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Estimating Per Unit Treatment Costs for Mental Health and Substance Abuse Programs

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I. INTRODUCTION

This toolkit is designed for program evaluators and others who wish to understand how unit costs of specific mental health services are estimated, especially where data available to carry out estimations vary in both quantity and quality[1]. Per unit costs are the key to determination of per person expenditures. This toolkit has been developed to offer some practical methods for arriving at unit cost estimates when it is not possible to gain access to the cost accounts needed to calculate precisely the per unit cost of providing a specific service from a specific site. We also help the reader to gauge the precision of such estimates.

By "unit cost estimate," we mean an approximation of the monitized resources required to provide a specified amount of a particular service to a person with a mental disorder. Ultimately, estimates of unit costs can be linked to specific amounts of service provided a given individual and aggregated for different time periods, episodes of care, or groups of special populations. Unit cost estimates may be used for such purposes as:

- Describe the mean per person costs of a set of specific services used within a network of programs or systems[2]. These per person costs might be compared to similar costs in other systems.

[1] If an evaluator wants to estimate unit costs within one agency with well developed financial information (e.g., a multipurpose CMHC in one physical plant, with one set of financial accounts and a single administrative structure) then the precise estimates are possible. For this type of cost-finding, we refer you to a monograph "Cost-Finding and Rate Setting for Community Mental Health Centers", by Sorensen and Phipps (1975), which provides a very complete and detailed guide to determining per unit costs of inpatient care, emergency treatment, outpatient and community support programs within one Community Mental Health Center (CMHC) or as the authors say, "under one roof." This monograph defines cost-finding as any method which attempts to charge all relevant CMHC expenditures -- both direct and indirect -- to final revenue producing functions or activities. The authors provide a method for determining, exactly, the per unit cost of delivering a particular unit of treatment, using accounting information from CMHC general ledgers. In order to use these methods, you need to have access to the accounts of the center. This approach, known as cost accounting, is the touchstone of all the work that follows, and we encourage the readers to be familiar with this work. Even if you do not intend to use this level of detail or if you think that you will never have access to the general ledgers of providers, the monograph will still provide a very clear explanation of general accounting principles, how general ledgers are set up, and how expenses which cannot be attributed directly to a treatment program are allocated between all the programs that share the expense. If you have absolutely no knowledge of how books are kept or what is meant by general accounting principles, we strongly suggest that you review "Cost-finding and Rate- Setting for Community Mental Health Centers" or other references on accounting.

[2] Program refers to a group of services related by a common clinical goal and which share some level of administration. Service system refers to services and programs that serve a common target population and are linked in some clinical or administrative ways.

- Develop cost effectiveness or cost-benefit ratios, using per person mean costs of a set of specific services used within a network of programs or systems as the denominator and the person's non-monitized or monitized outcomes as the numerator.

- Simulate per person costs for purposes of planning under changing service system configurations.

Cost evaluation studies require four separate steps to arrive at per person costs. This toolkit is designed to take you through Steps 1 and 2 (the determination of per unit costs) so that you can then use your own data to complete steps 3 and 4. The toolkit is organized to be consistent with these steps and includes sections on each of the four steps.

Step 1. Identify and list all the different service types(e.g., inpatient hospitalization, individual therapy), by provider (specific hospital or agency) for the consumers in the study. This list becomes the starting point for knowing just what costs are to be determined.

Step 2. Determine the cost per unit of treatment for each of the service types, by provider (e.g., $x per diem or $x per hour, for each treatment/service for each provider from the list generated in Step 1).

Step 3. Specify the type and amount of service used in one year for each consumer (number of hospital days in Hospital A, number of hospital days in Hospital B, number of therapy sessions at Agency C) preferably in a spreadsheet format. Multiply the amount of service used for each service type by the cost per unit for that service for each consumer in the study. Repeat this step for every service used from every provider for each consumer in the study. The next step is to summarize group-level costs.

Step 4. Use these person-level data: (1) to determine cost-effectiveness ratios for specific programs or systems of care or (2) to be the foundation of simulations projecting cost differences under different conditions.

The toolkit has six sections:

(1) this introductory overview of the contents and intended audience,
(2) an examination of the tradeoffs in estimating per unit costs between level of precision attained and level of effort expended,
(3) a discussion of what services to include and how to define them,
(4) a discussion of how to construct per unit cost estimates,
(5) a discussion of how to develop a format for summarizing person and group level costs,
(6) a brief guide to economic concepts that are the foundation of cost evaluations.

The Appendix provides two articles and other materials for the toolkit user.

In the US, we cannot offer a national cost per unit for a set of commonly used services because of the wide variation across the country in treatment settings, cost of living, provider types and other resources used. Instead, we provide guidelines and case examples that illustrate how to estimate service-specific per unit costs. The emphasis is on how to estimate the costs for the particular programs used by clients participating in the evaluation. Almost all the examples we provide come from our work in Massachusetts and thus may need modification in other states.

One good example of the construction of per unit costs in countries where universal health care results in standardized expenditure and activity information is a series of reports from the Personal Social Services Research Unit at the University of Kent, Canterbury, United Kingdom. The most recent volume of *Unit Costs of Health and Social Care* was compiled by Ann Netten and Jane Dennett (1997). Two pages from this report are included in the Appendix. One page documents the per unit costs of a clinical psychologist and one page the per diem costs of acute NHS hospital services for people with mental illness. This approach does not assume that the services provided across the country are exactly the same, but for purposes of cost studies, national estimates are based on national expenditure data. In both cases, the estimates include a "London multiplier" in recognition that the capital city has expenditures higher than other areas of the country.

We assume the reader has some clinical, research or administrative experience in the mental health field (e.g., understands that "case management" is a generic term for service that can vary widely in intensity and function, depending on the program philosophy, the size of the case-load, the training and experience of the staff and the needs of the individuals served), and some knowledge of

accounting and cost-finding (e.g., how administrative costs are stepped down). We do not expect the reader to have a background in economics or econometric analyses.

II. DETERMINING THE BEST APPROACH TO ESTIMATING COSTS: BALANCING LEVEL OF PRECISION WITH LEVEL OF EFFORT

Every increment of precision requires additional resources but varies in its usefulness. Thus, the level of precision needed in unit cost estimation must be considered in light of how the information is to be used. This is similar to the management of our own finances which is governed by decisions we make every day about how and on what to spend our money. Sometimes it is sufficient to make "back-of-the-envelope" estimates. Other times we make precise calculations about all our current and anticipated expenditures. In doing economic evaluations, the questions to ask are: Do we need to know precisely the costs for each service used for each person and if not, what magnitude of error are we (or others) willing to live with? What is the tolerable range of confidence limits around the estimate?

For example, if cost estimates are going to be used to predict future expenditures for large populations (such as future expenditures after health care reform), then even low levels of error in per unit costs for commonly used services become large errors in the prediction of population expenditures. On the other hand, in a small study, if certain services rarely occur, (e.g., several visits by a few clients to a court clinic, in a sample of 200 clients) even if the estimate is off by as much as 20% of the cost per visit, the total per person costs in this sample will hardly be affected by this imprecision. The level of precision required should be decided before embarking on the work necessary to develop the per unit costs.

Three guidelines for making decisions about what level of effort will provide the right *level of precision* in the per unit cost determination are:

- *What level of error are you (the evaluator) willing to accept?*

- *What level of error are the important audiences for your evaluation willing to accept? Can you confidently defend yourself against charges that your findings would be substantively different if you had been more precise?*

- *What level of effort will the available time and resources permit?*

Estimating the precision of a given estimate assumes some knowledge of just what resources are needed to produce a unit of service. Wolff has written that "how an estimate is derived determines its quality, reliability, accuracy, and comparability. An estimate ultimately depends on a litany of implicit and explicit assumptions, random and nonrandom data collection errors, exactness of the data sources, breadth and depth of omissions and oversights, and ability to measure true economic costs." (page 173, Wolff and Helminiak, 1993).

A major part of practical cost estimation is deciding what services to include when the evaluator wishes to estimate the per person cost of treatments within a multi-service health plan or service system. The criteria for deciding what services to include are related to the guidelines that we offered above:

- W*hat level of completeness are you willing to accept? Can you confidently defend yourself against charges that your findings would be substantively different if you had been more comprehensive?*

- *What level of completeness is the audience for your evaluation willing to accept?*

- *What level of effort will the available time and resources permit?*

The advantage of setting the scope as broadly as possible is that it provides evidence of cost shifting from one provider to another or unanticipated cost consequences outside the scope of your study. For example, in our recent study of formerly homeless adults, we chose to include psychiatric and substance abuse treatment, housing, and criminal justice costs. It would have been ideal to include, in addition, the costs to family of helping to care for their family member but we made our decision based on our estimate of the magnitude of family costs, the available resources and the time we had to complete the study. This addition would have been costly, and few of the subjects had any contact with family members. Adding these expenditures to the study would not have changed our findings (we argued) and the extra time it would have taken to determine these costs would have been considerable.

III. DEFINING AND COUNTING SERVICE USE (STEP 1)

1. Identifying Services

In most cost evaluations, the services used by every person in the study are collected. A list is then compiled of each type of service provided to be used as a starting place for determining just which per unit costs must be determined. If no one in the study spent anytime in a ClubHouse program, then ClubHouse costs do not have to be calculated. If, on the other hand, study participants were admitted to three different hospitals, then the per diem costs of each of these hospitals would have to be included.

To have an idea of the range of possible services provided in a given area it is useful to review service taxonomies maintained by public agencies for administrative and planning purposes. Service taxonomies may be found in:

- State plans,
- State mental health authority contracting manuals or other documentation,
- Billing system documentation including CPT codes[3],
- List of covered mental health benefits maintained by insurers or managed care companies.

Table 1, on the following two pages, is an example of a taxonomy of services from a SAMHSA funded multi-site managed care study.

[3] The CPT billing manual permits recording consistent and accurate information for insurance companies when claims are made for reimbursement for procedures covered by health plans. All treatment procedures are listed and briefly described. All patient-specific procedures and professional visits that occur during hospital admissions are billed separately using CPT codes to describe the specific nature of the procedure provided.

Table 1: Taxonomy of Services

MENTAL HEALTH SERVICES	
1.	**Long-Term Inpatient:** Twenty-four hour care within a unit designed to serve mentally ill persons who are clinically stable and do not need around-the-clock professional services. Services emphasize psychosocial rehabilitation and improving skills in daily living.
2.	**Acute Inpatient**: Twenty-four hour care within a unit designed to stabilize acutely mentally ill persons in need of professional services to evaluate mental status, determine diagnosis, plan treatment needed to alleviate acute status, and provide treatment aggressively.
3.	**Crisis Support and Emergency Treatment**: Evaluation and short-term treatment for mentally ill persons experiencing a crisis. Available in hospitals and other specialized settings.
4.	**Partial Day/Night Treatment:** For persons who need active intervention to manage acute status, but who do not need inpatient confinement. Programs are designed to stabilize persons who otherwise might have to be admitted to an inpatient unit.
5.	**Assessment:** Service for the purpose of intake, treatment planning, eligibility determination or functional assessment by a qualified mental health professional other than a psychiatrist. This includes psychiatric evaluation/mental status by a qualified mental health professional for diagnostic or disposition purposes, commitment evaluation, psychosocial evaluation and psychological evaluation with or without testing.
6.	**Evaluation by Psychiatrist:** Above definition by psychiatrist.
7.	**Individual Treatment/Therapy:** Outpatient mental health service provided on an individual basis in a clinic, similar facility, or other location. These services may include counseling, psychotherapy, behavior management for the purposes of developing insight, producing cognitive/behavioral change, improving decision-making and/or reducing stress.
8.	**Group Treatment/Therapy**: Psychotherapy provided to more than one client. Includes psychotherapy, activity group therapy, groups, etc. for the purposes of developing insight, producing cognitive/behavioral changes, improving decision-making and/or reducing stress.
9.	**Family Therapy**: Family members of mentally ill persons who receive psychotherapy
10.	**Medication Management:** Services provided by a physician to evaluate, prescribe and monitor medications for the treatment of psychiatric disorders. Includes medication review and administration services provided by an RN under the supervision/order of a physician or Nurse Practitioner. Includes visits for the purpose of prescribing medication as well as for medication refills or dosage regulation. Medication service does not include methadone maintenance, etc. or detoxification.
11.	**Medications**: Medication prescribing in visits where primary diagnosis is a mental health disorder.
12.	**Primary Care Visits for Mental Health Reasons:** Visits to a primary care physician where primary diagnosis is a mental health disorder.
13.	**Clozapine-Related Services**: Services associated with the provision of Clozapine including weekly blood test.
14.	**Clubhouse:** Daytime program that emphasizes self-help and the work-centered day. Members of the clubhouse carry out all the functions required to run the program with the guidance of staff, some or all of whom may be former consumers of mental health services. Focus is on performance based outcomes in practical, functional and work related skills.
15.	**Case-Management:** Support services provided by a paraprofessional or team. Case-managers assist a mentally ill person to access needed mental health, legal, educational or medical services, welfare benefits, and housing. In some forms of case-management, case-managers can provide certain services.
16.	**24-Hour Supervised Residential Treatment**: Residential service in a facility with continual staff supervision.
17.	**Non-24-Hour Supervised Residential Treatment:** Residential service with part time staffing.

Table 1: Taxonomy of Services continued

SUBSTANCE ABUSE SERVICES
18. **Assessment:** Service for the purpose of intake, initial diagnosis, and treatment planning. It will include taking a history of past and current alcohol and drug use, evaluating the person's strengths and weaknesses, and a history of medical problems.
19. **Acute Inpatient:** Twenty-four hour hospital care within a unit designed to stabilize acutely ill persons with Substance Use Disorders (SUD) who are in need of professional services to evaluate mental status, determine diagnosis, plan treatment to alleviate acute status, and provide treatment aggressively.
20. **Residential Treatment:** non-acute residential care in a setting with treatment services for alcohol and other drug abuse and dependency.
21. **Outpatient Methadone:** Methadone maintenance is the continued administration of methadone, in conjunction with provision of appropriate social and medical services at relatively stable dosage levels. Methadone is used as an oral substitute for opiates during the rehabilitative phase of treatment.
22. **Individual Therapy:** Outpatient service that may include counseling, psychotherapy, behavior management for the purposes of developing insight, producing cognitive/behavioral change, improve decision-making or reducing stress.
23. **Group Therapy:** Services provided to a group of clients by facility staff. These include, but are not limited to, psychotherapy, insight therapy, reality therapy, transactional analysis, and various types of expressive groups.
24. **Medication/Somatic:** Administration of medications to assist in the treatment of alcohol or substance abuse disorders. Drugs could include Antabuse or Naltrexone.
25. **Acupuncture:** A therapy for relieving pain or changing a function of the body by placing thin needles in the skin.
26. **Detoxification:** Treatment in which person is monitored while withdrawing from a substance, as part of being treated for a substance abuse disorder.
REHABILITATION SERVICES
27. **Vocational Program Other than Clubhouse**: Services designed to help clients obtain and/or maintain employment, or learn job related skills, not including services provided through a clubhouse program.
SELF-HELP SERVICES
28. **Self-help or Mutual-Help Groups for those Recovering from SUD:** Independent support groups or fellowships organized by and for individuals with alcohol or other drug problems or their collateral's to help members achieve and maintain abstinence from and/or cope with the effects of alcohol and other drugs.
29. **Self-help or Mutual-Help Groups for those Recovering from Mental Illness:** Services organized and run by individuals who are recovering from mental illness that are intended to support individuals with mental illness. Includes both consumer operated drop-in centers and other consumer operated services.
MEDICAL SERVICES
30. **Primary Care Visits for Physical Health Reasons**
31. **Emergency Physical Health Visits:** Unscheduled service provided by a facility which is open 24 hours a day in response to crises or emergencies related to physical health problems. Includes Urgent Care and other walk-in clinics as well as hospital-based services.
32. **Non-Mental Health Pharmacy:** Medications prescribed at a visit where the primary diagnosis is other than a mental health or substance use disorder.
33. **Medical Inpatient**: Twenty-four hour care within a unit designed to stabilize persons with physical health problems in need of professional services to evaluate health status, determine diagnosis, plan treatment needed to alleviate acute status, and provide treatment aggressively.
34. **Specialty Non-Mental Health Medical Services:** Services delivered by a non-psychiatric physician who is specially trained in a specific area of medicine for a problem related to the physician's specialty.

2. Defining Services

Being clear about the nature of each service to be costed is essential. Conceptual definitions must be grounded in concrete information. A mental health service such as a "crisis bed" may be different in different sites. Thus, it is helpful to define a treatment program along two dimensions: what does the treatment consist of and how is a unit of treatment typically defined? If you begin by determining the exact nature of the program for which component costs are being estimated, you will avoid the apples and pears problem in making comparisons later. For example, in two vocational rehabilitation programs, one per unit cost is $15/hour and another is $60/day. Are they the same program (the same clinical goals), but one costs more than the other or are they different programs (different clinical goals) which happen to cost the same? Without more knowledge of the programmatic differences, you may have accurately captured the costs, but will be unable to interpret the findings that result from the analyses of your data.

Conceptual service definitions should consist of information about aspects of services like the ones listed below.

- Staff to client ratios (fewer clients per staff member = more intensive services)
- Types of clients served (level of impairment, age, etc.)
- Expected mean length of service (days, weeks, months)
- Goals of the service, and (recovery, employability, clinical stability)
- Types of activities within services (job training, skills of daily living, etc.)

For community-based services not defined elsewhere, we recommend that investigators interview the service director and the financial administrator as first steps in defining the service. *The point of being clear about the nature of the service is to avoid misinterpreting cost and outcome data associated with service effects.* It is important to be comparing apples with apples. A program with the same definition (and in the same setting, and in the same region of the country) is likely to cost about the same.

Some years ago, we needed to determine the cost of a particular day hospital service. One member on our team decided to investigate the per unit cost of day hospitals nationally. She interviewed service directors all over the country. The questions she asked were:

(1) What is the treatment goal?
(2) Are there clinical indicators for inclusion in or exclusion of individuals from the service?
(3) Are there clinical indicators of successful client response to treatment?
(4) What is the direct clinical staff to patient ratio?
(5) What level of professional training do the staff have?
(6) What is the average length of stay in the service?
(7) Is there a limit to the amount or duration of this treatment that clients can get?
(8) Must providers in this service co-ordinate or plan treatment with other providers or is the service self-contained?

We found wide variation in the answers. The same questions should be asked of any treatment service, including inpatient treatment, so that per unit cost variation can be appropriately interpreted. The responses to these questions (see Table 2) allowed us to define a particular "day hospital" service. It also allowed us to make a decision about whether or not the cost of the "day hospital" in Boston could be substituted for the cost of a day hospital service in Walla Walla or Little Rock. The staff to client ratios, the level of staff professionalism and the numbers of support and administrative staff proved to be the primary indicators of the cost per unit of service.

Table 2: Defining Day Hospital "A"

1. Treatment goal: to provide a therapeutic environment that stabilizes and improves the clinical condition of acutely psychotic adults diverted from inpatient admission.
2. Excludes those unable to maintain minimal standards of safety for themselves or others.
3. On discharge, living skills will be such that, with supervision, clients can manage their own medication and have sufficient judgment to maintain a safe and healthy lifestyle in either a sheltered or supported living setting.
4. The direct clinical staff to client ratio is 1:2.
5. Staff are RNs with 1 MD:25 clients.
6. The average length of stay is 26 days.
7. No limits on the amount or duration of treatment.
8. Coordination with other providers is essential: day hospital treatment is a step below inpatient treatment and a step above community support programs.

Managed care is the catalyst for innovation in service approaches, but these very innovations can create confusion in arriving at service definitions. In many states, service innovation is moving well ahead of the bureaucratic procedures for renaming and categorizing services. The result is that out-of-date service names may be used to label new services. The evaluator must be both nimble and skilled enough to detect and closely examine variations in service definitions and also keep abreast of new services, including how and where they are accounted for in administrative documents.

3. Units of Treatment

Any approach that estimates service costs based on units of service provided must define a unit of service for every service studied. Units of service differ with the type of service. Examples for different services are listed in Table 3. Unit of service definitions can usually be found along with service definitions.

Table 3: Typical Services and Unit Measurements

Service	Unit
♦ Inpatient	♦ 24 Hour Day
♦ Day Treatment, Clubhouse, Drop in Center	♦ Full Day (6 Hours) or Partial Day (3 Hours)
♦ Residential	♦ 24 Hour Day
♦ Emergency Service, Medication Visit	♦ Hour or Visit
♦ Individual or Group Therapy	♦ Minutes
♦ Vocational Service	♦ Full or Partial Day (Workshop), Hour (Job Coaching)
♦ Other Support	♦ Hour (Case management). Trip (Transportation)

4. Sources of Data

The cost of a service, program or system for some number of persons over some period of time is estimated by multiplying unit cost times the number of units of service delivered in the period of time specified. Counts of units of service delivered can be based on different sources. Each of these sources has advantages and disadvantages. The sources and their advantages and disadvantages are listed in Table 4. No data source should be accepted as adequate without investigation. Wolff et al recommend that secondary data (such as paid claims) be cross-validated by comparing them with primary data from client charts.

Table 4: Sources of Data

Data Source	Advantages	Disadvantages
Client Chart	♦ Best source of unreimbursable service delivery	♦ Resource intensive ♦ Not available without written permission
Billing Information, paid claims	♦ Availability ♦ Efficient in large studies	♦ No bills for unreimbursed services ♦ Can be difficult to obtain ♦ Requires advanced programming and data management skills
Client self report or reports of others	♦ Availability ♦ Identifies services not recorded	♦ Resource intensive ♦ Inaccuracy due to selective retention and recall[4]

[4] Wolff, Helminiak and Tebes discuss the reliability of the informant when the information has a stigmatizing influence (1997). She concludes that multiple informants should be used, but warns that the longer the recall period and the more stigmatizing the information, the less reliable are the data.

IV. ESTIMATING PER UNIT COSTS (STEP 2)

In this section we will offer several methods which can be used to arrive at a per unit cost estimate. These methods vary in their level of precision and each has limitations which are described in Table 5 below.

Table 5: Methods of Estimating Costs and Their Data Sources

Type of Estimate	Data Sources	Limitations
Constructed Estimates	♦ Actual expenditures from agency general ledgers ♦ Actual expenditures from Medicare cost reports	♦ High level of effort, Limited access ♦ Doesn't include community agencies
Derived Estimates	♦ Contracts specifying total budget and obligated service provision; ♦ Allowed charges, adjusted by cost to charge ratio	♦ May include cross subsidies ♦ May be available for hospitals only
Payments	♦ Paid claims ♦ Fee schedules	♦ Do not reflect actual costs
Pre-existing Estimates	♦ Published reports	♦ May not be the same "product", May not have documentation on how estimates were generated.

On Table 5, the methods of estimating are arranged by relative level of effort and precision. The greatest effort and the most precision is in constructing per unit costs that are provider specific. The least effort and most imprecise approach is using pre-existing estimates. We include the latter here because there may be a case when this approach is both feasible and appropriate, but in general, we discourage the use of pre-existing estimates.

The evaluator must find a judicious compromise between the specific conditions of the evaluation and the recommendations in this toolkit. If you choose one method of estimating per unit costs and stick to it, you might find that some types of treatment or services will not be included. This might happen if you use paid claims and want to also include services not covered by the health care plan. Alternatively, you might choose to use several different methods, but then data

interpretation may be difficult. It is likely that no single data source may be the right one for the study you are doing. In some ways, estimating per unit costs is like solving a mystery and you are the detective. We can provide some general rules, but each case is different and a satisfactory solution is a balance between case-specific circumstances and adherence to the recommendations in this toolkit. Below, we present some methods for determining per unit costs.

Regardless of the method chosen, you should specify the inputs, to the extent that you are able, that are the basis of your estimates. Even if you use pre-existing or payment based estimates, it will be important to understand what inputs were included or how payments were determined. Costs based on these data sources can only be understood and compared if their components are known. Inputs can include:

- Labor
- Equipment and supplies
- Space (estimating the cost of space is discussed below under capital costs)
- Utilities, other operating expenditures

1. Acute Inpatient Treatment

The per diem cost of hospital care is a direct function of the amount of resources used. When more resources are used, such as more nursing staff per patient, then the per diem cost will probably be higher. When comparing costs of two hospital-based programs, it is important to know whether the differences are due to programmatic differences or simply due to differences in the cost of resource use for virtually the same program. An example of cost differences as a result of programmatic differences might be two inpatient programs which serve two different types of patients which, in turn, may affect the level of resource use: one program may be in a locked unit and another in an unlocked unit. Locked units admit patients who tend to require close observation because they are a danger to themselves or others. This monitoring may require additional nursing staff (i.e., more resources and therefore raise the cost).

An example of the latter might be a program that treats the same patients in the same type of program but pays higher salaries for the same staff (e.g., competition for nursing staff in a large city

may result in higher salaries than salaries paid in a small community for the same training, experience and duties).

a. Hospital Per Diems: Cost Reports

Information about hospital expenditures can be obtained from the hospital "Medicare cost report" submitted to the state rate setting agency. Virtually all states have such an agency and cost reports are public information. These reports are very detailed and represent each hospital's record of expenditures, revenues and occupancy rates over a given year. Based on this report, the agency approves a per diem rate for each type of "service" (i.e., what the hospital can charge for a one day stay). For example, per diem approved charges are different for surgery, for intensive care units and for obstetrics.

We caution the reader to avoid using the "approved" charge in lieu of costs. N. Wolff and T. Helminiak (1993, pp. 171-172) describe charges as "merely list prices of which third-party payers will pay some fractional amount (which is defined as payments). . . Medicare cost reports for Madison community hospitals reveal cost-to-charge ratios for service cost centers that vary from less than 0.5 to more than 2.0. Charges were found not only to be a poor absolute indicator of costs, but also a poor relative factor as well."

Cost reports do permit some calculations of the costs per day that avoid some (but not all) of the problems described above. If there is a separate and distinct psychiatric unit, cost information will be reported separately. The cost report is organized in much the same way income tax schedules are organized. The first few pages summarize all income and expenditures and each successive schedule summarizes more detailed information used to complete the calculations needed to support the preceding page. The most detailed data are at the end of the report.

The cost report is not an estimate of future costs, but a report of the year's actual revenues, expenditures and services delivered. Using the summary pages of the hospital cost report (see Tables 7 and 8), divide the total expenditures for the psychiatric unit by the total number of bed days actually used (not the total possible number of bed days). Using information from these summary pages for Forest Green Hospital, we calculate the per diem shown in Table 6.

Total expenditures for psychiatric unit = $2,846,106 (Schedule II, col. 7, expense by service)

Total patient days = 6,992 (Schedule III, col. 6, inpatient days)

2,846,106 / 6,992 = $407 per day

Table 6: Forest Green Hospital – Inpatient Per Diem

COSTS	**Primary Source**	**Value**
A. Expenditures for psychiatric unit (direct expense plus overhead stepped in)	Rate Setting Commission Schedule II Column 7 – Expense by service. (Sch XVII, C2)	$2,846,106
UNIT ESTIMATION		
B. Total Patient Days	Rate Setting Commission Schedule III Column 6 – Inpatient Days	6,992
Price base of costs	Hospital Cost Reports, Fiscal year 1992 The Mass Rate Setting Commission	
Per unit cost	**(A/B)**	**$407 per day**

Table 7: Medicare Cost Report

Forest Green Hospital For Fiscal Year Ended 9/30/92

****

HOSP *YR *SCH*1st *LAST*

NO. * * *COL*COL*

****

SUMMARY SCHEDULE

		(2) EXPENSE BEFORE RECLASS (SCH IX, C8)	(3) DIRECT EXPENSE (SCH IX, C12)	(4) EXPENSE AFTER STEPDOWN (SCH XIV, C25)	(5) EXPENSE BY DEPARTMENT (SCH XVII, C3)	(6) GROSS REVENUE BY DEPARTMENT (SCH VI, C.3)	(7) EXPENSE BY SERVICE (SCH XVII, C2)	(8) GROSS REVENUE BY SERVICE (SCH VI, C2)
69	M+S	10, 206, 009	9, 587, 286	18, 348, 620	18, 348, 620	37, 524, 987	28, 750, 334	68, 756, 919
70	PED	0	0	0	0	0	0	0
71	OB	0	0	0	0	0	0	0
72	PSY	1, 891, 674	1, 882, 422	2, 846, 106	2, 846, 106	0	2, 846, 106	31, 915
73	OTHER	0	0	0	0	0	0	0
74	SUBTOT	12, 097, 683	11, 449, 708	21, 194, 726	21, 194, 726	37, 524, 987	31, 596, 440	68, 788, 834
75	ICU	1, 931, 806	1, 778, 725	2, 847, 469	2, 847, 469	3, 005, 480	2, 847, 469	3, 005, 480
76	CCU	929	929	929	929	0	929	0
77	NEO	0	0	140, 670	140, 670	0	140, 670	0
78	OTHER	0	0	0	0	0	0	0
79	SUBTOT	1,932,735	1,779,654	2, 989, 068	2, 989, 068	3, 005, 480	2, 989, 068	3, 005, 480
80	NEWS	19,292	19,292	19, 292	19, 292	492, 523	19, 292	492, 523
81	CHR	0	0	0	0	0	0	0
82	SUBTOT	14,079,710	13,268,654	24, 203, 086	24, 203, 086	41, 022, 990	34, 604, 800	72, 286, 837
83	EMERG	1, 687, 359	1, 471, 989	2, 655, 007	2, 655, 007	4, 187, 155	8, 184, 340	19, 936, 838
84	CLINIC	424, 162	380, 203	1, 318, 107	1, 318, 107	1, 765, 228	1, 318, 107	1, 765, 228
85	SAT	0	0	0	0	0	0	0
86	SURG	0	0	0	0	0	0	0
87	A. DIAL	0	0	0	0	0	0	0
88	H. DIAL	0	0	0	0	0	0	0
89	PSY	0	0	0	0	0	0	0
90	H. HEALTH	0	0	0	0	0	0	0
91	OTHER	113, 914	113, 914	113, 914	113, 914	0	113, 914	0
92	SUBTOT	2, 225, 435	1, 966, 106	4, 087, 028	4, 087, 028	5, 952, 383	9, 616, 361	21, 702, 066
93	TOT PAT	30, 475, 140	28, 654, 998	49, 731, 131	44, 221, 161	93, 988, 903	44, 221, 161	93, 988, 903
94	TOT PAT+OH	63, 418, 182	62, 710, 765	49, 731, 131	44, 221, 161	93, 988, 903	44, 221, 161	93, 988, 903
95	NON-PAT.ANC.	**********	**********	**********	**********	0	0	0
96	RESEARCH	0	0	0	0	0	0	0
97	OTH.NON-PAT	0	707, 417	850, 069	850, 069	0	850, 069	0
98	SUBTOT	0	707, 417	850, 069	850, 069	0	850, 069	0
99	RECOVERY	**********	0	0	0	**********	0	**********
100	TOTPAT+NON-P	63, 418, 182	63, 418, 182	50, 581, 200	45, 071, 230	93, 988, 903	45, 071, 230	93, 988, 903

Table 8: Medicare Cost Report

Forest Green Hospital For Fiscal Year Ended 9/30/92

****
HOSP *YR *SCH*1st *LAST*
NO. * * *COL*COL*
****

PATIENT DAY STATISTICS

	(1) INPATIENT SERVICE	(2) WEIGHTED AVERAGE OPERATIN G BEDS	(3) LICENSED BEDS AT BEGINNING OF YEAR	(4) LICENSED BEDS AT END OF YEAR	(5) MAXIMUM LICENSED BED DAYS AVAILABLE	(6) INPATIENT DAYS	(7) PERCENTAGE OF OCCUPANCY ((C6/C5)x100)
1	MEDICAL/SURGICAL	192	192	192	70, 080	52, 807	75.35
2	PEDIATRIC	25	25	25	9, 125	559	6.13
3	OBSTETRIC	24	24	24	8, 760	2, 970	33.90
4	PSYCHIATRIC	20	20	20	7, 300	6, 992	95.78
5	OTHER ACUTE	15	15	15	5, 475	521	9.52
6	SUBTOTAL ACUTE	276	276	276	100, 740	63, 849	63.38
7	MED/SURG ICU	14	14	14	5, 110	3, 631	71.06
8	CORONARY ICU	0	0	0	0	0	0.00
9	NEONATAL ICU	0	0	0	0	0	0.00
10	OTHER ICU	0	0	0	0	0	0.00
11	SUBTOTAL ICU	14	14	14	5, 110	3, 631	71.06
12	NEWBORN NUSERY	36	36	36	13, 140	2, 337	17.79
13	CHRONIC + REHAB	0	0	0	0	0	0.00
14	TOTAL	326	326	326	118, 990	69, 817	58.67
	INPATIENT SERVICE	(8) AVERAGE DAILY CENSUS (C6/365*)	(9) ADMISSIONS	(10) TRANSFERS IN	(11) TRANSFERS OUT	(12) DISCHARGES (INCLUDE DEATHS)	(13) AVE. LENGTH OF STAY (C6/(C11+C12))
1	MEDICAL/SURGICAL	145	7, 521	0	0	7, 521	7.0
2	PEDIATRIC	2	231	0	0	231	2.4
3	OBSTETRIC	8	1, 163	0	0	1, 163	2.6
4	PSYCHIATRIC	19	436	0	0	436	16.0
5	OTHER ACUTE	1	104	0	0	104	5.0
6	SUBTOTAL ACUTE	175	9, 455	0	0	9, 455	6.8
7	MED/SURG ICU	10	0	0	0	0	0.0
8	CORONARY ICU	0	0	0	0	0	0.0
9	NEONATAL ICU	0	0	0	0	0	0.0
10	OTHER ICU	0	0	0	0	0	0.0
11	SUBTOTAL ICU	10	0	0	0	0	0.0
12	NEWBORN NUSERY	6	966	0	0	966	2.4
13	CHRONIC + REHAB	0	0	0	0	0	0.0
14	TOTAL	191	10, 421	0	0	10, 421	6.7

NOTE: IN COMPUTING AVERAGE LENGTH OF STAY, ONLY ICU COST CENTERS INCLUDE TRANSFERS OUT.

*366 IN LEAP YEAR

Hospital cost reports provide only room and board information, and do not give costs for ancillary services (e.g., lab tests, medications). In general, the room and board costs represent about 90-95% of the total costs of psychiatric inpatient episodes. If you have access to the average payment for these other services (through the billing office of the hospital), you can estimate the additional costs incurred per patient per episode. Another cost associated with inpatient care, is visits by the attending physician or any medical consultants. These services are billed directly by the physicians themselves and are difficult to estimate without some record of the number of visits (often daily during confinement) and the number of consultant visits. If you do not have information on physician visits, adjust room and board costs to approximate a comprehensive rate. We suggest adding 10% to the daily cost of room and board for ancillary charges and physician visits: $407 per day plus 10% = $448 per day

This is a good example of taking a short cut to estimating the costs on top of room and board. Because we know they are a small part of the overall per diem, this proxy will result in only a small margin of error.

b. Hospital Per Diems: Paid Claims

Using paid claims and dividing the number of days in the hospital stay into the dollar amount of the paid claim provides a figure that is likely to underestimate the actual cost of care if the payer is the government (Medicare or Medicaid) and to overestimate the cost if the payer is a commercial insurer. When using paid claims, it is important to remember that the claim is for the "room and board" costs, not any of the person-specific treatments that may have been part of the stay. These are billed through outpatient billing codes and must be added to the cost of room and board (see above). Surgical procedures (rare in psychiatric clients) are billed separately by physicians.

c. State Hospital Per Diem

We have calculated state hospital per diems (separately for each facility) using the state records of annual operating and capital expenditures for these facilities as the numerator and dividing it by the number of total inpatient days for the year. The facility records we used were aggregated at the inpatient level, so it was not possible to determine inpatient-level-of-care-specific daily rates. This meant that long-term care and acute treatment had the same per unit cost.

In many state hospitals almost everything (not just the room and board) is included in the daily rate, and thus costs do not vary by patient as they do in private hospitals, even though the resources used by each patient may differ. Sometimes state hospital costs may be available through the rate setting agency but if not, they may have to be calculated from records of expenditures or provided by the state mental health agency. In Massachusetts, the fringe on all salaries of state employees is paid by another separate state agency, so we must take care to add 29% to personnel for the cost of the fringe benefits, even though it does not show up on the books of the Department of Mental Health. Capital costs are often not included and should also be added. The additional costs in the Boston area (Cannon, McGuire, Dickey, 1985) are about 5% but range as high as 10%. The mean percent increase attributable to capital costs across eight VA sites (Rosenheck, Frisman and Neale, 1994) was 5.8%.

2. Day Hospital Treatment

a. Hospital Cost Reports

If the day hospital is in a hospital and serves acutely ill patients diverted from inpatient care, then a very rough estimate of the cost per day is possible by taking the inpatient cost per day (as calculated for acute inpatient treatment, above) and assuming that one at least one half of the rate (and possibly as much as two thirds) represents costs that can be attributable to the daytime (8 hour) period during which the day hospital is functioning.

Consulting with the service director and the financial administrator will improve the precision of the estimate. This estimate provided below is based on the definition we provided earlier. If we just took one third of the rate (8/24 = 1/3), we would have to assume that inpatient staffing didn't vary by shift (it does) and that all the administrative and other support functions associated with the inpatient unit would be reduced by two thirds (it isn't). It is far more likely that these overhead costs attributable to the day hospital would remain almost as high, regardless of the number of days per week or the number of hours per day the day hospital operated. Using the per diem from Forest Green hospital (see Table 6) the calculations would then be:

$2,846,106 / 6992 = 407 (expenses divided by patient days) + 10% = $448

$448 /.5 = $224 (one half of the per diem cost)

This rough calculation assumes patients attend for 8 hours a day. This may not be the case. Furthermore, the cost of treating an episode of illness in a day hospital needs to take into account the days the day hospital is open for business. Unlike inpatient units, many day hospitals are closed on weekends and holidays.

b. Agency Contracts

Some day or partial hospital programs (the names seem fairly interchangeable) are actually not in hospital settings, but are considered a community-based program. When this occurs it is wise to have a good definition of the program, as it is likely to be geared to less acutely ill individuals. However, in this era of privatization, agencies sometimes have contracts to run programs that are sited on hospital grounds or otherwise nearby. If the contract is available to you along with the annual actual expenditures associated with the contract (the "actuals"), then those expenditures can be divided by the total number of actual number of patient days (or service units) over that year to arrive at a fairly good estimate of the per unit cost.

3. Acute Outpatient Treatment

These services include, but are not limited to, psychotherapy and medication visits with a clinician. For purposes of determining the cost, the treatment philosophy is not important, but the experience and training of the provider delivering the service would influence the per unit cost of that service as well as the amount of time spent with the client. One hour of psychotherapy with a psychiatrist costs more than one hour of psychotherapy with a social worker. Less obvious, and much more complex is the question of value: what is the cost (comparing two professional types) to treat an episode of illness? The answer begins with knowing what the per unit cost of psychotherapy is for each category professional type.

We will consider four types of outpatient treatment in this section, assuming all of them are delivered by the same agency: individual therapy, group therapy, family therapy and medication visits. (Of course, all of these "acute" treatments may be modes of support and maintenance treatment for long-term clients, but if the professional delivering the care and the time spent is the same, then the cost is the same.) The per unit cost of these services will be partly a function of the level of professional training of the staff and the amount of time provided to a particular client. To

estimate the costs without actually using the general ledgers of the agency to do the cost-finding, we suggest the following approaches.

a. Using Information Supplied by an Agency or Clinic

In consultation with the agency, gather data about the staffing (Full Time Equivalents by professional level), the proportion of total budget that is devoted to non-personnel costs (e.g., an estimate of indirect and overhead costs), the number of units of service provided, by service type, the average number of people served in a group therapy session and the average number of people served in family therapy. Use this information to estimate the agency expenditures for these services and to arrive at a per unit cost by dividing the program expenditures by the number of units of service provided (See example on the following page.). Before you can make the necessary calculations, ask if the rent or capital costs are included in the overhead (non-personnel expenditures)? Are there volunteers? (Can the value of their time be estimated?) Does the clinic budget include expenditures for services other than the one for which you are estimating costs? (Can these resources be subtracted?)

To proceed, we assume that rent is paid and accounted for in the expenditures provided by the agency they gave you, but there is one volunteer who works two days a week who acts as an advocate for consumers who want information and help getting state or local benefits. To estimate the salaries (and fringe) of staff, use the Occupational Wage Survey available from The Department of Labor, which gives state and regional specific average salaries. The volunteer time is valued at the rate (including fringe benefits) this volunteer would be paid to do the same job. If there is no information about the job level, use the entry-level wage of a person doing similar work in another setting.

Annual Expenditures:	$750,000 personnel[5]
	$250,000 other direct and overhead, including capital
Total:	$1,000,000

[5] The costs provided in this and other examples are to illustrate the method of calculation and are **not** actual agency costs for this or any other treatment.

Agencies may provide service use in one of two ways. One way is to enumerate the time spent by clinicians by type of treatment. The list below is units of service by clinician. Typically treatment is billed in 15-minute segments allowing flexibility in treatment duration. Thus, "9,500 group therapy" means 9,500 15-minute units of group meetings.

Units of service:	12,500/year	individual therapy
	9,500/year	group therapy
	7,000/year	family therapy
	6,000/year	med visits
Total:	35,000/year	units of service

To calculate the cost per unit of service, divide the agency budget by the total number of service units actually delivered: $1,000,000 / 35000 = $28.57/ 15 minute unit for individual therapy and med visits (when only one client at a time is served). When more than one client is seen at one time by a therapist, then the cost per unit goes down. For group therapy, assume that on average 6 persons are in a group session, then $28.57/6 = $ 4.76 per 15 minute session per person (consult with program personnel to determine the actual average number of group members). For family therapy, assume 4 persons are seen together, then $28.57/4 = $7.14 per 15 minute session per person. (For actual mean group sizes, interview the program director at the agency.)

A second way that agencies might provide service use is by client visit. In this case,

Units of Service:	12,500/year	individual therapy
	57,000/year	group therapy (6 x 9,500)
	28,000/year	family therapy (4 x 7,000)
	6,000/year	med visits
Total units of service:	103,000/year	

Using this approach, a 15-minute session costs $9.71. This approach results in markedly lower rates for individual therapy and medication visits, but higher rates for group therapy and family therapy. This probably underestimates the cost of delivering individual therapy and medication and assumes all therapies have equal costs per 15 minutes. This is usually not the case. Professionals who deliver individual therapy or medication may have higher salaries.

Regardless of the approach, you can see from these examples that we cannot differentiate professional levels or experience. All the per unit costs assume the average personnel cost. In order to be more precise, it would be necessary to have access to the agency personnel records and job descriptions to accurately assign specific personnel costs to specific service provision activities. (Even a general ledger will not tell you how each person spends their time, just which cost center carries their expense. Furthermore, individual staff members typically provide a variety of services). These per unit costs could be adjusted using differences in salary levels by professional, if two additional pieces of information are available: first, the proportion of services provided (as units) by each type of professional and second, the service use data collection documents the profession of each service provider. There is no point in going to the extra effort to calculate profession-specific cost data if you don't know which specific services were actually delivered by which professionals.

b. Secondary Data: Billing Information

A different approach is to use billing data from the agency (this is not exactly the same thing as using paid claims data from the payer). This approach is feasible if the agency provides a limited number of services and is able to account for the funding of "free" care (e.g., care not billed to any payer and delivered "free" to the client). Using this approach, one could call the agency and ask for reimbursement rates for specific services delivered; ask the billing office what different payers pay for different services: Medicaid is usually lowest, Medicare higher and commercial carriers or "the Blues" the highest. To arrive at a more precise estimate of the cost per unit, use the average payment weighted by the proportion of clients in each payer category. Also, ask if the clinic is entirely supported by reimbursement or are there contracts or deficit spending to provide "free" care? For purposes of our calculations (see example below), assume that the state reimburses the agency for free care each year. In the year of interest, that amount was assumed to be the equivalent of Medicare rates and amounted to 10% of the revenues of the agency equivalent to reimbursement at that rate. For the procedure for determining the best estimate, we will use individual therapy as our example, but all types of services delivered by the agency can be estimated the same way.

Rates:	Medicaid:	$22.00/15-minute unit of individual therapy
	Medicare:	$26.00/15-minute unit
	Blue Shield:	$29.00/15-minute unit
	Commercial:	$32.00/15-minute unit

Proportion of Agency Revenue:

Medicaid:	35%
Medicare (and free care):	30%
Blue Shield:	20%
Commercial:	15%

Then, to weight the average payment, by proportion of payer revenue,

[22 x .35] + [26 x .30] + [29 x .20] + [32 x .15] = 26

Thus, we estimate the average cost to provide 15 minutes of acute outpatient individual therapy is $26.00. The same method could be used to estimate group, family and medication treatment.

4. Long-Term (non-acute) 24-hour care

When collecting service use data, it is important to determine the level of care provided, distinguishing long-term 24-hour care from acute inpatient care. Long-term care includes institutional programs, such as nursing homes or domiciliary care. An example of the latter might be clients in state hospitals who require 24-hour nursing care in a hospital setting, but not at the level of intensity of acute inpatient units. We make special note of this here because the cost of this non-acute round the clock care is likely to be far less costly than acute inpatient treatment, but records of admissions and discharges to long-term care units in state hospitals may be difficult to distinguish from acute admissions. This is especially true in state hospitals with multiple treatment units that serve patients with different needs. Daily rates for long-term care in a state hospital might be available from the state department of mental health. If only one rate is available, interview the hospital superintendent to help develop a definition that would permit an estimate based on what rates are available. It is likely that overhead will be less (but not much) for this type of unit, but staffing and medical backup may be significantly lower. Knowing how the staffing patterns differ from the acute inpatient care should help guide the estimation process.

5. Long-Term Community Support Services

Ambulatory community support services vary widely across the country, but most public services include some type of daytime program. These programs are among the most difficult to define for purposes of cost comparison, in part because several different types of activities (and levels of care) are sometimes provided within a single program and in part because the use of labels, such as day hospital or clubhouse, has not been standardized. Other programs include vocational rehabilitation, supported employment and case-management. Often programs providing community support are funded by the state or local mental health agency, rather than being reimbursed by health insurance. These funds might be provided to a local agency on contract to the public entity or that entity might directly provide the service.

When a private agency is delivering care on a contract, the agency or the contractor should have annual expenditures available along with the number of units of service provided through the contract. In Massachusetts, the Department of Mental Health categorizes all services by program code, which provides a measure of standardization across programs within code numbers. Remember that you need to inquire about whether the rent or capital costs are included in the overhead (non-personnel expenditures). Are there volunteers? Does the contract include expenditures for other services? To calculate the per unit cost of a day program (as an example of community support programs):

Actual annual expenditures: $60,168

Number of hours annually (average number of hours per day x number of clients served in a day): 6,235

$60,168/6,235 = $9.65 per client per day

Some programs have records of the number of hours attended by each consumer. If this is the case, then the per day unit cost can be broken down by per hour costs and more precisely attributed to each attendee.

6. Crisis Visits

Many systems of care for the seriously mentally ill have found that rapid response to psychiatric crises can mitigate the potential disruption that occurs and also avoid admission to an inpatient unit. In Massachusetts, crisis teams are called upon when a consumer is at risk for

hospitalization. They provide rapid assessment of the situation and based on a clinical evaluation of the client, recommend and refer to the least restrictive level of care. If we were to evaluate the cost effectiveness of these teams, then it would be important to understand if and how team activities varied. A crisis "contact" might last several hours, might involve travel, or might involve only a phone call between a provider and the team. Rural teams often spend considerable time on the road while Boston area teams are more likely to be Center-based, but travel occasionally to local hospital emergency rooms. Yet, the Department of Mental Health lumps all the contracts for these teams into one program type, "crisis evaluation" when they report their annual expenditures. The per unit cost, if calculated for each contract separately, varies by region and some of that variation is due to differences in how the crisis evaluation team activities are structured. To calculate the per unit cost of a team:

Annual expenditures (actuals or contract) for a set of teams in a given region of the state = $250,000

Number of clients evaluated during the year (from crisis team records) = 1,500

Then, $250,000 / 1,500 = $167.00 per evaluation

7. Emergency Room Services

Determining the costs of the use of hospital emergency rooms is particularly difficult for several reasons. First, costs vary according to the time spent and the procedures provided. These costs vary widely, by client, and cannot be meaningfully averaged. Keeping in mind the caveats listed above, hospital cost reports can be used to determine mean per unit costs in much the same way as the inpatient per diem was calculated. Using the same type of approach, we calculate the per unit cost as:

Expenditures for emergency room = $8,184,340 (Schedule II, col. 7)

Number of visits = 31,668 (Schedule II, col. 11)

$8,184,340 / 31,668 = $258 per visit

8. Case Management

In the Boston study of housing for homeless mentally ill adults, case management was a major feature of the program studied, so the level of precision in the cost estimates was important. The agency that employed the case managers had a subcontract from the larger state-financed housing program. This contract included a budget that specified the salaries of the case managers,

their supervisor and the agency overhead. Interviews with the state agency (the contractor) and the local agency finance officer supported the plan to use the contract budget figures as the first step in the cost-estimation plan. In addition to personnel costs, the subcontract also included other operating costs of the program including case-manager travel costs; the case management program's share of the agency operating costs, and a share of the facility capital costs. To these numbers, we added a portion of the salary that represented the time of the supervisor's supervisor (not in the subcontract, but paid directly by the state). In this example, "salary" includes fringe benefits.

Note, how several of these items are joint costs and are apportioned among many services in addition to case management. In this case, the apportionment was calculated as a percent of the program personnel salaries of the agency salaries. Sometimes apportionment is done using the square feet of space the program uses or some other meaningful unit depending on the work of the unit. The sum of these annual costs was adjusted by subtracting the time spent (10%) on research related activities. Next, the adjusted total was divided by the total number of client direct contact hours over the year. The information of face to face visits was taken from the case-manager logs. The result is an estimate of the cost of providing an hour of face to face case management. The actual calculations were:

Personnel plus fringe benefits	$323,901	
Agency overhead, including capital costs		$ 62,037
Supervisor plus fringe benefits	$ 63,833	
TOTAL		$449,771
Research related activities (10%)		($44,977)
Adjusted TOTAL		$404,794
Client direct contact hours		4,965

$404,794 / 4,965 = $81.53 per client contact hour

Remember that using *contact hours* as the denominator means that we have accounted for all the time the case manager spends on behalf of the "average" client. A more precise estimate of the cost of a case manager's time for a particular client would require an accounting of all the time a case manager spent on behalf of that client (both directly and indirectly, including administrative

meetings and supervision) and then that amount of time would be multiplied times the cost per hour to deliver case management services. This hourly rate might be a third of the rate derived above.

9. Housing Costs

Rent for apartments are normally set so as to compensate the landlord for vacancies as well as other expenses. When apartments are single-occupancy, costs can be simply estimated from the monthly rent[6]. Supported apartment expenditures consist mainly of the occupancy costs. Personnel costs are, by design, much lower than living sites with staff. In the case of the housing study, apartments were distributed among a dozen buildings in Boston, virtually all under the control of the Boston Housing Authority (BHA). Due to the number of buildings involved and the variation in apartment size and within-building location, real estate agents' estimates of fair market rents for each unit were not obtained. Instead, the U.S. Department of Housing and Urban Development (HUD) fair market rents for Section 8 housing were used. These are set at the 45th percentile of rents (including utilities) in the city. About 80% of the clients were assigned to efficiencies, according to availability, and the remainder to one-bedroom apartments. These proportions were used to weight the HUD ceilings for studio apartments (single room with small kitchen and bath) and one-bedrooms for 1994, yielding an average monthly rent of $580. We choose to use this average amount rather than apartment-specific amounts because apartment was a function of random assignment, not individual choice.

In order to calculate the "support" part of supported housing, we included staff time related to housing (in other words, not treatment support). A part time housing liaison for the BHA apartments was assigned to maintain contact with the BHA on-site manager in each location (a cost already included in the average BHA rent), who met with residents on a monthly basis for education, crisis resolution, and other individualized help; and was available 24 hours a day to property management staff. In addition, a housing specialist furnished and set up the individual apartments and cleaned them when vacated. The salaries of these two individuals, including fringe benefits and

[6] If the rent is subsidized, as in a Section 8 apartment, then that subsidy must be treated consistently with other transfer payments, such as Social Security Income (SSI) or Social Security Disability Income (SSDI). Typically, they are considered revenue, not expenditure.

payroll taxes were added to the cost. In addition, a staff person in one building was hired for several months to reduce problems of drug dealing during the night. The staff person's total compensation, for this responsibility, was estimated at about $5,000/year (10% of his salary). This amount was distributed among clients in proportion to the number of client-months each year. The only start-up expenditures associated with apartments in the housing study were for new furniture, lamps and a television. These costs were allocated to the first month of rental tenancy. Although it is more common to treat furniture as a capital expenditure, which are amortized over the course of their lifetime (typically 5 years), we found, in this study, that furniture often had to be replaced more often which led to our decision to allocate these costs to the first month of rental tenancy.

10. Shelter Costs

In the Boston housing study, the number of nights in a shelter for all the housing study subjects accounted for less than 2% of the total nights for all clients in the study, the cost per night was calculated as the annual budget for the shelter divided by the number of clients who used the shelter over the course of the year. This method is not very precise, but if shelter costs were a large part of a cost evaluation, then more care would need to be applied to obtaining the cost per night. For example, shelters are far more likely to be crowded in the winter, leading to more staff and possibly higher costs per diem in the winter because of fluctuations in staffing and other related resources used (e.g., higher utility costs).

Often the cost of living on the streets or in the home of a friend or relative is priced at zero, although the true cost of such stays is higher. Those living on the streets may in fact incur some local government expenditure, such as police contact, and living with friends results in some additional use of resources at that house. In another study, we used SSI monthly payments as a proxy for subsistence costs and divided the monthly payment by 30.4 days to arrive at a daily cost of living on the street or in someone else's house.

11. Market-Rent Apartments

Market rent should reflect resources used by the landlord to make the apartment available on the market, including less than optimal occupancy, real estate taxes, maintenance and repair costs. When some, but not all, of the utilities are included in the rent, those utilities that are not included must be added on. When the client shares the apartment with a roommate, the rent and utilities are

divided by 2, assuming that each incurs half of the resource use (and thus is libel for half the expenses).

12. Police Contact

The following description of how to cost a police contact is taken directly from Nancy Wolff and Thomas Helminiak's work (1993) and provides guidance on how to estimate other non-mental health costs. It is provided to assure readers that the same guidelines for estimating those costs are the same for non-mental health services. They begin the discussion by reminding the reader that a contact needs to be clearly defined as it could mean a telephone contact with a dispatcher, an arrest, an incident that leads to a written report or any other incident. They chose to define contact as " a case-logged incident, where the officer responds to a complaint or an observed infraction and the contact generates an officer report." They based their per unit cost estimate on "the annual budget expenditures plus the estimated imputed value of building space that was allocated to the provision of primary police and follow-up investigative services. The population-based average cost estimate for a police contact was then adjusted to account for the higher use of police department resources by the severely mentally ill. Unit costs ...were estimated to be 17% higher than cost of police involvement with other individuals."

Provided by local police headquarters $148 per contact

V. DEVELOPING A FORMAT FOR SUMMARIZING SERVICE USE AND COSTS (STEP 3)

1. Linking Service Use Data With Per Unit Cost Estimates

To provide an example of how to summarize client treatment costs, assume that you have collected data on service use over a one-year period. After the data on services used for each client are collected and all the necessary per unit costs have been estimated, set up a table in the format illustrated in Table 9. Worksheet software is very useful at this stage. It is not hard to see that this format permits the data to be summarized in a variety of ways, most importantly, the total cost to treat each individual. In the next section we will expand on the uses of these data and how they might be used in a cost evaluation.

Table 9: Worksheet for Individual Mental Health Service Use Costs

ID	Hospital A			Hospital B			Outpatient/group			Medical Visit			Case-Manager			Total cost
	Days	Per unit $	Total $	Days	Per unit $	Total $	15 min.	Per unit $	Total $	15 min.	Per unit $	Total $	Contact	Per unit $	Total $	Per person $
1	10	448	4480	0	0	0				10	32	320	0	0	0	4800
2	0	0	0	6	522	3132	45	15	660	12	32	432	6	45	270	4494
3	0	0	0	0	0	0	30	0	450	0	0	0	0	0	0	450
4	3	448	1344	0	0	0	0	0	0	5	32	160	0	0	0	1504
5	0	0	0	28	522	14616	68	15	1020	4	32	128	11	45	495	16259

Computerized spreadsheets are very useful, but the size needed to carry out the work is not easily reproduced on the printed page. A more realistic picture of the many different services provided a single individual over one year is summarized below. We provide it in its entirety to remind readers that the number of services available to consumers covers a lot of territory and spreadsheets need to be organized accordingly.

For example, in an 18 month study, ID#001 used 35 hospital days in two different hospitals, 13 case-management visits, 39 group therapy visits, 12 medication visits and 2 ER visits. The consumer lived for 9 months in supported housing, for 1 month in a shelter and for 8 months in a market apartment.

20 psychiatric hospital days @$597	$11,940
15 state hospital days@$605	$ 9,075

13 case-management visits @$78.50		$ 1,020
39 group therapy visits (1 hour) @$6.68		$ 261
12 medication visits @23.59		$ 283
2 ER visits @$98.00		$ 196
For housing costs		
9 months, supported housing @$715	$ 6,435	
1 month, shelter @$124		$ 124
8 months, shared market apartment@650		$ 2,600
8 months utilities@$30		$ 120

Sometimes it may be wise to group certain types of services together rather than report each separately to improve generalizability of the cost data. This was the case in our study of formerly homeless and mentally ill adults in Boston. Participants in this study were admitted to different hospitals with very different per diem rates, based on the area of town where they lived. After the per diems were calculated for each hospital, the per diem costs by private psychiatric hospitals, general hospitals and state hospitals were aggregated to yield the average per diem cost for each type of institution. (Before aggregating hospitals into these three categories, the per diems for individual hospitals ranged from $432 to $1,007). This cost averaging was done because clients were assigned randomly to houses within different catchment areas. The particular hospital a client went to was determined, at least in part, by the catchment area in which s/he lived. If hospital-specific per diems had been used, treatment cost for a client would be significantly influenced by the catchment area of the house to which
the client happened to be assigned. This could have biased the comparison of costs between housing types. Each episode length of stay was then multiplied by the appropriate hospital-type average per diem.

Once the cost of treatment, by service type, is available for each person in a study, it is not hard to imagine the next steps: summarizing costs by service types, by client types or by provider types. In the Table 10 below, we provide a sample table that summarizes the data (not the data from the above worksheet) by general service use types and by state agency payer. This illustrates how service units, when converted to expenditures, allows the display of expenditures in simple descriptive summaries that reveal a lot about the clients in the study.

Table 10: Costs by Service Use Types and State Agency Payer

Psychiatric Treatment	N (1)	Sum (2)	User Mean (3)	Claimant Mean (4)
DMH				
State Hospital	1,601	$64,295,989	$40,160	$3,350
OPD/Clinics	5,326	$2,369,848	$445	$123
Psychiatric Services	6,837	$6,661,064	$974	$347
Community Support Services	3,727	$36,771,297	$9,866	$1,916
MEDICAID				
Inpatient				
Room & Board	2,421	$28,145,967	$11,626	$1,466
Other Payment	2,138	$1,669,190	$781	$87
Total	2,421	$29,815,175	$12,315	$1,553
OPD/Clinics	3,240	$2,771,921	$856	$144
Physician Office	7,150	$2,233,383	$312	$116
Psychiatric Services	8,036	$13,970,727	$1,739	$728
Total Psychiatric	19,194	$158,889,404	$8,278	$8,278
Medical Treatment	15,399	$89,539,479	$5,815	$4,665
Transportation	5,564	$3,700,856	$665	$193
Pharmacy	17,882	$30,601,904	$1,711	$1,594
Dental	8,016	$1,991,124	$248	$104
TOTAL	19,194	$284,722,767	$14,834	$14,834

In Table 10, we provide four types of summary statistics: (1) the total number of users, (2) the total expenditures for a particular type of treatment (such as inpatient admissions), (3) the mean *user* expenditure for that treatment type, and (4) the mean expenditure for *all* clients (the sample mean) in the study, not just those who used the service. The TOTAL row provides information about everyone (19,194) studied. In this row, the last two columns are the same because the denominator (19,194) for users and total sample are the same.

Costs can also be categorized by payers, such as the cost to a particular state agency, the cost to state government, cost to federal government, and the cost to tax payers (which would be a sum of federal, state and local expenditures).

2. Summarizing Services

Common **temporal categories** are:

- The month – as in the cost of x service per month
- The episode – as in the cost of x service per acute hospital episode of schizophrenia

Common **person categories** are:

- The individual – as in the cost of x service per person per month
- Age groups – as in the monthly cost of x service for persons between the ages of 19 and 64
- Disorder groups – as in the monthly cost of x service for persons with schizophrenia

Common categories for **aggregations of persons** are:

- The program – as in the cost of community support program services per person per month
- The health plan – as in the mean cost of services provided by a particular agency or health plan
- The system – as in the annual cost of all public mental health services for persons with schizophrenia.

3. Grouping Services

Cost evaluations are rarely done for a single discrete audience. Reporting cost evaluations is helpful to both administrators and policy-makers, but language that is particular to a single health plan or program may make information sharing difficult. Once services have been defined, it may be possible to group some services with different names together as being approximately equivalent. It is particularly appropriate if these services are known to have similar unit costs.[7]

In addition to making cost information more accessible to a wider audience, it has the advantage of forcing one to think through the cost implications of programs and improves the conceptual clarity of the study. Grouping conceptually similar services, is also a way of summarizing the data for services that only a small number of persons receive. For example, we have often found that a small percentage of study subjects has a particular treatment type that no one else has but a small N makes it difficult or impossible to analyze separately. However, by dropping these data out of the study, valuable information would be lost.

[7] Combining services with very different unit costs in a database is also possible, provided there is information to construct a weighted average cost that reflects both the differences in unit costs and the differences in relative frequencies of the services combined.

However, if the service use data can be aggregated up into a particular group of services, the data will not be lost. This does not mean cost all the data in a particular group using only one cost per unit, rather that the cost of all services that fall within a group can be reported together.

Services can be grouped in any way that makes sense within the context of the study, but we have found that a six level grouping process works well. We use these groupings to provide a structure for how the study is conceptualized, for organizing tables when we present the findings (see Section 4) and for making decisions about the level of effort needed to determine the scope of a particular for the study. The levels we use are:

- Inpatient
- Residential
- Outpatient Treatment
- Psychosocial Rehabilitation
- Other Support Services
- General Medical Treatment

VI. CARRYING OUT COST EVALUATIONS (STEP 4)

Conducting a cost evaluation involves more than just attaching per unit costs to service use data. This section discusses four important economic concepts related to cost evaluation: opportunity costs, capital costs, discount rates and social costs. We briefly describe them and offer explanations of why these concepts are important. Fuller explanations are available in textbooks on cost-effectiveness evaluation and we believe that it is important for evaluators doing cost studies to know these concepts. We recommend that anyone doing a cost evaluation be familiar with these terms and refer to economic texts and colleagues with background in economics for a more complete understanding. Two useful books on conducting cost evaluations are now available:

Gold MR, Seigel JE, Russell LB, and Weinstein WC. *Cost-Effectiveness in Health and Medicine* 1996, New York: Oxford University Press, and

Hargreaves WA, Shumway M, Hu T, Cuffel B. *Cost-Outcome Methods for Mental Health* 1998, San Diego: Academic Press.

1. Guideline #1: The most precise estimate of a per unit cost is the opportunity cost.

It is important to note that the practical approach described in this toolkit will give us only an approximation of the "true" cost of a unit of service as economists think of it. From an economist's point of view, what is known as "opportunity cost" is the standard for estimating the true monetary costs of any resource. Opportunity cost is the economic concept of taking into account the value of a resource in its next best use.

The opportunity cost of a unit of service would be based on the value of the resources directly involved in producing the service in their next best use. For example, the use of public land may not require any expenditures. Its true cost, however, is not zero because that land could be rented out or otherwise used to generate revenue. The accounting cost of the land is zero, but its opportunity cost is its value in its best alternative use—a measure of the value of the opportunity that is lost by using it for the program being evaluated. When measuring the opportunity costs of a program or project, economists start with the market price. If this price does exist, they ask whether the market price is a reasonable measure of the opportunity cost.

If a market price for a resource does not exist, they estimate what is called a shadow price. To determine the shadow price, we would need to ask: what is the value in its best alternative use—the use to which it might otherwise be put? One method of measuring a shadow price is to conduct a survey asking persons what they would be willing to pay for a particular service. Alternatively, if we do not trust the results of such surveys (talk is cheap), we might look for evidence of what others have been willing to pay. For example, in the case determining the cost of family burden, how have other people faced with family caregiving responsibilities in fact responded? Did they quit their jobs, or reduce their hours? Did they hire a caregiver? The cost they have thus actually chosen to incur in response to their caregiving responsibilities is an alternative measure of the opportunity cost.

In mental health care, the "true" cost of delivering a particular unit of service may be very different from what providers charge for that treatment or what an insurance company pays for that treatment. For example, providers in a multiservice agency often price one service so that it subsidizes another service. Additionally, different types of persons can also be charged different amounts. Hospitals, for example, provide care that is "free" to some consumers, but of course not

free to the hospital. Free and discounted care must be paid for by someone, and such costs are usually passed on to those who can afford to pay out-of-pocket or who have insurance.

2. Guideline #2: All per unit cost estimates should include capital costs.

Whether the building in which a program takes place is rented or owned by the agency, the facility capital cost must be included in the per unit cost for any service. Capital costs must also be allocated across direct services. Typically, facilities have two types of capital costs associated with them: the value of the facility and land (which may show up as an expenditure in the accounts as depreciation for the building over some period of time) and interest associated with the repayment of a mortgage loan. When the property is privately owned, there are several ways to determine value: (1) cost accounting-- if it includes the depreciation and the debt service (typical of hospital costs reports), (2) the actual cost of the land and the construction-- in a new building and (3) the market rent paid by the agency or program-- which can be decomposed to estimate the amortized value.

Amortization of the value of a building means spreading this value over the presumed life of the building. Typically, buildings are amortized over 20 years[8]. For example, if a building was valued at $1,000,000 and we were to simply divide the total value by 20, we would fail to take into account the opportunity cost of the capital invested in the building. Thus, amortizing the value over twenty years means thinking what might be a reasonable rate of return on the investment. If we use 5% as the return on investment, then the annual amortized value for one year will be $52,500. Then, using the square feet of the building occupied by the particular service of interest, determine the share of this annual value that is associated with this service. Finally, add the annual value to the expenditure for the program for that year.

When the facility is publicly owned, determining the value raises special problems. There is unlikely to be any debt service associated with a particular public building, even if the state or local level of government floated bonds to cover the capital expenditures. Furthermore, there is no resale

of public facilities that allows us to value capital periodically. In this situation, it is still possible to estimate the capital costs by determining the value of the building using indirect methods.

In a study some years ago (Cannon, McGuire and Dickey, 1985), the capital costs of a public community mental health center were estimated by using four different sources of valuation to determine the upper and lower bounds of valuation. These valuations were first converted into per square foot rental prices and these then converted to rental rates using four different rates of return (3% to 9%). The sources of information about the value of the facility came from four informants: a neighboring hospital that had just purchased "comparable" property adjacent to the building under study, the state appraiser who provided a written estimate, a real estate appraiser who provided an estimated purchase price for the building and land as commercial real estate (the opportunity cost), and a local architectural firm that had just received written bids for replacement of the building. When these estimated valuations were converted to rents, they ranged from $24.92 to $117.64 per square foot. The difference between the lowest and the highest estimate was very large indeed. These large differences illustrate the care with which such valuations must proceed.

One well-known cost-effectiveness study used a relatively high discount rate (see below) and found that the capital costs accounted for about 30% of the inpatient per diem. A small adjustment downward in the discount rate would have changed the principle findings of the study (Rosenheck, Frisman and Neale, 1994). If capital costs are not available and you calculate them yourself, we recommend reporting the results from a sensitivity analyses so that the reader can judge for herself whether the rate actually used seems appropriate (Cannon, et al, 1985).

3. Guideline #3: Projected expenditures need to be discounted.

The concept of discounting is important when cost evaluations include projections into the future, as studies with policy implications often do. To determine the costs of the program over the first five years, you cannot simply sum the annual costs because a cost of $1 incurred in a later year is equivalent to a cost of less than $1 incurred today. The reason is easy to see: if you will need to spend $1 next year, you can put, say 95 cents in the bank today, receive 5 cents interest over the next

[8] Not every country uses the same discount rate or expected facility life. In the UK (See Allen and Beecham, 1993), economists assume an expected rate of return for UK public sector investments is 6% and the building lifetime is 60 years, not 20.

year, and have the dollar you need one year from now. Thus the future costs need to be discounted to make them comparable to current costs.

In order to discount future costs, one must choose a discount rate, which is the mirror image of an interest rate. In the example above, we assumed that 95 cents would earn five cents in interest over one year. This implies an interest rate of 100 x 5/95, or just over 5 percent. Why choose that particular rate?

In costing certain programs, we generally assume that costs will be incurred with certainty. The discount rate to use is therefore the amount of interest one would earn on a very safe investment, such as Treasury bills. This interest rate is at the low end of interest rates available on investments[9], because the investment is virtually risk-free (the US Government is not expected to default on its loans). If one used a higher interest rate, then one would in effect be assuming that the costs might not have to be incurred at all. The chance of losing part or all of the initial investment that arises when one invests in, say, common stocks, would reflect the chance of not having to incur the costs. We prefer to conservatively assume the costs will be incurred, and so use the low rate of interest on safe investments.

But while we know the rate of interest on safe investments today, we cannot know that rate for future years. Because of this uncertainty, the choice of discount rate is somewhat arbitrary. A simple and popular way to deal with this uncertainty is to do a sensitivity analysis. In a sensitivity analysis, we see how the results change when we change our assumptions. Suppose we start (arbitrarily) with the average rate of indicator of future rates, 5%. Then we see what happens to the total discounted cost if we use, instead, a discount rate of 3% or 7%. If we report the range of results that come from using discount rates ranging from 3% to 7%, the reader's level of confidence in the results should increase.

You may wonder how many years in the future to go. This is a subjective decision; it depends on the anticipated duration of the program. One final note: if some assets purchased at the

[9] The very low interest rates in 1998 suggest that a 5% discount rate may be too high.

beginning of the program, such as buildings, have some value at the end of the program, that estimated resale value must also be discounted and subtracted from the total discounted cost.

For example, a five year program for housing a population of homeless mentally ill is expected to incur costs of $300,000 the first year, $100,000 during years 2 - 4, and a net cost (after resale of the house) of $10,000 in year 5. Using a discount rate of 5%, the present value of the cost[10] (PVC) is:

$$PVC = \$300{,}000 + \$100{,}000 \times (1 - .05) + \$100{,}000 \times (1 - .05)^2 + \$100{,}000 \times (1 - .05)^3 + \$10{,}000 \times (1 - .05)^4$$

$$PVC = \$579{,}132.56$$

This means that, in today's dollars, the cost of the program over five years is $579,132.56. If we are comparing two programs, we need to be able to make the comparison equivalent in today's dollars to take into account that programs may have different time-spans.

4. Guideline #4: Cost evaluations should include social costs.

Social costs refer to resources used to produce services, like police and social services, beyond those mental health services under study. It also includes "costs" of not working because of a psychiatric disability or the time spent by family members who may provide housing or other care to a consumer. This approach leads to the broadest possible scope and implies that changes in the resource use in one area will effect resources used in other, perhaps peripheral areas.

Ideally, effort should be made to take into account <u>all</u> the costs (and the benefits) that result from a particular change in policy. Thus, a study of the social costs of managed care might include the costs of police services and the increased costs of worker compensation claims if access to hospitalization is limited to the most disturbed mentally ill. Jails might have to replace some of the hospital functions or nursing staff may suffer more accidents treating individuals with more serious behavioral problems.

The resources and time required for estimating social costs can be considerable, depending on the method used. In addition, estimating social costs requires considerable expertise. We

[10] PCV is the value in today's dollars.

recommend that the reader turn to an economist to determine morbidity and mortality costs, (e.g., the cost of iatrogenic illness or death as a result of treatment).

Some mental health services, particularly community based ones, involve labor or supplies that are provided by families or other donors. These inputs have costs, although families or donors may not require payment. These are sometimes referred to as "contributed costs." When resources permit, evaluators may wish to estimate these contributed costs. These costs can be examined separately or combined with the costs of other program inputs.

5. Guideline #5: Cost variation should be explained.

If you are familiar with regression analytic techniques, then it is possible to use this approach to understand statistically what accounts for variation in the total annual per client cost to provide services. There are groups of factors that might affect the cost of care (in addition to the amount of service provided): personal and clinical characteristics of the individuals, the characteristics of the providers of care, the health care environment and the specific program or treatment intervention (e.g., managed care). Examples of individual client socio-demographic characteristics are age, sex, ethnicity and income level. Provider variables can include characteristics of individuals or facilities. Whether or not a hospital is a teaching hospital, has been shown to be a factor in cost. Some studies have examined training and experience of professionals. Variables that might be grouped under health care environment include the number of physicians or hospital beds per capita. The intervention, which is the independent variable, is a dummy variable in the multivariate estimation model (1 = received the intervention or 0 = did not receive the intervention).

Take for example the introduction of managed care. Clients are randomly assigned to a managed care system or the usual conventional community-based service system. One evaluation question is whether or not the managed care intervention costs more or less, on average, than conventional care. Once the per unit costs are determined, they are used to calculate the cost of services used by each individual. Then these costs can be summed (as in table 9) for each person. The regression analyses will estimate the contribution that the managed care intervention makes to variation in per client annual treatment costs after other factors known to influence costs are controlled.

6. Guideline #6: Cost effectiveness studies are more helpful to policymakers than a study of costs alone.

Evaluators are likely to be asked to compare changes in service costs relative to changes in service outcomes. One simple approach to doing so is to compute the change in service (and social) costs and the change in outcomes after an intervention. If the per person costs are lower and the outcomes (i.e., effectiveness) are the same or higher, then no more analysis is required because it is assumed that lower costs and better outcomes are desired. However, if costs go up and outcomes improve, then cost-effectiveness ratios can be calculated to help determine the "best" treatment relative to the usual and customary care (the typical comparison). A good example of this type of study was carried out by Lave et al (1998). They suggest that rather than using the simple approach described above, more precise estimates can be had from using regression models that help to determine how costs and outcomes vary across treatment groups. Their method is quite sophisticated, but bears attention in an era when improved medical technology often leads to better outcomes but at increased costs.

No effort is made to convert the outcomes into dollars. Converting any type of outcome to dollars is difficult and for mental health treatment outcomes, it may be very difficult. Nevertheless, cost-effectiveness ratios can be obtained which provide the dollar amount needed to raise an "outcome score" by one unit. A more complete discussion of these analytic techniques can be found in texts such as *Cost-Effectiveness in Health and Medicine*, Edited by Gold, Siegel, Russell and Weinstein; Oxford Press, 1996 or in *Cost-Outcome Methods for Mental Health* by Hargreaves, Shumway, Hu and Cuffel; Academic Press, 1998. These two texts also discuss, more briefly, cost-benefit analyses which compares changes in the costs of service in relation to changes in an outcome measure when these changes are translated into monetary values, such as wages earned or taxes paid.

7. Guideline #7: Cost studies have limitations.

It is the convention to use the term "cost estimates", rather than simply "costs." This is a useful reminder of the many limitations in developing precise "true" costs. One limitation is our inability to truly capture all the resources used in providing a treatment program. For example, volunteers may be an important component in a particular service, but the cost of a volunteer's hour may be very difficult to calculate because the time spent may not be documented or the value of the contribution may be difficult to assess.

Another example is the practice of using consumers to provide services to other consumers, but the consumer may not be paid in cash, but might have some other form of compensation, such as free room and board. In this case, the value of the room and board per day would be the starting point of calculating the per hour cost of the service provided by that consumer. Benefits, especially intangible ones, should be used to balance costs, but these are even more difficult to estimate, even though they may be very real. Other limitations to keep in mind are whether the sample is large enough to provide reasonably stable estimates, or whether cost estimates are truly generalizable to the population sampled.

Despite these limitations, we encourage evaluators to find ways to add to the cost literature, literature that would benefit from more well done cost studies. We hope that this toolkit format improves access to this kind of work, even though we must acknowledge that it opens the door to many questions best answered by more detailed discussions which are likely to be found in accounting and economics textbooks. Perhaps this short "introductory" course will lead to further study in these matters. Despite these shortcomings, we hope that we have given you a jump-start into this important and interesting field of work.

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APPENDIX*

*Note: Only bibliographical references are given for the published materials in the appendix. For your convenience we have consolidated the references below. Please consult the appropriate publications for the items.

Examples of 2 Schemas from: *Unit Costs of Health and Social Care*

Netten, A.. & Dennett, J. (1997). Personal Social Services Research Unit, University of Kent at Canterbury, Kent, UK.

Housing Costs for Adults Who Are Mentally Ill and Formerly Homeless

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The Cost and Outcome of Community-Based Care for the Seriously Mentally Ill

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