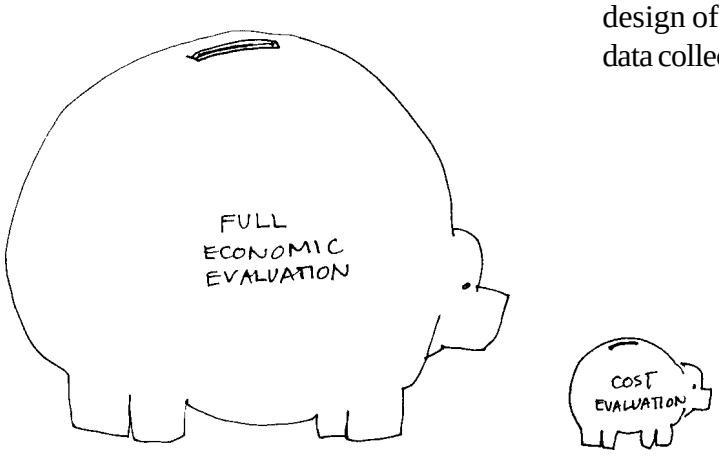


Why do an economic evaluation?

Economic evaluation is one of the tools available to help choose wisely from a range of alternatives and implement efficient resources.

Using any resource for the treatment of PSU disorders means the opportunity to use that resource for something else is lost. Therefore, cost-effectiveness (or "value" for money spent on treatment services) is of central concern in most health care and government systems. Economic evaluation is one of the tools available to help choose wisely from a range of alternatives and implement efficient resources.

In general, economists prefer the widest possible societal perspective: general questions about the use of scarce resources and societal well-being. However, in certain cases, policy makers may wish to know the answers to narrower questions, for example, restricting the perspective to health outcomes and health care expenditure, or restricting it to a specific area, for example, the effects on crime and the criminal justice system.

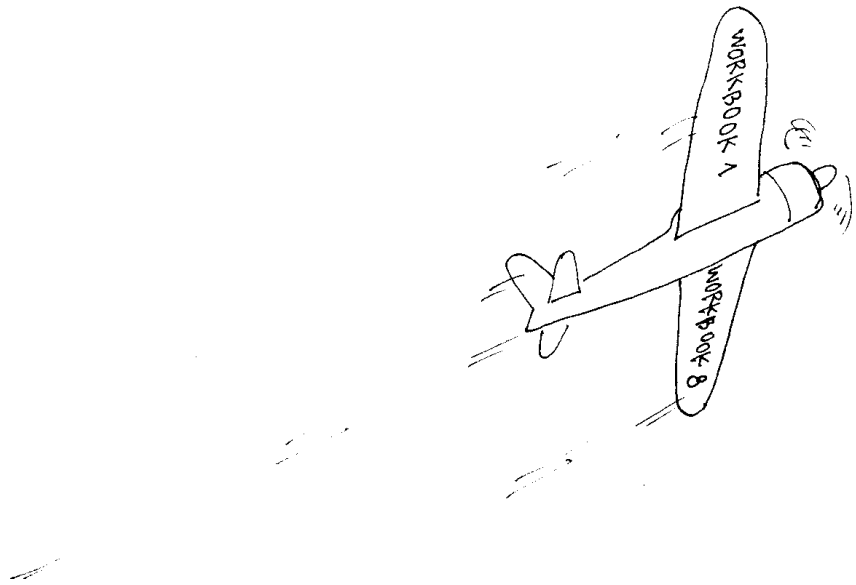


Full economic evaluations are rarely completed. One reason is that economic evaluations are resource intensive and typically require a high level of research expertise. It is important, prior to undertaking this type of study, to determine whether a full economic evaluation is warranted or required. For some research questions, answers can be addressed through a cost evaluation (Workbook 5), which is generally less intensive to complete.

Full economic evaluations should only be undertaken after an initial analysis to gauge the usefulness of the study. Prospective economic analyses are best undertaken alongside other evaluations, particularly outcome studies (Workbook 7). In themselves, economic components of research need not be excessively expensive. There is, however, great merit in examining the economic design from the beginning of a research planning process as results may affect the overall design of the study as well as the detail of data collection.

How to do a cost evaluation: general steps

Before doing an economic evaluation, it is important to review Workbook 1 of this series, which outlines general steps to evaluation planning. The specific steps for undertaking economic evaluations are outlined in this section.



The main steps are:

1. Defining the economic question and the perspective of the study

2. Determining the treatments to be evaluated

3. Choosing the study design

4. Identifying, measuring and valuing the costs of the alternative treatments

5. Identifying, measuring and valuing the benefits of the alternative treatments

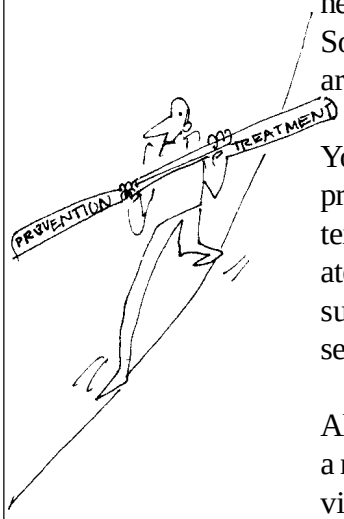
6. Adjusting costs and benefits for differential timing

7. Measuring the incremental costs and benefits

8. Putting the costs and benefits together and analysing the results

9. Testing the sensitivity of the results

1. Defining the economic question and the perspective of the study



Your choice of study questions will depend on the specifics of your situation and your evaluation priorities. Use Workbook 1 to help you define your specific evaluation goals. Some pros and cons of different approaches are discussed below.

You may want to know the cost of your own programme, in your own organisational context. While this approach is likely to generate some useful data, results generated from such a study cannot be generalised across services.

Alternatively, you may want to know whether a new therapy should be adopted. The providers of substance use service may be interested in the detailed analysis of the costs and consequences for their own organisation. Funders of services may be interested in the wider implications for health service delivery under their jurisdiction. National or state authorities may be more interested in the societal perspective. It is important that you assess the potential consequences of taking any narrower perspective than that of society.

Questions about adopting a new treatment can, depending on your situation, be put in a number of different ways. For example, you may have a set budget for substance use treatments. In this situation, your question may be whether a new treatment can deliver more benefits within the same budget constraint as other existing approaches. In other situations, you may be more concerned with meeting a health target and then the question may be posed as to which type of therapy involves the least net cost for some target level of benefit.

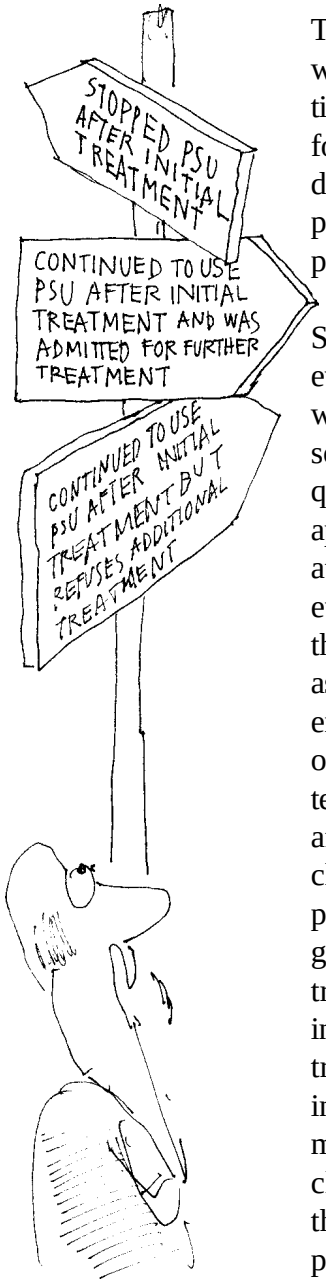
More general questions, for example, about the overall level of funding of substance use treatments in a local area, or whether the balance between prevention and treatment funding is bringing the highest health gains, require a broader approach and perspective. Answering such broad questions requires data at a more aggregate level and assumes that many of the detailed evaluations have already been undertaken.

2. Determining the treatments to be evaluated

Given the current scarcity of economic evaluations, it is important to generate a body of well-conducted research. However, such studies need to be resourced at an appropriate level.

Full economic evaluations require two or more PSU treatments for evaluation. The choice of treatments is a very important part of the evaluation process. An economic evaluation is not useful if a potential treatment of greater benefits and lesser costs has been omitted. On the other hand, it is impossible, for practical reasons, to evaluate all possible alternative PSU treatments.

A clear evaluation question for all new treatments is: what are the costs and outcomes of the new treatment compared to current practice? (Sometimes this is interpreted as current "best" practice.) For more fundamental questions of the value of treatment, the question may imply a comparison with a no-treatment option. This implies, however, a full evaluation of the no-treatment alternative. For example, a certain proportion of the group may stop taking PS or reduce the harm associated with their PSU without formal treatment. However, obtaining data on a sample receiving no-treatment is difficult, and research including such a no-treatment option may be deemed unethical. In practice, there



is usually some attempt to evaluate the new therapy compared to some form of minimal intervention.

The case example located at the end of this workbook presents an evaluation of a relatively new case approach versus "usual care" for people with severe mental illness and PS dependence. "Usual care" was defined as participation in a community-based PSU support group (alcoholics/narcotics anonymous).

Some questions require more complex evaluation designs. For example, you may want to evaluate a system of treatments or some form of stepped care. These types of questions lend themselves to a decision-tree approach. Zarkin and colleagues (1994) created one structure to consider the impact of evaluating outcomes and costs over more than one treatment episode. This approach assumes that a PSU client will have repeated encounters with treatment services throughout his/her lifetime, and helps to identify alternative PSU policy interventions that might affect outcomes. Considering any one PSU client's lifetime history, he/she will be on a particular "branch" of a decision tree at any given time (e.g., A) stopped PSU after initial treatment vs. B) continued to use PS after initial treatment and was admitted for further treatment vs. C) continued to use PS after initial treatment but refused additional treatment. By estimating the proportion of the total client population that may follow each of these paths, you can examine the effect of potential policy changes in terms of numbers of clients affected, costs, and expected outcomes. For example, you can assess the proportion of your PSU population that is classified into category C (above), and estimate whether an intervention directed at motivating this category of patients to return to treatment is as cost effective as directing similar resources at initial intervention efforts.

Alternative structures could be composed looking, for example, at the potential different outcomes from compliance to maintenance therapies. Glazer and Ereshefsky (1996) present a model with antipsychotic therapy that could be adapted. In their model, the first step is to identify all the treatments in current clinical practice, then to identify the possible outcomes of each of the treatment alternatives (e.g., client will comply or not comply, client will remain abstinent from PSU or begin using PSU again, etc.). The next step is to establish the estimated probability of each of the outcome combinations (or "pathways") for each treatment alternative. Ideally, these probabilities should be derived from previous outcome evaluations (Workbook 7). Costs for each treatment alternative are compiled separately. Finally, costs for each treatment alternative are compared by multiplying the costs associated with each outcome pathway by the cumulative probability that a client will reach this particular outcome. After repeating this process for each of the outcome pathways associated with each treatment alternative, costs can be added together to yield the total cost of that treatment strategy.

Another approach would be to use a decision analysis to evaluate a stepped care programme where "failures" are entered into different or progressively more intensive therapies. The advantage of the decision- tree approach is that thought must be given to all the alternative courses. The disadvantage is that data are required on the probabilities of outcomes at different stages and for evaluation to be feasible at each of these stages.

Given the current scarcity of economic evaluations, it is important to generate a body of well-conducted research. However, studies such as these need to be resourced at an appropriate level. The danger is that with so few studies conducted, the results of a study that is designed to answer a very specific question, with very selected alternatives being considered, may be inappropriately generalised.

3. Choosing the study design

Many existing studies fall short of full economic evaluations. Drummond and colleagues (1997) outlined different types of partial evaluations and emphasised two characteristics necessary for full economic evaluation:

- a comparison of two or more alternatives
- both costs and benefits of the alternatives are considered

Only where there are two or more alternatives, and both costs and benefits are examined, is the study classified as a full economic evaluation. It is only from full economic evaluations that questions about value for money can be addressed.

No intervention can be cost-effective if it is not effective in terms of clinical outcomes (see Workbook 7). Therefore, the most robust design for a full economic evaluation is a randomised controlled trial. This is the design that was used in the case example evaluation located at the end of this workbook. Other evidence of cost-effectiveness is less robust. In particular, studies using differences between before and after treatment, with no control group, tend to overestimate benefits of treatment. These benefits are even more prone to overestimation if only those who complete treatment are included in the study.

Ideally, cost data is collected at the same time and with the same degree of accuracy as outcome data. While this is increasingly becoming the practice, most studies have either attempted to estimate costs for alternative therapies retrospectively, or model costs and consequences for the alternatives being considered using literature reviews of effectiveness data and models of resource costs. For more complex structures, or where there are longer term benefits, some modelling and model predictions will always be required. Any modelling or predictions require some assumptions to be made.

Part of the study design stage involves the choice of an economic evaluation method: cost-minimisation; cost-effectiveness; cost-utility or cost-benefit (described below). There is a need to match the choice of economic analysis to the questions being addressed in the analysis. For example, if the question is about the best way to improve the health of PSU users, a cost-effectiveness design may be adopted. However, if there was a need to make wider comparisons it may be more appropriate to use a cost-utility framework. For studies attempting to look at the full range of costs and benefits of providing treatment compared to no treatment, the most appropriate design may be cost-benefit analysis.

There are four types of full economic evaluation:

- cost minimisation
- cost-effectiveness
- cost-utility
- cost-benefit

The main difference between the four types of full economic evaluation is how the benefits to the individual are measured and valued.

Cost minimisation analysis

In cost minimisation, the effect of the alternative interventions on the individuals health-related quantity and quality of life are assumed to be equal. In these studies, all other resource consequences are measured in monetary terms. Some of these resource consequences, such as reduced future levels of crime or health care costs, can be seen as "benefits" of the intervention, whereas other aspects such as the direct costs of the interventions can be clearly defined as "costs." Published studies vary in the name given to some of the non-individual "benefits" — in some studies these are considered as part of the cost calculations but as benefits these sums are subtracted from other costs to give a net costs total.

The advantage of the cost minimisation approach is that the measurement problem is reduced to just examining resource consequences. However, the assumptions are difficult to justify prior to any experimental study.

If two interventions have the same individual health effects, then the one which can be judged as the most value for money will be the intervention which minimises the net costs. It is, however, a strong assumption to assume that individual health effects are the same between two or more alternative treatments (or treatment scenarios if more complex questions are being posed). It would be an even stronger assumption to include all other benefits of treatment as equal. The advantage of the cost minimisation approach is that the measurement problem is reduced to just examining resource consequences. However, the assumptions are difficult to justify prior to any experimental study. This method, therefore, has only limited application within the PSU field.

An example of a cost minimisation study is an examination of several standard methadone facilities in which client group and expected consequences are assumed to be the same. The figures in the table on the next page illustrate some potential results. They are taken from a study by Bradley and colleagues (1994), and it should be stressed that this study was only concerned with costs and no claims were made about the outcomes of the different sites. Of the three sites reported in the table below, Site A was hospital based whereas Sites B and C were free standing facilities. In this case, Site A is the cost minimising option, because of the lower average staff costs.

Illustrative cost minimisation analysis for 3 standard methadone treatment programmes (1990)

	Site A	Site B	Site C
Capital cost	105,340	83,107	17,190
Rent and maintenance	6,508	102,326	44,876
Staff costs	414,812	843,323	663,257
Telephone, office supplies, utility costs etc.	222,273	199,206	111,298
Contracted services (laboratory tests, pharmacists, accountants etc)	39,339	237,205	131,645
TOTAL Costs	788,272	1465,167	968,266
Number of clients	210	333	250
Average cost per client	3,754	4,400	3,873

Cost-effectiveness Analysis

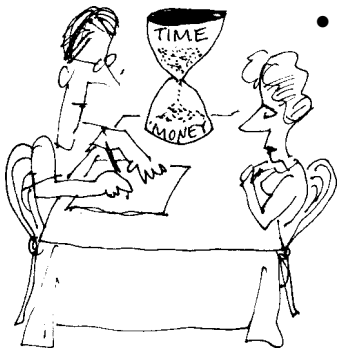
The majority of the published economic evaluations have been cost-effectiveness analyses. In this type of economic evaluation, the effect of treatment is measured in a single natural health unit. Costs and other consequences also are measured in monetary terms in the same way as for cost minimisation analysis. The requirement for an economic study to have a single, principal outcome measure is needed to construct some cost-effectiveness ratio indicating the net costs required for each unit of outcome. For some health care interventions, the natural health unit outcome measure may be best reflected by deaths avoided or gains in life years. Most PSU studies have used some measure of PSU rather than a health measure, for example, the net costs per abstinent day, or per percentage reduction in PSU.

In this type of economic evaluation, the effect of treatment is measured in a single natural health unit. Costs and other consequences also are measured in monetary terms in the same way as for cost minimisation analysis.

One down side of this technique is that using a single measure is that the total effects of PSU treatment may not be reflected in any one health or PSU variable. Further, many of the effects of treatment on the individual may have wider impact on the quality of life than just that of health. Hence, a narrow unidimensional outcome measure used as a comparison may fail to "measure" the full impact of the different therapies and lead to a misleading conclusion on the relative "worth" of the therapies under consideration.

The choice of outcome measure not only affects the validity of the study, but also the use of study results. PSU quantity measures may be preferred by therapists as being the only measures relevant to their client group. However, funders of treatment could not use such studies to examine the comparative worth of expanding PSU treatments vs. expanding vaccination programmes because of the lack of a common generic health status measure.

To illustrate the use of cost-effectiveness studies, consider the following example of the effectiveness of brief interventions compared to a control intervention for those drinking alcohol above a low risk level. In this example, both costs and effects are measured as the excess over the control intervention.



- Systematic reviews of the effectiveness evidence suggest that alcohol consumption is reduced on average by 20 per cent following brief interventions. Assume that in a hypothetical problem- PSU population, this would translate into a reduction of 6.02 alcohol units per person per week. (One unit is equal to 8 grams of alcohol).
- Based on these results, administrators want to implement a screening programme and delivery opportunistic brief interventions in a primary care setting for 100 men and 100 women. Before doing so, they want to understand the cost-effectiveness.
- The screening costs of applying an alcohol use questionnaire, 2 minutes, are calculated to be between £0.8 and £2.40 per person, total costs £160 to £480.
- The questionnaire is estimated to suggest that 46 people would need a brief intervention (36 true positive and 10 false negative)
- It is estimated that 15 minutes is needed to deliver each intervention, with additional costs of leaflets, etc., giving a cost of each brief intervention of between £8 and £20
- For the 46 people receiving the intervention, this yields a service cost of between £368 and £920
- Total programme costs including the screening are therefore between £528 and £1400
- The cost per at risk drinker is between £14.6 and £38.9
- Expressing this in terms of effectiveness evidence yields an average extra costs of £2.4 to £6.5 per "unit" of reduced alcohol consumption.

Note this example is conducted from the primary care perspective and only a limited range of cost and consequences are examined.

Cost-utility Analysis

All resources have an opportunity cost: opportunities to do something different with resources are lost when resources are committed in a certain direction. Within health care, there is a need to make decisions on the balance of resources, for example, between terminal care and prevention interventions. Such comparisons, however, require some common outcome measures that can incorporate quantity and quality of life changes. Such measures can be seen as measures of *utility* (or value of health) to individuals. Economic evaluations using such outcome measures are hence called *cost-utility* studies.

.. this method should be used when quality of life is the important outcome.

Drummond et al (1997) suggest this method should be used when quality of life is *the* important outcome. PSU cost-utility studies might involve the evaluation of social care programmes designed to help individuals who have been in long-term residential programmes. Or, it might be used to compare interventions that have effects both on the length and quality of life. Finally, there are those programmes that have a range of different outcomes arising from interventions and some common measure is required to make comparisons between them.

There are a number of different aspects to constructing and using health utility measures in economic evaluations. It is necessary to identify, measure, and value the health gains from any extension of life and improved quality of life. Some treatments may improve both aspects, but others may influence only the length of life or the quality of life. Whereas cost-effectiveness studies measure the outcome a particular point in time, for example one year after treatment ends, cost-utility measures must estimate how long the treatment effects will last.

Most cost utility studies measure **quality adjusted life years** (QALYs) among their participants. A QALY is based on the idea that categorising people merely as "alive" or "dead" (i.e., quantity of life) does not capture adequately multiple states of health, or quality of life, that exist in individuals' lives following PSU treatment. QALYs assign the score of 1.000 to a (hypothetical) person who is in a state of perfect health. Then, deductions from 1.000 are taken for different symptom reports while answering quality of life questions. For example, use of a cane may reduce a person's QALY by.060 (1.000 - 0.060), while wheezing or shortness or breath may reduce QALY by.257 (1.000 - 0.257). Note that not all QALYs are calculated in the same way. Scoring for different questionnaires may be based on different ideas about what constitutes quality of life. For example, is regular fainting "worse" than chronic pain? Different quality of life measures will "weight" or value these items differently. Different QALY measures also have different health dimensions. The EuroQol EQ-5D, for example, has 5 dimensions: mobility, self-care, usual activity, pain/discomfort and anxiety/depression (Dolan et al., 1995). Another measure, the WHOQOL-BREF, has four dimensions: physical health, psychological, social relationships, and environment. Copies of both measures and scoring instructions are located in Workbook 1, Appendix 2.

All other costs and resource consequences are measured and valued in a similar way as in all the other types of economic evaluations.

As an example of this type of study, consider the three treatment programmes described in the previous cost-minimisation table. If a cost utility study of these three programmes were completed, it would have been possible to chart both differences in any overdose or other mortality while in the programme and the improvement in general health.

Using this example, assume that Site C (with greater proportionate staff input) resulted in each client having large health improvements using a standard quality of life measures. Combining the health and reductions in mortality yielded the following average total health gains in the three programmes over a year programme. No future health gains were thought to arise from these programmes, a minimum estimate position.

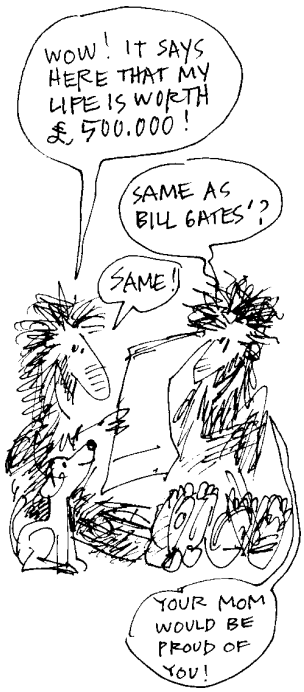
Site A	160 QALYs	(210 original clients)
Site B	291 QALYs	(333 original clients)
Site C	345 QALYs	(250 original clients)

Combining these findings with cost data (assuring the original cost figures were adjusted for the premature mortality (and hence reduced annual cost) yielded the following average cost per QALY figures shown in the table below.

Illustrative example of a cost utility study

	Total Programme costs ($)	QALYs gained	Average cost per QALY ($)
Site A	788,272	160	4,927
Site B	1,465,167	291	5,035
Site C	968,266	345	2,807

All other costs and consequences are assumed to be the same between the sites. In this example, Site C has a far lower cost per QALY than the other two sites. Given the different mortality rates, there would be differential health gains in future years even if all existing clients reverted back to former levels of PSU.



Cost-benefit Analysis

In cost-benefit analysis, all individual benefits are measured in monetary terms. This means that all costs and consequences are measured in the same units. The method is useful when there are a wide range of diverse outcomes associated with the treatments being evaluated. Because the results can be expressed in terms of whether the monetary value of benefits outweighs the costs, such studies are often seen to provide more powerful arguments for implementing programmes (or not) than other forms of economic evaluation. However, the relevance of any study to decision-making depends on the alternative options being evaluated and the scope of the evaluation.

In cost-benefit analysis, all individual benefits are measured in monetary terms.

Measuring health gains in monetary terms is sometimes viewed as problematic. For example, market values of the value of life, based on foregone earnings have been thought to undervalue some groups in society, particularly older and poorer people. This method of valuation is now rarely used. Other methods include using market values of risk or asking individuals to put monetary values on different health states using a willingness-to-pay approach (see Johannesson et al. (1996) for a review of these methods).

An illustration of the results gained by willingness to pay methods can be drawn losses associated with fatal road accidents in the United Kingdom. The government agency reviewed the available estimates from all different methods, and choose a value in 1987 of £500,000 per life. This compared to a figure of £283,000 calculated using a foregone earnings method. In 1996 terms, this converts to a value of £23,000 for each lost (gained) life year.

Willingness-to-pay methods may be seen as an alternative measurement system to that used for utility measures. The differences between them may be in the weighting system used for different groups of the population. Utility measures usually have an equity element built in, with one quality adjusted life year being deemed of equal value to all individuals. This is not always the case with monetary measures as some may be biased to giving greater weight to those with more income. This method may be appropriate in health care systems were individuals are responsible for paying for health care.

French and colleagues (1996) have proposed recently a method for estimating the monetary value of PSU treatments. The methodology they proposed is a mixture between

using health utility measures and monetary valuations. Estimates of quality adjusted life years are calculated for different age/gender and race cohorts and a dollar value of a QALY applied. The average value was taken from assuming a value $5 million for the statistical life of an average white male at age 38. In essence, the methodology proposed could be used within either a cost-utility or cost-benefit analysis. Different disease outcomes were related to a general index of values of different health states. For example, compared to a perfect health value of 1 and death as 0, a moderately severe case of Hepatitis B was thought to generate a value of 0.96 over 2 months duration. This is an interesting "low cost" methodology for estimating individual health gains. It may have useful applications for PS injection users who are vulnerable to a number of different diseases with measurable consequences. It may be possible to provide reasonable estimates of the "avoided cases" by treatment. However, these data would need to be estimated from available epidemiological data and it is not clear that "avoided disease" can be accurately estimated for the range of different PSU. Also, by concentrating on avoided disease, the measure may fail to capture the full individual benefit of treatment. This may be particularly important for treatments applied to less dependent users.

The fullest study examining both costs and benefits in monetary terms was conducted by Gerstein and colleagues (1994). This was a before and after study without a control group and therefore can be criticised on methodological grounds. The study, however, illustrates the size of potential gains to a number of agencies. Consequences included criminal justice costs, an estimate of victim losses from crime, health care cost and productivity consequences. The summary figures are given in below, showing all modalities apart from methadone discharge resulted in greater benefits than costs for an average episode of treatment.

CALDATA examples of cost benefit analysis

	Residential	Social Model	Outpatient Discharge	Methadone Continuing	Methadone
Savings per Day During	$22.19	$12.79	$10.60	$14.14	$29.68
Savings per Day After	$24.51	$14.43	$7.50	$-3.79	N/A
LOS (average)	69	79	150	60	
Cost per Day of Treatment	$61.47	$34.41	$7.87	$6.79	$6.37
Total Cost Per Episode	$4,405	$2,712	$990	$405	$(2,325)
Total Benefits	$10,744	$6,509	$2,853	$-1,206	$(10,833)
Benefits to Cost	2.44	2.40	2.88	-2.98	4.66

Undertaking a partial economic cost study is one practical way to collect data with limited resources.

Cost-offset, cost-outcome and other types of partial economic evaluations

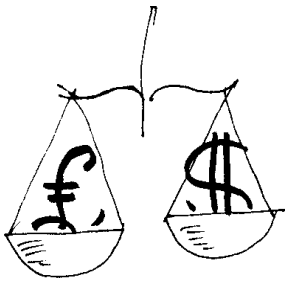
There also are a number of valuable partial, economic evaluations that have been undertaken for PSU treatments. These are given different names in the literature including cost-offset and benefit-cost studies (often referred to somewhat erroneously as cost-benefit studies).

- An *outcome description, a cost description or a cost-outcome description* is a study that examines only one treatment (or possibly one treatment system).
- A *cost analysis* is a study that considers one or more alternatives, and only costs are examined (see Workbook 5).
- *Cost-offset* studies examine the costs of different treatments or treatment systems and the consequent impact on future health care costs. The idea being tested is that the costs of substance use treatments can be fully or partly offset by reductions in future health care costs. The purpose of these studies is to lend support for the inclusion of coverage of alcohol and other substance use treatments in insurance plans. It is an attempt to partially address the question is treatment worthwhile. In general, the analysis has involved observational data on individuals through time and comparing health care costs before and after treatment.

Undertaking a partial economic cost study is one practical way to collect data with limited resources. Such data can give a broad picture of a service, although great caution is needed in making any comparisons either within the service or across services. Such studies provide some evidence on the broad worth of treatments while not being of sufficient rigour to answer more detailed questions on how services could be changed to yield more benefits with less resource use.

4. Identifying, measuring and valuing the costs of the alternative treatments

The table on the next page outlines all the potential costs of a PSU treatment. The four general areas identified where costs may occur are:



- costs to service providers
- costs to the individuals and families in treatment
- costs to other agencies or individuals
- productivity costs

Checklist of costs of substance use treatments

1. Costs to service providers

- ***Capital***
  - land
  - buildings
  - equipment
- ***Running costs***
  - paid staff
  - volunteers
  - administrative and managerial costs
  - consumables including drugs prescribed and their dispensing costs, toxicology costs etc.

2. Costs to the individuals and their families in treatment

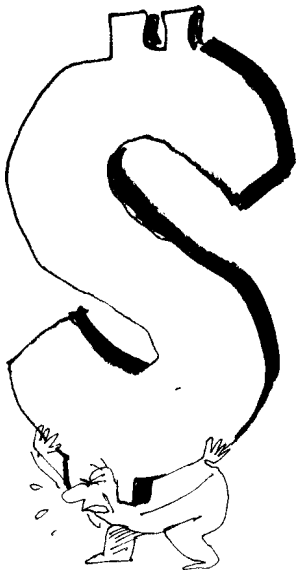
- ***Out of pocket expenses***
  - travelling and other direct expenses
  - contribution to treatment costs (if not included in A)
- ***Leisure time and other costs associated with input to treatment Costs***
  - pain, distress etc. associated with changing habits, or with process of treatment

3. Costs to other agencies or individuals

- ***Referrals to other health or social agencies linked to the treatment***
- ***Increases in potential problems associated with treatment***
  - leakage of prescribed drugs to illicit markets

4. Productivity costs

It may be relatively easy to measure and value the provision of the costs of treatment. Some other potential consequences pose more problems.



The areas that may be included in your analysis will depend on your situation. For example, an evaluation from the health service perspective may only concentrate on the cost to providers and any other consequent cost for other health agencies. If a wider perspective is taken, more variables may be analyses. In these situations, it is important to avoid double counting. For example, individuals may lose income while undertaking treatment. Including an allowance for the full cost of lost productivity from the time spent in treatment would mean that the lost labour "resource" would be erroneously counted twice. It should also be noted that the list refers only to "resource" costs – those actions which mean there is a loss of scarce raw materials, land, labour or capital. Many PS users may be in receipt of welfare payments from the state — these are transfers from one group (the taxpayer) to another group. Changes in transfer payments are not included in economic evaluations. However, such changes may be of prime interest to state or national governments and may need some separate analysis.

It may be relatively easy to measure and value the provision of the costs of treatment. Some other potential consequences pose more problems. For example, it is often difficult to trace the full impact of different treatments on other agencies. Alternatively, certain treatments may be associated with more distress both to the individual and their family. While it may not always be possible to measure and value all these effects, some analysis can be undertaken to check whether they are likely to differ among the alternatives being evaluated.

A controversial area is whether costs arising from lost productivity while in treatment should be included in different economic evaluations. For long residential treatments, the estimates of these costs can be considerable. A sizeable group of substance users in treatment may have been unemployed for some time and therefore the valuation of this item will depend crucially on whether the estimates are based on some unadjusted value of time, or adjusted for labour market demand conditions – i.e. adjusted for the risk of unemployment.

A number of questions also arise in applying "values" to material resources. For example, some resources may be more expensive in rural areas because of transportation costs whereas others, including buildings, may be more expensive in urban areas because of scarcity. It is helpful to present results in resource use terms as well as applying monetary values so that individual readers can relate the results to their own situation.

More detail on how individual treatments may be costed and further discussion of some costing issues are contained in Workbook 5.

5. Identifying, measuring and valuing the benefits of the alternative treatments

In the table on the next page, the range of possible benefits that may arise from treatment is outlined. The five broad areas are:

- direct health benefits to the individual
- non-health improvements in quality of life for the individual and family
- reduced use of other health care interventions
- benefits to other agencies
- productivity benefits

Consequences of PSU Treatments

1. Direct health benefits to the individual

- **Quality and quantity of health improvements**
  - exact measurement depending on economic analysis type
  - associated with reduction in drug use
  - reduced risk of injection-transmitted disease
  - more healthy lifestyle in general
  - less any adverse effects of treatment

2. Non-health improvements in quality of life for the individual and family

- **Reduction in PSU- related violence**
- **Improvements in social functioning**
- **Other benefits to the family**

3. Reduced use of other health care interventions

4. Benefits to other agencies

- **Reduced use of resources from other social care and welfare services**
- **Reduced criminal justice system costs**
- **Benefits net of any adverse consequences to "community and social environment"**

5. Productivity benefits

- **Benefits in individual productivity as a result of the treatment**

Most studies are likely to include a number of different individual outcome measures. For example, many controlled trials may include some measure of substance use, some specific substance-related outcome measure and a more generic health status instrument. For economic evaluations, there may be a need to value the health benefits and a need to choose both the method of valuation and the groups from which values are sought, for example, from PS users or the whole population.

PSU... affects a number of other dimensions of life quality of both users and their families.

Most existing general health measures are focused on health-related quantity and quality of life changes. This makes sense because maximising health gain is a very important objective. PSU, however, affects a number of other dimensions of life quality of both users and their families. Some PSU-related outcome measures have attempted to include some of these dimensions. There is a need to evaluate whether such "non-health" benefits to PS users can be measured and valued perhaps through "willingness to pay" or preference-based measures on total health and non-health-related quality of life. At the current time, there are no such ready-to-use economic measures.

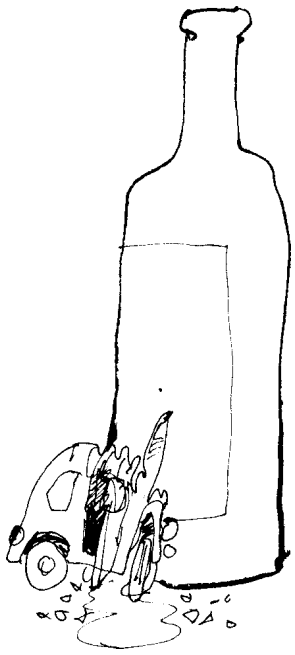
The current body of cost-offset and cost outcome studies suggest that one of the consequences of individuals receiving treatment is the reduction in demand for other health services. These potential gains could be sizeable. The ease by which health use can be measured varies with health care systems. Where there is some charging mechanism, even if individuals do not pay directly because of social insurance, there may be records of all health care use, including the resource cost of the different treatment episodes. However, in many countries it may be necessary to ask individuals about their use of health care over a period before, during and after treatment and then use average values of the costs of such use. Cost-offset studies using insurance record data can track individuals within the plan over considerable periods. This would be more difficult to achieve with self-report data. It is not clear how accurate recall would be over long periods especially of frequently used health services. This is one of the important challenges to researchers.

Not all consequences of treatments may be beneficial. It is important to consider possible negative consequences of the alternative interventions being evaluated.

As well as the benefits to the health care system, PSU treatments also are likely to reduce the use of other social care and welfare agencies. It should be noted again that these resources relate to services received rather than changes to welfare benefits, which are transfer payments not resource costs. The difficulty for evaluators is tracing such changes in use and finding some means of valuing the diverse range of effects that may arise. It would of course be far too costly and time consuming to individually trace all potential effects. Some may be excluded from the analysis but the effects of such exclusions has to be considered carefully. It is clear, for example, that there is a large impact on the costs to the criminal justice system from treating some dependent drug users. It would be important to consider whether the alternative treatments being evaluated had differential effects on crime before it was decided to exclude them, even if the main focus of the study was the impact on health care services. Some important benefits from successful treatments may be more and difficult to measure. For example, an adequate system of services for PS users may well have a favourable impact on a community and the environment over and above some of the reductions in direct problems. For example, reductions in crime rates may also produce reductions in the fear of crime among community members. Not all consequences of treatments may be beneficial. It is important to consider possible negative consequences of the alternative interventions being evaluated.

Finally, there are the benefits that result from gains in productivity. As with productivity costs, there is some debate about the inclusion of such effects and if included how they should be measured. Treatment is likely to improve employment prospects and increase the productivity of those in work. However, the actual changes will depend on the state of the local labour market.

6. Adjusting costs and benefits for differential timing



For all costs and consequences, there is a need to consider the time period over which any effects will be measured and valued. In research terms, observed follow-ups are generally limited in time. In some instances, epidemiological data may be available to model plausible outcomes over time including an allowance for relapse. In other cases, assumptions may have to be made and a range of results presented. It is these types of issues and how they are resolved which illustrate some of the assumptions and compromises that have to be made in practical economic evaluations.

Many of the effects from treatment may last more than one year. This is particularly true if the interventions under study extend the life of the participants. However, we tend to put a lower value on events occurring in the future than those that occur in the current year. One step in an economic evaluation is to convert all costs and benefits to a "present value" so that they can be compared. This process is called discounting. While there is general agreement on the need to discount most resource consequences, there is less agreement on whether future health benefits should be discounted. Is a life year saved in this year worth twice as much as a life-year saved ten years from now? Or should all life-years saved be treated as equal even if the saving does not occur until 20 years in the future? In practice, most guidelines suggest both discounted and undiscounted figures for health benefits should be made available to readers of the study. Discount rates are usually based on current financial interest rates. Applying discount rates to data is relatively easy and tables are available for converting figures across a number of years to present values. Tables from Drummond et al., 1997, are contained at the end of this workbook for reference purposes.

To illustrate, consider potential gains from eliminating alcohol related road traffic deaths in one year. In England and Wales, this would result in a total gain of 148,500 life years in a 30 year period. Discounting the future gains of life years at 5 per cent per annum, however, reduces the total to a figure of 85,800 life years. If a higher discount rate of 10 per cent was used, the calculated health gain reduces to 57,000 life years, less than half the undiscounted figure.

7. Measuring the incremental costs and benefits

Lists of costs and benefits are created in terms of totals (or average per individual) associated with each of the alternative treatments. For economic evaluations, it is important to know whether the costs or benefits vary with the level of service provided. Measuring the incremental (or extra) costs and benefits as more treatment is undertaken is important for this task.

Clearly, not all costs rise at the same rate as the number of treatment admissions increases. There are some fixed costs, such as buildings and equipment. As numbers rise, these fixed costs are spread over a larger number until some capacity limit is reached. At this critical point, however treating a few extra people can involve a large amount of extra resources. One of the largest inputs into treatment is therapists' time. This can be regarded

as semi-fixed and obviously the extra costs of treating an extra client fall until the therapist has a full load.

Other costs and benefits also may change according to the level of activity. It is therefore important to undertake additional measurement and modelling of costs and benefits to fully understand the processes of different therapies as they expand or contract.

Illustration of incremental costs was given in the study by Bradley et al (1994): see the table below. In this example, an extra client is assumed only to require more consumables, such as methadone. However, an extra 25 clients would require more staff and other programme costs, although not extra building space. In this example, Site C has the lowest marginal costs for 1 and 25 clients.

Marginal costs for a year from standard methadone treatments (1992)

	Site A		Site B		Site C	
	1 Client	25 Clients	1 Client	25 Clients	1 Client	25 Clients
Methadone & other client related costs	1,019	49,571	776	41,909	164	28,090
Staff	–	296	–	1,335		1,785
Other costs	–	5,118	–	11,547		15,822
Marginal costs	1,019	54,986	776	54,791	164	45,697

For some research questions, the whole study could be framed in an incremental way. Many policy decisions concern how much each programme should be funded rather than a choice of funding only one. The incremental approach would be an appropriate way of evaluating some stepped programme of care. In this case, the additional benefits and costs of providing extra units of care against the alternative of no additional care.

8. Putting the costs and benefits of the alternatives together and analysing the results

After valuing all the costs and benefits of the alternatives, discounting the sums to present values, and completing some incremental analysis, the results still need to be brought together. **Review Workbook 2 for more thorough information about analysing and reporting research results.**

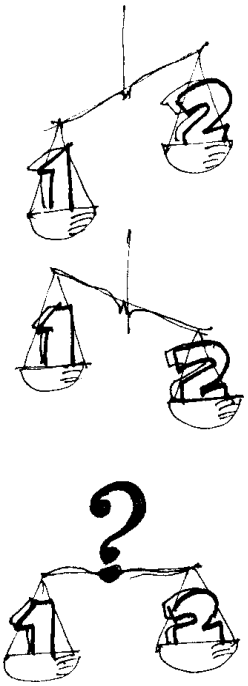
In *cost-minimisation studies,* the analysis involves straight comparisons of the costs (or net costs if some resource, rather than individual health benefits, have been included).

For *cost-effectiveness and cost-utility studies,* there are two ways of presenting results. Cost-effectiveness ratios are generally calculated by comparing the net costs divided by the individual health outcomes of one programme to the costs divided by the individual health outcomes of the second programme. For example, one intervention could result in £1000 per quality-life-year (QALY) gained and another £1200 per QALY. These ratios are generally based on average costs and benefits.

The alternative is to compare costs and outcomes directly:

$(Costs_1 - Costs_2)/ (Outcomes_1 - Outcomes_2)$

to give a net figure for the difference between programme 1 and 2 (if the design of the study is comparing two alternatives in this way). This is usually calculated using incremental costs and benefits and can clearly be adapted for some of the more complex economic evaluation designs (see Drummond et al., 1997).



With a simple study comparing two alternative programmes, there are four possible results:

- Programme 1 has more benefits and lower costs than programme 2 (at all levels of implementation). In this case programme 1 clearly dominates programme 2.
- Programme 2 has more benefits and lower costs than programme 1 and 2 will dominate 1.
- Programme 1 has more benefits but also more costs than programme 2. In this case the decision is not so simple and may depend on whether incremental figures show an advantage of one over another.
- Programme 2 has more benefits and more costs than programme 1. Again decision is unclear.

With cost-benefit analysis, the benefits and costs are measured in the same unit, money values, and the results may be presented as the net benefits of the alternatives (benefits - costs) or in terms of cost-benefit ratios (costs/ benefits). Ratios are not particularly useful and can be manipulated because some benefits can be redefined as averted costs and affect the ratio. Ratios do not give any ideas of the size of the scale of benefits or costs. This may be important when comparing programmes.

The results will be more complex if a more complex design is used. Similarly, there may be subsidiary analysis to consider if the design of the study allows. For example, it may be possible to consider whether costs or benefits vary with severity or other characteristics. However, unlike in other areas, there are no standard measures for case-mix for substance use services.

9. Testing the sensitivity of results

Undertaking a full economic evaluation requires a large number of assumptions to be made. It is important to have some idea whether the overall results of the study would vary if different assumptions had been taken. Some assumptions can be tested systematically by using sensitivity analyses. This may involve, for example, using different levels of effectiveness varying the main cost variables or using different discount rates and assessing the impact on the results.

As Drummond et al. (1997) suggest, sensitivity analysis may be needed when estimates are subject to debate. This may occur if no estimates are available, the estimates are subject to imprecision, or there is methodological controversy such as those surrounding discount rates. Upper and lower bounds on estimates for the sensitivity analysis can be set by using evidence from other studies, current practice in the literature or by soliciting judgements from those who will be making decisions. Calculations can be made using a combination of best guess, most conservative and least conservative estimates.

It's your turn

Put the information from this workbook to use for your own setting. Complete these exercises below.

Remember to use the information from Workbooks 1 and 2 to help you complete a full evaluation plan. Review that information now, if you have not already done so.

1 Decide whether a full economic evaluation is needed or warranted, given your research questions and your research resources. Is a partial economic evaluation (reviewed in this workbook) or a cost evaluation (Workbook 5) more appropriate?

2 Decide the scope of your study and the treatment alternatives that you want to evaluate. Will you conduct an economic evaluation within an agency, across several agencies, or evaluate wider social costs?

- Within an agency
- Across several agencies
- Wider social costs

3 Using the information contained in this workbook, choose the study design that is most appropriate for your research questions and resources.

- Cost-minimisation
- Cost-effectiveness
- Cost-utility
- Cost-benefit
- Partial economic evaluation

4 List programme cost sources that you want to evaluate. If evaluating services across agencies, decide the common measurement(s) you will use. Meet with planners from the other agency(ies) to achieve consensus on the evaluation methods.

We have started the list as an aide for you. Cross out the sources that do not apply to your situation, and add others that are not already listed.

1) Costs to service providers

- *Capital:*
  - land
  - buildings
  - equipment
  - vehicles
- *Running costs:*
  - paid staff
  - volunteers
  - administrative and managerial costs

- building related expenditure (heating, lighting, maintenance, etc.)
- consumables including drugs prescribed and their dispensing costs, toxicology costs etc.

2) Costs to the individuals and their families in treatment

- *Out of pocket expenses:*
  - travelling and other direct expenses
  - contribution to treatment costs (if not included in A)
- *Leisure time and other costs associated with input to treatment costs:*
  - pain, distress etc. associated with changing habits, or with process of treatment

3) Costs to other agencies or individuals

- *Referrals to other health or social agencies linked to the treatment*
- *Increases in potential problems associated with treatment*
  - leakage of prescribed drugs to illicit markets

4) Loss of patient productivity costs

5 Decide how you will assess the "benefits" of treatment. This will depend partly on the evaluation design that you choose (Exercise 3), and may include a combination of cost, quality of life, and other outcome data. Determine what information you have available, and what other information you will still need to find out. If you need to collect additional data, decide what method you will use to do this. Review Workbook 2 to help you choose an appropriate data collection measure.

Here's a list to get you started. Cross out items that you will not measure, and add others as needed.

1) Direct health benefits to the individual

- *Quality and quantity of health improvements:*
  - exact measurement depending on economic analysis type
  - associated with reduction in drug use
  - reduced risk of injection-transmitted disease
  - more healthy lifestyle in general
  - less any adverse effects of treatment

2) Non-health improvements in quality of life for the individual and family

- *Reduction in PSU - related violence*
- *Improvements in social functioning*
- *Other benefits to the family*

3) Reduced use of other health care interventions

4) Benefits to other agencies

- *Reduced use of resources from other social care and welfare services*
- *Reduced criminal justice system costs*
- *Benefits net of any adverse consequences to "community and social environment"*

5) Productivity benefits

- *Benefits in individual productivity as a result of the treatment*

6 Review what you have planned in these exercises. Will your plans answer your research questions? Are your plans realistic, given your research resources? If not, make modifications as needed.

Conclusion and a practical recommendation

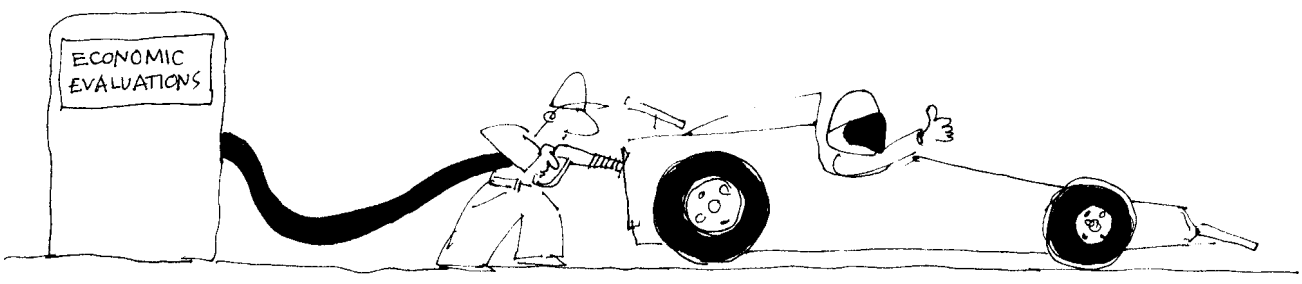
In this workbook, we have outlined the basic principles and practices of economic evaluations within PSU services and systems. In undertaking economic evaluations, it is essential that you pay close attention to the principles and practices of planning and implementation as outlined in Workbooks 1 and 2. Trade-offs have to be made as to the **rigour** with which you collect and analyse information to answer your evaluation questions, and the **resources** you have available. You must strive to achieve the best possible information with the time and resources available to you. You must carefully document the limitations of your findings and conclusions. With these principles in mind, you will be able to undertake practical and useful cost evaluations within your treatment service or system.

After completing your evaluation, you want to ensure that your results are put to practical use. One way is to report your results in written form (described in Workbook 2, Step 4). It is equally important, however, to explore what the results mean for your programme. Do changes need to happen? If so, what is the best way to accomplish this?

Return to the expected user(s) of the evaluation with specific recommendations based on your results. List your recommendations, link them logically to your results, and suggest a period for implementation of changes. The example below illustrates this technique.

Based on the finding that programme A, compared to programme B, results in 20% cost savings yet equivalent quality of life outcomes, we recommend that programme A is adopted on a larger-scale basis.

Remember, economic evaluations are a critical step to better understanding the day to day functioning of your PSU services. It is important to use the information that economic evaluations provide to redirect treatment services. Through careful examination of your results, you can develop helpful recommendations for your programme. In this way, you can take important steps to create a "healthy culture for evaluation" within your organisation.



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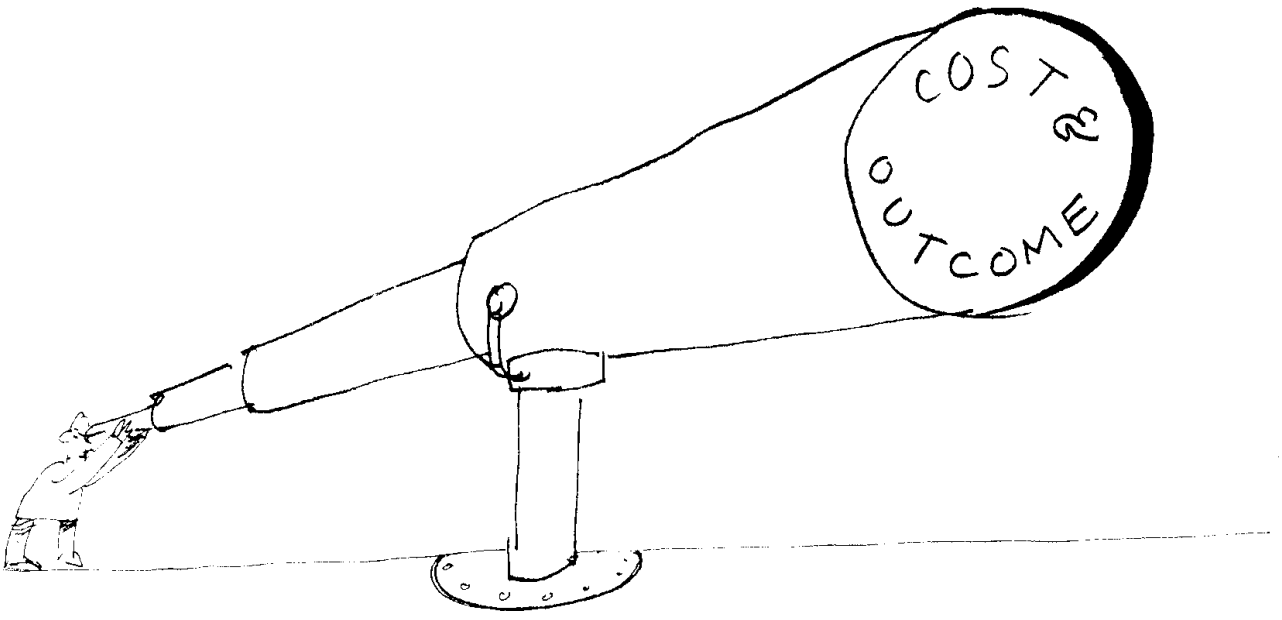
Comments about case example

The following case example presents a modified cost-effectiveness economic evaluation. The evaluation compared a case management approach to a "usual care" approach for people with severe mental illness and PSU dependence. In this evaluation, case management included intense individualised assistance and monitoring by a team of professionals. Usual care was defined as participation in a community-based PSU support group (Alcoholics/Narcotics Anonymous). Costs of providing each programme were calculated on a per client basis, and compared against changes in societal costs that were incurred by participants. Societal costs included psychiatric, medical, legal, and family resources. Results indicated that both treatments resulted in cost savings. However, the case management approach also resulted in significantly improved psychiatric symptoms and role functioning relative to usual care. Evaluators did not provide a cost-effectiveness ratio, thus departing from standard cost-effectiveness evaluation techniques as described in this workbook. As a result, their conclusions had to be based on a general overview of cost and outcome data rather than a single measure of effectiveness.

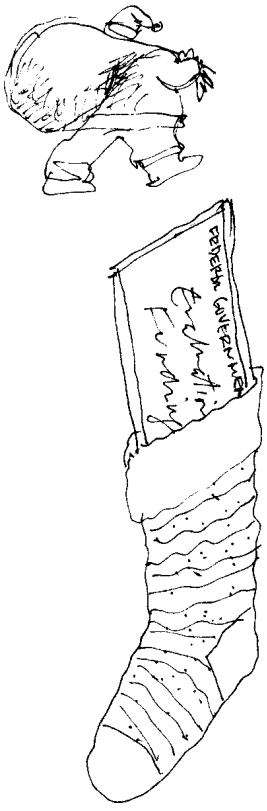


Case example of a economic evaluation

Cost-effectiveness evaluation of substance misuse interventions

By
Teh-wei Hu, Ph.D.

The author alone is responsible for the views expressed in this case example.



Who was asking the question(s) and why did they want the information?

Towards the late 1980's, a California county mental health administrator was very much concerned about the rising costs of mental health care and the prevalence of substance misuse. The administrator was searching for a services program which might be able to contain the rising costs of care, and, perhaps at the same time, improve the mental health status and functioning of clients. In response, the county allocated funds for carrying out alternative models for treatment. At the same time, evaluation funding from the federal government was received to evaluate the costs and outcomes of this experiment.

This case study focuses on the treatment of people with severe mental illness and alcohol and drug abuse in a California county (Jerrell & Hu, 1996; Jerrell, Hu, & Ridgeley, 1994; Jerrell & Ridgeley, 1995). A case management program was developed for this client population since they are very high users of public health and other services. The case management program involved intensive individualised assistance and monitoring by a team of clinicians and paraprofessionals. The clients involved in the case management program were compared to those involved with Alcoholics Anonymous or Narcotics Anonymous (AA/NA), a form of supportive counselling to help people work through the 12-step recovery process. Staff met with clients both individually and in groups and provided an additional three to four hours per week of services in addition to their mental health services. Staff actively engaged in teaching patients the 12-step recovery approach, and linked them to existing AA/NA meetings in the community. Thus, the 12-step AA/NA approach served as the control group or as a "usual care" group.

Qualified patients were randomly assigned into the two intervention programs. In the final analysis, 39 patients were in the AA/NA program and 45 patients were in the case management program. It was anticipated that the individualised assistance and monitoring within the case management program would produce superior outcomes for this client population and be more cost-effective.

What resources were needed to collect and interpret the information?

To carry out this evaluation, the director of the evaluation department in the county recruited a health economist and a clinical psychologist to design the study. Two graduate students and two staff were hired to collect and process the data. Outcome data were collected from personal interviews, and cost data were mainly collected from county services claim records and personal interviews with clients and their families.

How were the data collected?

Outcomes - This study examines the outcomes of treatment of dual diagnosis clients. It placed much emphasis on psychiatric and substance disorder symptoms, social functioning, and life satisfaction. Outcome information was collected from several survey instruments: the Social Adjustment Scale (SAS), (Schooler et al., 1979), the Role Functioning Scale (RFS), (Green et al., 1987), and the Satisfaction with Life Scale (SLS), (Stein and Test, 1980), augmented information on client use of drugs and alcohol, and their mental health and medical conditions.

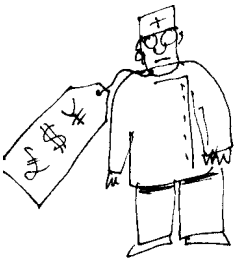
Costs - Resources utilised by clients with severe mental and substance disorders in each of these intervention programs involve the public and private mental health sector, general medical sector, judicial system, social service agencies, and families. Data were collected on all these sources of support.

Intensive mental health services that were provided to each client in the study (i.e., inpatient days, skilled nursing days, residential treatment days, and emergency visits), were separated from the mental health supportive intervention services (i.e., case management hours, outpatient visits, medication visits, supportive housing days, and day service days). This was done to compare the cost differences in providing supportive services through each intervention. The cost impact of these programs on the use of other mental health services, such as acute and subacute, intensive services and non-mental-health services was then compared.

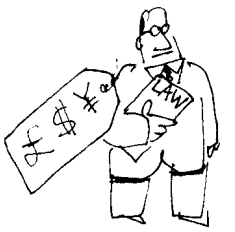
Data on general medical services were also collected, because many of these clients also have co-occurring chronic medical problems, or have a propensity to seek treatment in medical emergency or outpatient health services. Medical treatment included inpatient, outpatient, and emergency visits, as well as nursing home care. All these clients were eligible for Medicaid, so the costs of these services were obtained from the billing system in the local public hospital or clinics, and from Medicaid claims data for clients served in the private sector.

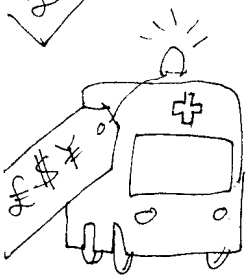
Criminal justice and social services were provided to some clients in the study as well. Criminal justice services included police contacts, arrests, court appearances, attorney services, jail, probation, and conservator services. The major challenge in estimating criminal justice costs was the complexity of the process of retrieval and placing a cost value to each unit of those contacts. Criminal justice system utilisation data were obtained through the criminal justice data system. The unit costs were obtained from the county executive's office, which had previously undertaken a special cost accounting study to determine what the public's direct costs were by type of charge (misdemeanor or felony, drug related and non-drug related) at each stage of the criminal justice contact. Data on use of other social services, including mental health conservatorship or guardianship, were collected from client interviews and

clinical public guardian records. Information regarding average cost per unit of these services were obtained from the relevant departments.



Costs incurred by the family in providing care to these clients were included in the cost estimation procedures. This included, for example, the actual family expenditures for treatment, transportation, legal services, as well as the time family members spent with the client in treatment and transportation. These data were obtained from family/ care giver interviews. Market value of the transportation costs and wage rate of services were then used to estimate the costs to the family. The issue of whether maintenance costs, such as food, lodging, and clothing should be included in this type of analysis is debatable. One approach is to treat all maintenance costs as treatment costs (Rice, Kelman, & Miller 1992). Another approach is to treat only a portion of the total as treatment costs (McGuire et al., 1987). Maintenance costs incurred while living with family members or alone in a house are not usually considered treatment costs because these maintenance expenditures are part of daily living expenses, even of persons who are ill. On the other hand, in the context of this study, the costs of employing a paid caretaker to assist a client with basic daily living activities should be considered as treatment costs. The latter reasoning was adopted in these analyses. In this study, we performed a separate accounting of all these maintenance costs to reflect the magnitude of those costs of daily living. These data were collected in client and family/ care giver interviews.





Finally, to understand the relevant financial burdens among various sectors of society, transfer payments were also recorded in our data set. Transfer payments are from one party to another (i.e., parents to children, government welfare payments, etc.) that are not accompanied by an exchange of services or goods of comparable value. These payments are not treatment costs because they reflect only a shifting of existing resources. However, they are an important indicator reflecting the government/ taxpayer share of the cost of illness. The amount of transfer payments also serves as a useful outcome indicator demonstrating treatment providers' success in connecting clients to entitlement programs that are likely to enhance overall income level and, therefore, quality of life. These data are collected from client interviews as well as from public or private guardian records.

After all the public and private service elements related to the evaluation were identified, we determined a standard unit of measurement for each type of services and obtained the unit cost of each service. This unit cost was then multiplied by the number of units of services and summed to obtain various types of subtotal and total costs.

How were the data analysed?

Cost and outcome data were compiled for the 6 months prior to each client's entry into the study, and then for each 6-month period that they remained in the study. Cost and outcome variable were found using statistical computing software. Each cost and outcome variable was summarised using the mean, variance (standard deviation), minimum, and maximum value, the use of which provides a basic understanding of these variables and also helps to check for any possible outliers or unreasonable values. A number of cross-tabulations were constructed with socio-demographic variables (age, gender, ethnicity, etc.) to provide a description of the study populations between study groups. To evaluate the possible differences between programs, multiple regression analysis was used for cost and outcome data analysis.

What did they find out?

Psychiatric symptoms include depression, manic episodes, and schizophrenia while using drugs and alcohol. Compared to the AA/NA program, patients under case management had an overall lower mean value of schizophrenia symptoms and depression. There was no difference in drug and alcohol use. These results were obtained after controlling for sociodemographic differences and baseline illness condition using multiple regression analysis. Overall life satisfaction measures showed that case management program patients improved in terms of their living situation, global satisfaction with life situation, and mental health condition, as compared to AA/NA program patients. The overall role functioning measures show that case management program patients improved in independent living, but were rated lower in extended social involvement in the community, as compared to AA/ NA program patients. Again, all these findings are based on multiple regression models, controlling for other sociodemographic factors.

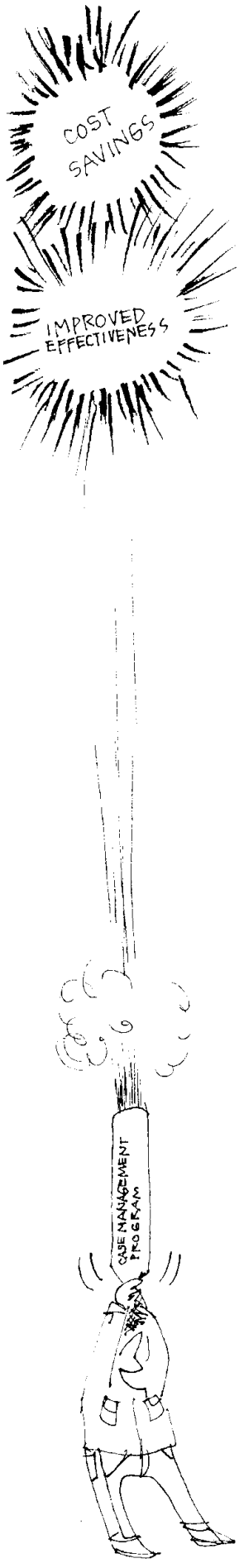
Changes of psychosocial outcome measures scores were measured and compared between the baseline and 12-month period through regression analysis. It was found that adjustment of family interaction (SAS) was improved by 0.75 for case management clients, as compared to AA/ NA clients. Similarly, the score of Global Satisfaction of Life (SLS) for higher for case management clients by 1.74. Furthermore, mental health symptoms (Schizophrenia, -1.88; Depression, -2.19; Mania, -0.96) were all reduced among case management clients as compared to AA/NA clients.

The findings from these effectiveness measurements indicate that the case management program provides some improvement in psychiatric symptoms, life satisfaction measures, and independent living, but no significant improvement in drug or alcohol symptoms.

Tables 1 and 2 provide a summary of mental health costs and average societal costs for the two interventions. The detailed categories of these costs changes over a 12-month period are illustrated. It can be seen that both programs significantly reduced mental health costs from the baseline period: AA/NA program reduced costs by 50%, while the case management program reduced costs by 41.2%. Similarly, total average societal costs were reduced 46.8% for the AA/NA program, the case management program reduced costs by 39.7%.

When comparing effectiveness measurements, it seems that case management is more cost effective than the AA/NA program. The AA/NA reduced costs by 10%, but had less improvement in patient outcomes. On the other hand, the case management program achieved both cost reduction (4%), and improved some of the psychosocial conditions of participating patients.

Given the nature of multiple outcome measures in numerous scales, it is very difficult to provide a meaningful cost-effectiveness ratio. However, it is clear from this analysis that the case management program has not only reduced (or saved) the costs of treatment, but also improved the outcomes of participating clients. In other words, it achieved both cost savings and improved effectiveness.



How were the results used?

These two programs have achieved cost savings primarily because of the major reduction in the use of intensive mental health services. Therefore, the dual diagnosis treatment programs studied succeeded in their goal to reduce cost.

The findings of this evaluation were reported by the county director of evaluation to the Director of the Bureau of Mental Health Services, the County Medical Director, and the County Supervisor. As a result, the County decided that case management programs should be continued and clients should be encouraged to utilise case management services so that total care costs are reduced and treatment outcomes are improved. In fact, the County has also expanded case management services to mental health and juvenile delinquent services program.

Table 1: Changes in average mental health service costs per client for two dual diagnosis treatment programs

Service	AA/NA (n=39)			Case management (n=45)		
	Baseline	12 months	% Change	Baseline	12 months	% Change
Intensive mental health services						
Inpatient	7,660	2,196	-71%	2,860	1,563	-45%
Skilled nursing	1,158	159	-86%	1,606	707	-55%
Residential	568	384	-32%	701	201	-71%
Emergency	405	184	-55%	426	157	-63%
Subtotal	9,791	2,923	-70%	5,593	2,628	-53%
Supportive mental health services						
Medication	724	604	-17%	794	565	-29%
Outpatient	1,852	1,870	+1%	1,611	1,251	-22%
Case management	466	602	+24%	506	539	-7%
Housing	349	485	+39%	460	378	-18%
Day services	196	189	-4%	237	100	-58%
Partial hospitalization	0	0	0	94	0	-100%
Subtotal	3,587	3,750	+5%	3,702	,833	23%
Total Costs	**$13,378**	**$6,673**	**-50%**	**$9,295**	**$5,461**	**-41%**

Table 2: Comparison of average societal cost per client for 12-month time periods for two dual diagnosis treatments

	AA/12-step Program (n=39)			Case management (n=45)		
	Baseline	12 months	% Change	Baseline	12 months	% Change
Psychiatric						
Psychiatric Intensive	9,791	2,923	-70%	5,593	2,628	-53%
Psychiatric Supportive	3,587	3,750	+5%	3,702	2,833	-23%
Subtotal	13,378	6,673	-50%	9,295	5,461	-41%
Medical						
Medical Inpatient	134	371	+176%	193	341	+77%
Medical Emergency	377	117	-69%	235	121	-49%
Medical Outpatient	104	27	-74%	6	77	+1183%
Subtotal	615	515	-16%	434	539	+24%
Legal						
Court, jail, etc.	1,151	995	-14%	1,657	977	-41%
Conservatorship	23	54	+134%	34	11	-68%
Subtotal	1,174	1,049	-11%	1,691	988	-42%
Family						
Support	687	176	-74%	363	139	-62%
Travel	57	55	-4%	41	9	-78%
Subtotal	739	231	-69%	404	148	-63%
Grand total	**$15,906**	**$8,468**	**-47%**	**$11,824**	**$7,136**	**-40%**

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