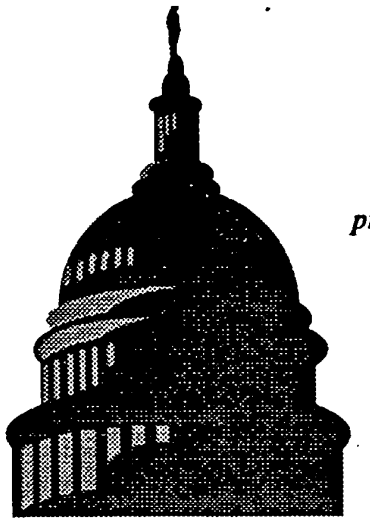
CENTER OF ALCOHOL STUDIES
RUTGERS UNIVERSITY
PISCATAWAY, NJ

EXECUTIVE SUMMARY

SOCIOECONOMIC EVALUATIONS OF ADDICTIONS TREATMENT



prepared for the

PRESIDENT'S COMMISSION
ON MODEL STATE DRUG LAWS

Socioeconomic Evaluations of Addictions Treatment

Prepared for
The President's Commission on Model State Drug Laws

Researchers at the Center of Alcohol Studies, Rutgers University were asked in May, 1992 by the PRESIDENT'S COMMISSION ON MODEL STATE DRUG LAWS to review the existing scientific literature on socioeconomic evaluations (methods which enumerate the cost and consequences) of untreated addictions and addictions treatment. The term "socioeconomic evaluation" is a phrase inclusive of terms that are more specific, including cost-of-illness, cost-benefit, cost-effectiveness, and cost-offset analysis.

Cost-of-Illness Studies of Addictions (COI)

A classic cost-of-illness study is a form of evaluation which computes the current economic impact of a disease, including the cost and consequences of the untreated illness and the cost of treating the disease when such treatment is available. The most thorough and best respected COI analysis of addictive diseases estimated the cost of addiction to society in 1985, at $114 billion. This estimate may be very low since certain cost components - the emerging crack-cocaine problem, the spread of HIV infection due to intravenous drug use, and the arrival each year of hundreds of thousands of alcohol, nicotine, and other drug-exposed infants - are not well reflected yet in any COI study. Add to this estimate collateral health care costs, or the tendency of close family members of addicted persons to develop physical and/or emotional illnesses, and an estimate for 1993 that lies between an annual $150 and $200 billion appears justified by all findings.

A disproportionate share of the costs of alcoholism are due to morbidity, which can be loosely defined as loss of functional capacity, and mortality. In contrast to the costs of alcoholism, in other drug dependencies, much of the research on total costs here are in police and other criminal justice system activity, legal defense fees, incarceration, drug interdiction, property destruction and costs to crime victims. The most significant cost, however, is in losses to the legitimate economy due to drug addicts' crime careers.

Only a modest portion of the total cost-of-illness estimates for addictions are for payments for prevention and treatment of the illness. In fact, payment for treatment accounts for only 10% of the overall cost-of-illness spending for alcoholism and for 5% of the cost-of-illness expenditures for drug dependency.

Recent studies of overall health care spending indicate that addiction treatment comprises only 1 - 4% of medical costs. In addition, even with expansion of insurance coverage, utilization of alcohol and drug treatment benefits remains less than 1% of the covered population.

Addictions Treatment in General Clinical Populations

General Clinical Populations, as used here, include Medicaid/Medicare, Blue Cross/Blue Shield, Veterans Benefits, and private indemnity insurance eligibles. The socioeconomic literature on this population is still emerging. Ongoing work promises even more sophisticated analysis of large data bases during the 1990s. However, already a few firm conclusions can be drawn.

First, in contrast to non-alcoholics, alcoholics usually incur health care costs that are at least 100% higher, and in the last twelve months before treatment of addiction, the costs are close to 300% higher. Most of this difference is attributable to the alcoholics' higher inpatient utilization for alcohol related illnesses and injuries but not for treatment of the alcoholism. There is strong evidence that the treatment of alcoholism, and most likely, other drug dependencies, is cost-beneficial - with a return of between $2-$10, depending on the types of costs and benefits used, for every $1 spent. When reductions in criminal offenses (and resultant legal and court costs), alcohol and other drug affected infants and HIV incidence, etc. are factored in, CBA ratios become even more attractive.

Second, the potential of addictions treatment to significantly reduce medical care utilization is one of the strongest conclusions in the scientific literature. After treatment, health care utilization of treated alcoholics is observed to dramatically converge to levels of use in the non-addicted population. Only in cases where the medical complications are advanced, or when the patient is no longer physically resilient, does convergence not occur. Even in these cases, there may be attractive cost-offsets. As with other diseases that are no longer curable, costs at least can be stabilized and contained.

Third, collateral health care offsets are the positive health benefits and changes in service utilization in other family members when addiction treatment is provided. The few studies of collateral cost-offsets indicate a very significant benefit of addictions treatment. The potential savings are enormous, even larger than those accruing from cost-offsets of treated alcoholics and addicts themselves.

Fourth, currently existing assessment and placement instruments are available and evolving to assist in matching patients to appropriate levels of care. The current tendency to favor low cost solutions runs against a limit: an ineffective treatment, no matter how cheap, is no bargain and should not be an element of a clinical continuum.

Fifth, it appears that the costs of addicted individuals impact at the federal, state and local levels and that each has much to gain from appropriate treatment.

Sixth, there is some evidence that cost offsets in health care can also be expected when dependencies to drugs other than alcohol are included. That the largest cost-offsets seen in younger patients -- the most likely multiple-drug addicted -- supports this expectation.

Seventh, the cost-offset research reported out so far is less impressive for the treatment of older patients. But even here, financial savings may be observed in a stabilization of high health care costs, rather than in a reduction from pre-treatment levels.

Eighth, treatment of addictions is equally positive in male and female patients, showing good cost-offset properties that are both pronounced and durable.

Addictions Treatment in Workforce Populations

Seventy percent of those who report current illicit drug use are employed. About 8.2% of wage earners admit to current illicit drug use (24 % when the group at highest risk - young males - is considered alone) and an additional 6.3% of the workforce report heavy drinking without other drug use. Thus, nearly 15% of workers report illicit drug use, heavy drinking, or both. Many studies demonstrate the high cost of alcohol and drug problems in the workforce population. For example, one study found job performance problems including sick-benefit claims at 120%, absenteeism rates at 335% and disciplinary actions at 235% of the normal levels. After addiction treatment, outcome indicators found absenteeism, disability days and disciplinary actions all reduced by over 50%.

Summarizing the results of socioeconomic evaluations of addictions treatment in workforce populations, the following conclusions are offered.

First, research supports the conclusion that addictions treatment is strongly cost-beneficial to business and labor. Addicted workers consistently experience high negative performance indicators - absenteeism, disciplinary actions, workers compensation and accident benefits, etc. - which ramp up and peak just prior to treatment. Post-treatment, these performance indicators, over time, dramatically improve and converge with comparison groups. Unfortunately, studies in the workforce do not generally track improvements in health care utilization, which could even more strikingly demonstrate the effect of treatment.

Second, the current direction of individualized patient assessment followed by placement appears to be supported by the research. Many patients can be treated effectively in an outpatient setting, especially those who are non-psychiatric, young, stable, and uncomplicated by multiple-drug addiction. On the other hand, thsoe patients who are more severely addicted, may benefit more from inpatient or residential treatment straightaway. Overall, the only strategy that seems completely unsupported by the data is the dogmatic approach to referral, either to inpatient or outpatient.

Third, health care cost-offset research from a primary worksite perspective is almost absent. However, most general clinical population studies were conducted utilizing the health care records of persons who had their insurance policies as a result of employment. Therefore, the limited specific offset results of workforce populations, combined with evidence from insured general clinical population members, demonstrates excellent cost-offset evidence.

Addictions Treatment in Criminal Justice Populations and Narcotics Users

There is almost no socioeconomic research specifically on criminal justice populations. There are instead a number of extremely large and sophisticated outcome studies of drug abuse treatment which indirectly refer to this population. These studies are generally part of a strong and vital federal research effort. All studies indicate that this is a difficult population to treat. The research available focuses on cost-benefit of methadone maintenance, therapeutic communities and drug free outpatient treatment. On this basis, several conclusions appear warranted.

First, research involving patients from a variety of settings and populations indicates that positive treatment effects are fairly general and durable. There is substantial reduced use of narcotics and other illicit drugs as well as other positive effects of treatment - less intravenous use and needle sharing, much reduced levels of predatory and violent crime and other legal involvement, less abusive drinking and use of cannabis, less depression, and increased gainful employment. The cost savings during treatment alone more than recoup the cost of providing the treatment. Post-treatment gains are virtually an economic bonus.

Secondly, it is very clear that early intervention and treatment provides the most beneficial approach to the criminal justice population.

Third, once in treatment, a top priority must be to retain patients in treatment. It is clear that success is related to time-in-treatment - a minimum treatment

threshold of three months is suggested by the best research. Markers of what may indicate a good prognosis include family and employment stability, relatively low pre-treatment levels of criminality and drug dealing, the absence of psychiatric illness and positive program characteristics (e.g., low staff turnover and high morale).

Fourth, coerced criminally involved clients do as well, if not better, than voluntary clients. Moreover, the effect of court involvement, thought by some to compromise a therapeutic relationship, appears instead, to help retain patients in treatment and help them to achieve a more favorable and stable outcome. Cultural and other demographic characteristics of clients appear to have little to do with treatment outcomes.

Fifth, more recent research on the "treatment career" of addicts shows the durability and the accumulative nature of treatment effects. Treatment can be viewed more as an additive experience than as a single episode. Clearly, treatment continues to have an effect, even when the patient has completed or has dropped out. Drop-outs are not necessarily failures, as each additional treatment experience seems to accumulate positive additive effects - a progressive recovery process.

Sixth, given the very high risk health behaviors of addicted individuals with criminal justice involvement (threat of AIDS, multiple-drug addiction, the potential effects of alcohol and other drugs or HIV positivity on fetuses, etc.) and the ability of quality treatment to diminsh these behaviors, it is almost certain that the total benefits to society, estimated to be in ratios as high as four to one, is seriously underestimated.

Seventh, patients referred through the criminal justice system clearly suffer the double stigma of being both drug addicted and criminally involved. Problems related to this double stigma and not specifically targeted by treatment - such as unemployment, abusive drinking, etc. - must be adequately addressed in the treatment regimen. Long term programs, after the addiction is thoroughly stabilized, may try an innovative holistic approach aimed at these secondary targets.

Finally, the area of collateral health care offsets, developed in research with general clinical populations, most likely have equivalent collateral criminal justice offsets as well. The collateral offsets may include reductions in other family member criminality, addictions in other family members, health and welfare utilization, etc. and may have the potential to dramatically enhance cost-benefit ratios.

ADDICTIONS TREATMENT WITH PREGNANT WOMEN

The problems associated with alcohol, nicotine and other drug use by pregnant women are devastating, causing at least 500,000 birth defects, low birth weight and a host of later medical, social and developmental problems and the suffering that accompanies these human tragedies.

Most quality studies have focused on fetal alcohol syndrome. Very little is known about the short- or long-term effects of maternal smoking and illicit drug use. In spite of this shortage of knowledge, a few conclusions are warranted.

First, associated birth defects significantly increase the length of stay and cost of hospitalization. In addition, the long-term costs of medical treatment and the social and educational services required to counter fetal alcohol and other drug effects are substantially increased. Estimates of hospital costs for drug-exposed infants run $1,100 to $4,100 higher than for non-exposed infants. Neonatal intensive care costs range from $20,000 to $40,000 per child. Overall hospitalization costs for drug-exposed infants are estimated in the range of $385 million to $3 billion. Factoring in additional costs for fetal alcohol syndrome, the annual economic loss to society ranges from $0.6 to $3.3 billion.

Second, for the most commonly used drugs (alcohol, cocaine, and cigarettes) the most acute health care cost is related to a low neonatal birth weight.

Third, the amount of prenatal care is positively correlated with increased birth weight. Pregnant women who decrease their cocaine, alcohol and cigarette consumption have significantly higher birth weight babies than those who do not.

Fourth, the effects of heavy drinking and other drugs on fetal development are still largely unrecognized by pregnant women themselves. Recently, the introduction of warning labels on alcoholic beverages has been put into effect and regional prevention efforts aimed at raising awareness about the harmful effects of perinatal drug use have gained steadily. It is obvious that great cost can be saved with the institution of a national public education program to prevent alcohol, nicotine and other drug use during pregnancy.

Fifth, state and national databases are needed to collect reliable statistics on the combined incidence of FAS and other drug-affected infants. It is difficult to describe or deal with problems in the absence of such a reliable database.

Sixth, outreach and secondary prevention coupled with

early diagnosis in high-risk groups (African-American groups, Native American, and other minority groups and groups scoring low on socioeconomic scales) would greatly reduce the cost of exposed babies.

Seventh, the high cost of alcohol and other drug affected births can be contained through early detection and appropriate social planning. The number of days the infant is kept in the hospital awaiting proper placement and related costs could be reduced by proper planning.

Finally, very few addiction treatment programs are equipped to provide care for the special needs of pregnant women and dependent children. There are a few innovative programs that have developed to meet this need, but many more outreach and treatment programs need to be developed to react to this national tragedy.

CONCLUSION

Addictions are very costly to society and these costs can be substantially reduced through treatment. With the exception of alcohol and other drug affected infants, all populations show strong treatment cost offset and high cost-benefit ratios. Alcohol and other drug affected infants have not received adequate scientific attention from which to draw conclusions, but the potential for dramatic cost-benefit ratios is quite apparent.

Cost-effectiveness research in addictions has had limited application in the addictions field because of the ethical dilemmas presented. Because of these difficulties, the future relies on skilled assessment of patient needs and matching to appropriate treatment. Strong national efforts have been initiated in this area and in the near future should throw light on this vitally important matter. A related area that treatment matching research will clarify is the elements of a quality continuum of care, including the intensity and length of treatment.

1 INTRODUCTION TO THE TECHNICAL APPRAISAL

RESEARCHERS AT THE CENTER OF ALCOHOL STUDIES, RUTGERS UNIVERSITY were asked in May, 1992 by organizing staff of the President's Commission on Model State Drug Laws to review the existing scientific literature on cost-offsets of addictions treatment. As normally understood by health economists, "cost-offsets" are reductions in the future burden of services (usually medical services) that can be attributed directly to treatments or curative agents applied at the present time. Medical services that are generally considered to produce attractive subsequent cost-offsets include inoculation procedures, early detection programs (e.g., "cancer screens" or "cholesterol clinics") and some other forms of early or primary care designed to prevent the onset of a disease process or to arrest or reverse an ongoing disease process before its results are devastating. The costs of many medical procedures are offset by later benefits, and in the current restrained funding atmosphere the "offset literature" is a burgeoning domain in health economics. The President's Commission is cognizant of the tightening financial atmosphere of the new decade and wished to adduce evidence on the potential for addictions treatment services to deliver significant benefits through a health care cost-offsets mechanism.

A substantial amount of preparatory work is necessary in presenting data bearing on the socioeconomics of addictions treatment. The term "socioeconomic evaluation" (Luce & Elixhauser, 1990) is favored throughout the Technical Appraisal as a phrase inclusive of terms that are more specific and frequently used improperly, including cost-benefit, cost-effectiveness, cost-offset and cost-of-illness analysis.

The work of the authors of this Technical Appraisal commenced on November 12, 1992. The ultimate goal of the project was to produce a document in which the socioeconomic literature on addictions treatment would be reviewed and documented in detail. This was designed to be a thorough, objective analysis of the literature, drawn from (1) professional and other formal sources contained in or available to the Center of Alcohol Studies Library, the premier collection of alcohol literature in the world, and (2) a "Call for Data" directed to the professional and nonprofessional communities in order to locate "fugitive" source documents not held in libraries or other collections.

The resulting review and analysis is available to the Treatment Task Force of the President's Commission and to other interested Commission members, as a thorough study and archive of sources bearing on the socioeconomics of addictions treatment. It is accompanied by an Executive Summary, using the Technical Appraisal as the principal source document, prepared in language and form accessible to the nonspecialist.

The President's Commission requested that socioeconomic research on five populations be examined critically. These were to consist of (1) Blue Cross / Blue Shield and private insurance eligibles, (2) Medicare/Medicaid eligibles, (3) employee groups, (4) criminal justice populations, and (5) pregnant women. Unfortunately, the literature as it exists is not organized in this form, but further study showed that the available body of research could be organized along similar lines, with only a few adjustments.

As it developed, several hundred research papers, reviews, books and book chapters and private documents bearing on four groups were surveyed. These include (1) general clinical populations, which include the privately insured, Medicare/Medicaid eligibles, and self-pay patients, (2) workforce populations, which include military service personnel as well as the private and public civilian sector, (3) narcotics users, in which the criminal justice population is very heavily represented but is not present exclusively, and (4) pregnant women. The result is the first integrated review of the socioeconomic literature on addictions treatment ever assembled; in no other source are even any two of the literatures cited above discussed under the same cover.

The sources used in the design of the Technical Appraisal, which was prepared with the assistance of professional librarians at the Rutgers Center of Alcohol Studies, were derived from a series of computerized literature searches and more sensitive hand searches of the literature. In addition, a Call for Data was issued in December, 1992, wherein more than 650 managed care companies and HMOs, more than 800 employee assistance programs, 100 major insurance carriers, and officials in state health departments and appropriate arms of the federal government, were personally contacted, to seek their help in locating any source materials that could be of value. A large volume of material was in this way collected and reviewed to inform the Technical Appraisal. Altogether, the four literatures described above, plus several others, were thoroughly explored.

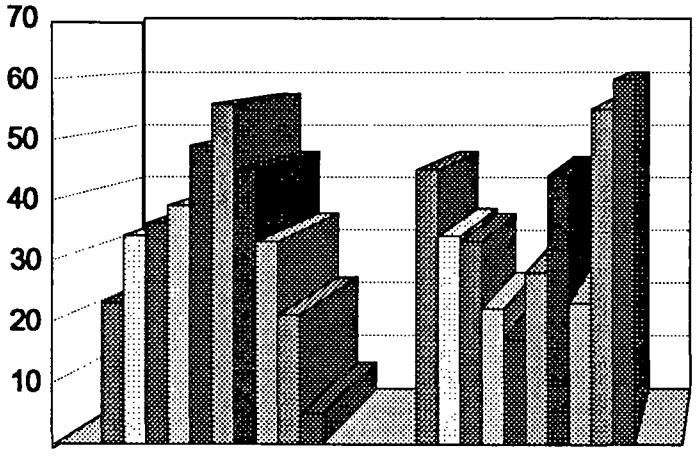
First, a collection of materials on socioeconomic methods was reviewed. This material is used to develop Chapter 2, *Methods of Socioeconomic Evaluation*, which provides a summary introduction to matters discussed in later chapters. Second, a large collection on the historical development of alcoholism and drug abuse treatment were studied, and are used throughout the Technical Appraisal to provide a sense of depth and background against which socioeconomic findings are best studied.

Third, a variety of studies of cost-of-illness, a socioeconomic term introduced in Chapter 3, *Cost-of-Illness Studies of Addictions*, were reviewed. These are located in Chapter 3, and also in Chapter 7, *Addictions Treatment with Pregnant Women*, a so far relatively unexplored area which consists primarily of cost-of-illness studies at this time.

Next, broad literatures and programs of research were studied to develop the arguments made in Chapter 4, *Addictions Treatment in General Clinical Populations*, Chapter 5, *Addictions Treatment in Workforce Populations*, and Chapter 6, *Addictions Treatment in Criminal Justice Populations and Narcotics Users*. After Chapter 7, *Addictions Treatment with Pregnant Women*, a summarizing chapter, Chapter 8, *Conclusions and Recommendations*, is offered, in order to pull together from the disparate literatures a number of points that could not have been made except in the light of an integrated review.

James W. Langenbucher, Ph.D.
Barbara S. McCrady, Ph.D.
John Brick, Ph.D.
Richard Esterly, M.H.S.

Center of Alcohol Studies
Rutgers University
Piscataway, NJ



2 METHODS OF SOCIOECONOMIC EVALUATION

QUANTITATIVE EVALUATION OF ALTERNATE WAYS TO ALLOCATE RESOURCES has a long history, in health care and in most other areas where the investment of resources must be justified on the basis of outcomes. In the mid-1600's, the first analysis of the socioeconomics of health care was drawn up by an English physician, Richard Petty, who was able through torturous (and sometimes dubious) calculations to prove to various royal societies that the value of lives saved as a result of social investment in the health care of the time exceeded the costs of that health care. The use of socioeconomic evaluation in health care in the modern era did not, however, gather momentum until the last few decades.

In fact, the use of socioeconomic evaluation methods in any technical area was not widespread until the 20th century. Prior to the 1960's, its use by government was virtually restricted to the U.S. Army Corps of Engineers, which used cost and projected benefit estimates to evaluate the prospects for an array of water and flood control projects it had planned in the postwar era. In the 1960's, other agencies under the Department of Defense adopted a broad system of program-budgeting based on socioeconomic methods. In 1965, Lyndon Johnson issued orders requiring the implementation of cost-benefit analyses for program proposals throughout the federal government. In this way, arms of the federal government became among the first entities to seize upon quantitative estimates of costs, benefits, and cost-offsets as a way to allocate their resources.

These analyses were eventually to include programs of the Public Health Service, the Veterans Administration, and a variety of other agencies where costs are substantial, opportunity costs are large, and there are many attractive but competing calls on scarce resources. In health care, early and very influential cost-benefit studies were reported on programs to control kidney disease, to develop and deliver maternal and child health care and care for the poor, and programs to educate and deploy nursing personnel and other non-physician health care providers.

By 1983, a program of scholarly review and original research by the Office of Technology Assessment (OTA), *Medical Technology and Costs of the Medicare Program,* had resulted in 22 in-depth studies of major medical and psychiatric technologies. The motive for this movement was clear:

> The demand for health care exceeds the supply of resources, and rationing takes place implicitly, incoherently, and illogically. To identify the best value in health improvements from a given finite budget, it is essential to identify, measure, and value the costs and outcomes (in terms of enhancements in the length and quality of life) of competing treatment options for given episodes of illness. (Maynard, 1990, p. 761)

Clinical effects must be understood before socioeconomic evaluations can be undertaken in a substantive way. Thus, these evaluation methods have not always been broadly applied, nor their results widely accepted. Now, though, at least six factors are driving an increasing emphasis on socioeconomic evaluation as an arbiter of resource allocation in American health care.

First is the "graying of America." People 65 years of age comprised 11% of the population in 1980 and will increase to 15.5% in 2020 (Price, Galli & Slenker, 1985); elders use triple the amount of health care

Table 2-1

Major Studies in the OTA Health Technology Series, 1980-1983

CASE STUDY NUMBER AND TITLE
1. Formal Analysis, Policy Formulation, and End-Stage Renal Disease
2. The Feasibility of Economic Evaluation of Diagnostic Procedures: The Case of CT Scanning
3. Screening for Colon Cancer: A Technology Assessment
4. Cost-Effectiveness of Automated Multichannel Chemistry Analyzers
5. Periodontal Disease: Assessing the Effectiveness and Costs of the Keyes Technique
6. The Cost-Effectiveness of Bone Marrow Transplant Therapy and its Policy Implications
7. Allocating Costs and Benefits in Disease Prevention Programs: An Application to Cervical Cancer Screening
8. The Cost-Effectiveness of Upper Gastrointestinal Endoscopy
9. The Artificial Heart: Cost, Risks, and Benefits
10. The Costs and Effectiveness of Neonatal Intensive Care
11. Benefit and Cost Analysis of Medical Interventions: The Case of Cimetidine and Peptic Ulcer Disease
12. Assessing Selected Respiratory Therapy Modalities: Trends and Relative Costs in the Washington, DC Area
13. Cardiac Radionuclide Imaging and Cost Effectiveness
14. Cost-Benefit / Cost-Effectiveness of Medical Technologies: A Case Study of Orthopedic Joint Implants
15. Elective Hysterectomy: Costs, Risks, and Benefits
#16. The Costs and Effectiveness of Nurse Practitioners
#17. Surgery for Breast Cancer
#18. The Efficacy and Cost Effectiveness of Psychotherapy
#19. Assessment of Four Common X-Ray Procedures
#20. Mandatory Passive Restraint Systems in Automobiles: Issues and Evidence
#21. Selected Telecommunications Devices for Hearing-Impaired Persons
#22. The Effectiveness of Alcoholism Treatment

services of younger persons, consuming a growing proportion, now 30%, of the national health care budget.

Second is the increase in the number and types of health care professionals, and their demands for shares of the resource pie. Third is the continued development of medical technologies, many of them very expensive and some having entered wide practice without evidence of their benefits being even remotely in line with the costs of the procedure (Banta & Gelijns, 1987). This is at the heart of widespread concerns about "unnecessary," "frivolous" or "experimental" procedures that, it is feared, soak up enormous sums for the profit of a few.

Fourth is the increased level of public demand for improved quality or, more precisely, *value* of health care. Particularly as costs for the maintenance of the American health care system have been shifted to lower and lower levels, and as growing numbers of workers and other purchasers feel a financial pinch in increased premiums and higher deductibles or copayments, the demand for more value per health care dollar has intensified.

Related to these last two elements is the increasing pressure to restrain the growth of health care expenditures. Health care costs have been widely recognized as a leading inflationary and budget-busting factor that must be brought under control, with direction from the highest levels of government and industry. Finally, there is the rise of the managed care sector and third-party payers during the last few decades, with a closely built-in and profit-driven motive to control costs. As will be seen in later chapters, it is often this element of the private sector, which has planned and conducted some of the best socioeconomic research in the field.

Overview of Socioeconomic Methods

Luce and Elixhauser (1990) have defined socioeconomic evaluations as "... research methods based on the social sciences, primarily economics and psychology. They are methods which enumerate the costs and consequences associated with medical products and services." At the outset of the socioeconomic evaluation era summarized in Table 2-1, OTA published ten general "principles for excellence" in socioeconomic analysis, as shown in Table 2-2. Some of these are straightforward, others only look simple, and many are rarely met or even approximated in most studies.

(Goals 1 and 2): Problem definition and statement of the objectives refer to the need to clearly specify the kinds of information desired, which must, of course, depend to some extent on the technical and conceptual limits of the field of inquiry. (Goal 3): By identifying alternate means to address the research objectives, scientists are encouraged to experiment with different methods to collect, evaluate, or estimate cost and benefit vectors. We will find, for example, in the literature on cost-offsets with general clinical populations that researchers have used a variety of imaginative and statistically powerful ways to estimate the health care utilization of persons with alcohol problems who are denied treatment, an ethically impossible situation for which statistical modeling of the hypothetical "no-treatment" condition has sufficed.

(Goals 4 and 5): Analysis of the benefits is typically a strong point of socioeconomic research, as it capitalizes on an increasingly solid area of program evaluation - scaling of outcomes and long-term follow-up of patients. Analysis of costs is, unfortunately, a

Table 2-2

OTA "Guidelines for Excellence" in Socioeconomic Research

ORDER	GOAL OR PRINCIPLE
1	Define the problem
2	State the objectives
3	Identify alternative means to address the objectives
4	Analyze benefits and negative effects
5	Analyze costs
6	Differentiate perspectives of analysis
7	Perform discounting
8	Analyze uncertainties
9	Address ethical issues
10	Interpret results

Source: Office of Technology Assessment, 1980

principle of socioeconomic research that has too often been ignored in research on the addictions. Many studies have overlooked entirely the costs of treatment, others have found it difficult to estimate various costs of the addictions themselves, and many others have relied on regional or even national estimates of various cost categories to show changes due to treatment - for example, the costs of property crime attributed to the average untreated heroin addict, or the dollar value of an hour of labor derived from a national estimate - rather than taking data on these cost vectors from the subjects themselves.

(Goal 6): The importance of different perspectives, and how the interests of different constituencies affect their views of various data and what they think of as important, is another principle that needs to be addressed by socioeconomic evaluations of addictions treatment. Table 2-3 shows how different analyses may be called for, depending on the particular needs of the social sector that plans the socioeconomic review. We will find, for instance, that in the studies reviewed in Chapter 5, *Addictions Treatment in Workforce Populations*, costs and benefits that were looked at in the studies were of the kind that interest employers - productivity indicators, effects on insured health care costs, etc. In Chapter 6, *Addictions Treatment in CJS Populations and Narcotics Users*, most of the variables looked at were of the kind that interests the criminal justice system - crime-career costs, involvement in drug dealing, etc.. The perspective of the agency which has commissioned the socioeconomic analysis, more than any other factor, determines what cost and benefit vectors are looked at. Over time and across studies, this perspective determines the entire shape and quality of the literature as a whole.

(Goal 7): Costs and benefits are adjusted by a discount rate whenever they are expected to come into play over a period of some years. Discounting is a socioeconomic technique that has had virtually no exposure in studies of addictions treatment, though it is addressed briefly to examine the anticipated costs of care for drug- and alcohol-exposed infants in Chapter 7, *Addictions Treatment with Pregnant Women.*

Briefly, discounting is used to adjust for the principal of *positive value of time preference*, by which benefits in the future have lower value than benefits received now, and costs in the future are less aversive than costs that must be paid now. Thus, a benefit now worth $100 that will be received at some future time has a value discounted to well below $100, and a $100 cost also to be incurred at a future date has a level of aversion worth well below $100. Typically, discount rates used in socioeconomic research range from 3-10% per year.

(Goal 8): Sensitivity analysis is a related feature, used to analyze uncertainties in the data. Because socioeconomic research relies as much on estimates of costs and benefits as on hard facts gathered in the field, superior pieces of research will present several parallel lines of analysis in which estimated vectors - discount rates, proportions of cost viewed as fixed vs. variable, anticipated future cost curves, etc. - are allowed to vary. Results are then presented as those that would obtain under the conditions stipulated. Sensitivity analysis has been used sparingly in socioeconomic

Table 2-3

Impact of Perspective on Cost Vectors of Interest

PERSPECTIVE	COST VECTORS OF INTEREST
Societal	All medical and nonmedical costs Hospitalization Long-term care Home care Social Welfare services Productivity losses (indirect costs) Crime-Related Costs Intangible costs
Third-party payer	Charges that pertain to reimbursement to providers
Health care Provider	Variable costs that influence the expense of providing health care
Patient	Out-of-pocket costs Lost wages (indirect costs)
Employer	All insurable direct costs Lost productivity
Criminal Justice System	Criminal justice system maintenance Crime-career Interdiction Costs to victims

Adapted from: Luce & Elixhauser, 1990

research on the addictions, principally only in cost-offset studies in general clinical populations, to present alternate assumptions about medical care cost increases under "no-treatment" conditions.

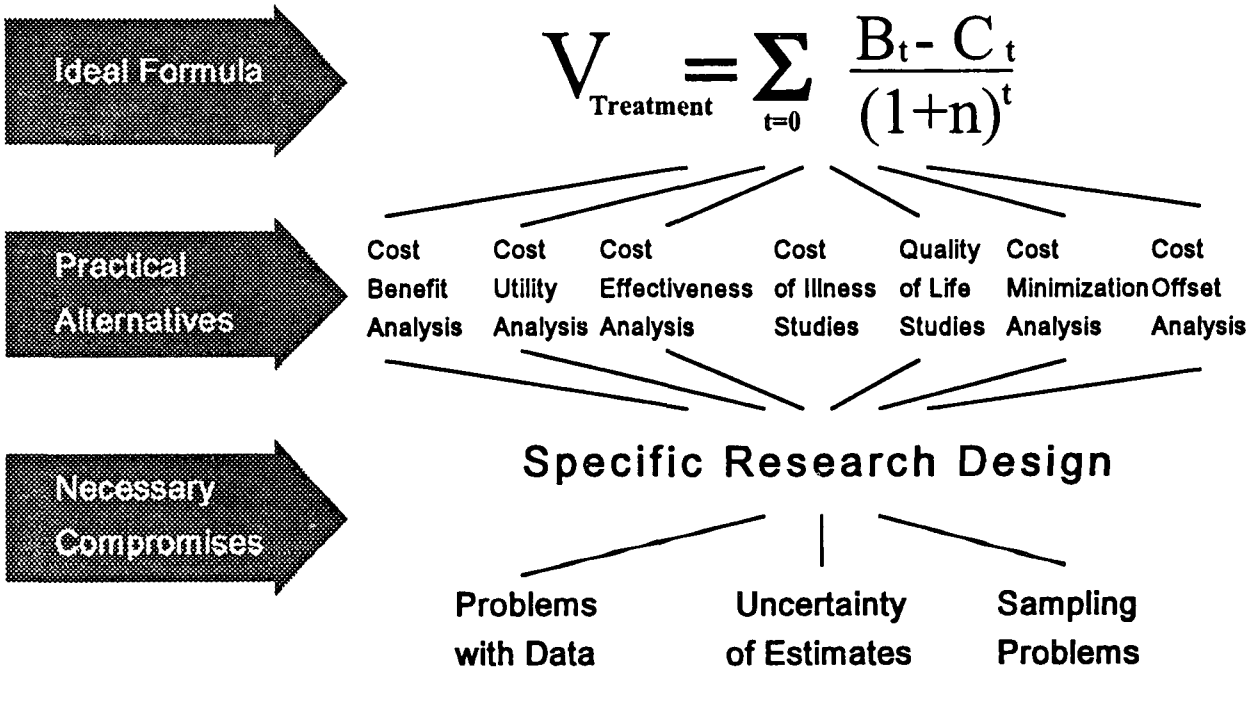
Typically, socioeconomic research in general departs in many ways from the ideal model described by OTA. Problems are poorly defined or not well understood, traditional but inappropriate methods are used, costs and benefits are imperfectly estimated and analyzed, and so on. Much of the body of socioeconomic research shows other flaws, as well. Horisberger (1990) voiced concern over a number of them, including (1) the fact that socioeconomic results do not easily identify courses of remedial action, (2) that reports are often weak in practical knowledge of the area studied (3) that some recommendations or conclusions are naive politically or professionally, (4) that there is too much evaluation of technologies as they are used in ideal settings, not on how they are used in typical situations, and others. Socioeconomic evaluations of addictions treatment reflect similar patterns and have a very short history.

For instance, sources of utilization or other treatment data may be limited to hospitals, clinics, and insurers which, while highly accessible, ignore cross-boundary use patterns that could be picked up through direct surveys (McKinlay, 1972). Patient samples may be limited geographically, or may be temporally restricted and cross-sectional rather than longitudinal. There is typically an emphasis on quantity of treatment (e.g., number of visits, length of stay in a hospital, etc.), rather than quality of treatment. Typically no attention is paid to the decision-making processes and motivational and attitudinal variables that led to the choice to seek treatment, nor to logistical considerations such as the proximity of treatment, its availability and cost, its suitability, etc..

However, socioeconomic research in health care, like most other kinds of research, involves a series of practical compromises between the ideal standard and the limitations of the researchers, their technical field, and the resources they command, as Figure 2-1 shows. The ideal mathematical situation - in which the grand value (V) of a treatment is expressed straightforwardly as the sum over time of treatment benefits (B) minus

Figure 2-1

Compromises in Socioeconomic Evaluation



Adapted from: Luce & Elixhauser, 1990

treatment costs (C), adjusted for the size of the patient group affected (1 + n) - must instead be filtered methodologically through one of several study types, each vulnerable to specific limitations of the study sample, the data taken from the research subjects, and uncertainties or ambiguities surrounding the sampling procedures, measurement processes, follow-up results, and so on. With the ideal as the goal, the product is always the "do-able," informed by a critical scholarship and a growing consensus on the properties of a high quality socioeconomic literature.

Models of Socioeconomic Evaluation

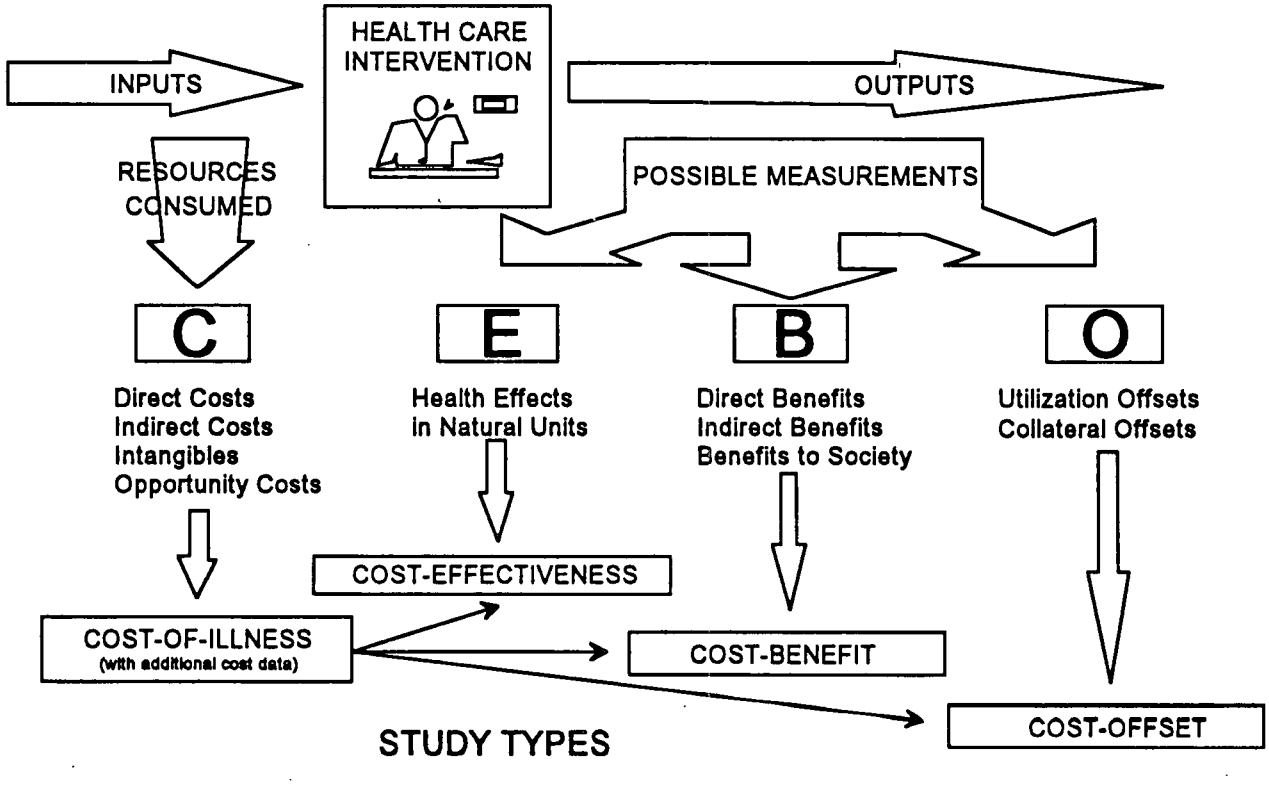
In the addictions treatment system, the operations of a variety of forces which codetermine the use and outcome of health care resources can be observed. These include (1) the patient, (2) the network of primary health care agents and gatekeepers, (3) the system of hospital care and specialty services, (4) the insurance system, (5) the interests of employers and low-level coercive agents, (6) the criminal justice system, and (7) public opinion. To date, no body of socioeconomic research sufficiently sophisticated to handle all of these forces has been developed. Rather, most research follows the simpler outlines of the socioeconomics of health care generally, as in Figure 2-2.

Intervention, which has a measurable set of costs, can produce any of a variety of physical, psychological and social consequences, as well as three forms of economic consequences.

These are (1) the health effects themselves, which are changes in state that have an inherent and measurable economic value, (2) direct and indirect benefits such as changes in productivity at work or at home brought about by the improvement in the state of health, or changes in other symptoms which are driven by the state of ill health, such as accident-proneness, impulsivity, involvement in criminal activity, and so forth, and (3) changes in the future utilization of health care resources, both for the patient receiving the treatment and for other persons, collaterals, whose well-being is influenced by the state of health of the person receiving treatment. Their relationships, and the kinds of

Figure 2-2

Elements of Socioeconomic Evaluation and Possible Study Types



Adapted from: Luce & Elixhauser, 1990

Table 2-4

Models of Socioeconomic Analysis

ABBREVIATION	MODEL
COI	Cost-of-Illness Study
CBA	Cost-Benefit Analysis
CMA	Cost-Minimization Analysis
CEA	Cost-Effectiveness Analysis
CUA	Cost-Utility Analysis
COA	Cost-Offset Analysis
QALY	Quality-of-Life Study

socioeconomic studies they suggest, are illustrated in Figure 2-2.

In all, at least seven types of socioeconomic analysis have been developed, as shown in Table 2-4. Several - the cost-minimization, cost-utility and quality-of-life study- are rarely used in health care generally and have no bearing at all on socioeconomic evaluations of addictions treatment. A fourth, the cost-of-illness study, is addressed in the next chapter, *Cost-of-Illness Studies of Addictions*, and need not be explained here. Instead, discussion in the sections to follow focuses on the most widely used and influential forms of socioeconomic evaluations of addictions treatment, the cost-benefit, cost-effectiveness and cost-offset analysis.

Cost-Benefit Studies

Cost-benefit analysis is the oldest and most frequently utilized type of socioeconomic evaluation in health care research and in the evaluation of addictions treatment. Most studies with workforce populations, and most in which narcotics users and criminal justice populations have been involved, are cost-benefit studies.

While other methods seek to discover which benefits in particular are obtainable from a given treatment (like cost-offset analysis), or which treatment will yield most benefit for a given level of investment (like cost-effectiveness analysis), cost-benefit analysis (Figure 2-3) seeks to discover whether the treatment or activity being tested is at all worthwhile, whether it at least "breaks even" or instead costs more to deploy than its outcomes are worth. Cost-benefit analysis is useful in the evaluation of almost any activity in which inputs and outputs can be valued monetarily. As a specialized economic analysis its heyday arrived in the 1950's and 1960's, when the Program Planning Budget System was installed in the Department of Defense and elsewhere in the federal government. It is still the most appropriate form of socioeconomic analysis when technologies are relatively new and untested.

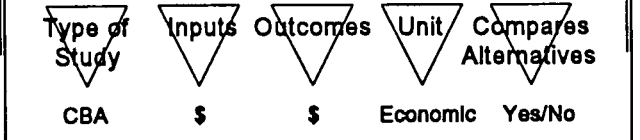
There are three general uses of cost-benefit analysis in health care as elsewhere (Spiegel & Hyman, 1991). First, cost-benefit methods can provide technical data - especially "the bottom line" of costs and benefits - that help resolve management conflicts. Second, CBA forces planners to consider alternate choices for investing resources. CBA is rarely undertaken in a policy vacuum, but rather is most typically done when resources are limited and arguments have sharpened. Third, cost-benefit data can help planners to finely adjust budgeting processes, when, for instance, projected benefits in a given area can be expected to be recouped within a definite period of time.

In its best form, cost-benefit analysis is conducted in six steps, though the last, sensitivity analysis, is neglected in some cases. These are (1) to clearly specify program objectives, (2) to identify and express in monetary terms all present and future program costs, (3) to identify and express in monetary terms all present and future benefits, (4) to select an appropriate discount rate when costs and benefits must be projected into the future, (5) to express the ratio of costs to benefits as a summary measure, and (6) to perform sensitivity analyses, allowing the discount rate and important cost or benefit assumptions to vary within feasible limits.

Overall, CBA makes few assumptions about the state of development of the domain of health care or other domains being investigated. Unlike cost-of-illness studies CBA does assume that a treatment has been developed and deployed in the field, but it does not assume that more than one treatment is available (as do cost-effectiveness studies). Nor does it assume that treatment, if effective, will have any effect on the state of

Figure 2-3

Cost-Benefit Analysis



The cost-benefit study is a form of socioeconomic analysis in which all real costs and consequences, inputs and outcomes, of a program or technology are expressed in monetary terms. Results are given as benefit-to-cost ratios, or ratios of monetary benefits to monetary costs. Two or more treatments, even programs in entirely alien domains, can be compared, though competitive advantages of one treatment over another are not usually a focus of cost-benefit research.

health of the individual; the effect could well be in some other behavioral domain (e.g., appropriate use of scheduled medical visits vs. emergency room use; taking a taxi home after becoming intoxicated at a bar rather than driving, etc.) and a treatment could still be deemed cost-beneficial. It is principally for the reason that few assumptions need be made about the state of technical development of the treatment being studied that many health care technologies are first studied for their cost-benefit profiles rather than for cost-effectiveness or cost-offsets, though CBA studies have many other demands that exceed those of the CEA and COA studies that generally come later in the field's development.

The principal demand of the cost-benefit study is that all factors in the analysis - costs of treatment, costs of illness if treatment is denied, benefits of treatment, even its side-effects if there are any - be expressed in common monetary terms. This has both a positive aspect and a negative one.

On the positive side, outcomes of CBA studies can be expressed in very simple benefit-to-cost ratios of the 1:1 form. Any ratio above this level shows that a treatment yields economic rewards of a value greater than the resources it absorbs and should probably receive policy support unless greater payoffs are available through some other use of the resource, a concept called *opportunity cost.* Conversely, any ratio below 1:1 indicates that the treatment itself drains the system, and should be viewed skeptically. That is not to say that the treatment should be discontinued or denied - humanitarian concerns may override economic ones in many cases - but few health care technologies will, in the absence of such overriding concerns, long withstand further scrutiny. Thus, on the positive side, cost-benefit analysis provides a simple, generalized statement of a treatment's overall economic worth that can be readily compared to CBA ratios derived elsewhere, even in quite alien domains of activity.

On the negative side, however, CBA has a number of liabilities. First, its insistence that outcomes be valued in monetary terms means that outcomes that cannot be valued in that way, or that resist monetary valuation and "feel awkward" when so valued, tend to be ignored in the analysis. Second, CBA ratios are likely to be deceptive policy guides for choosing between alternate ways to allocate resources when the scales of activity are very different between the alternatives (one alternative may yield a higher *net benefit* while showing a less attractive CBA ratio). Third, CBA studies do not show which social sector is likely to benefit from a treatment, and it is possible that an unattractive, even a negative, CBA ratio can be reported for a given treatment even though that treatment yields very substantial benefits for one social sector in particular. For example, an approach like DWI education and deterrence that focuses on reduction of alcohol-related driving hazards may have very substantial payoffs in terms of reduced criminal justice activity, but less payoff or no payoff at all in the form of less drinking, less drinking to intoxication, or reduced health risks. Furthermore, if the interests of the socioeconomic research team studying the matter lead them to ignore all but costs associated with motor vehicle safety, the low cost per patient of the education class, and the very high cost of the rare but measurable event which it reduces - the motor-vehicle fatality - may yield a much higher CBA ratio for this intervention than might be obtained with other treatments that directly target drinking or drug use itself and that look at a broader array of cost and benefit vectors.

Cost-Effectiveness Studies

In contrast to CBAs, good cost-effectiveness studies (Figure 2-4) are notably unavailable in the socioeconomic literature on addictions treatment as in most other areas of health care. There are a number of reasons for this dearth of studies.

First, cost-effectiveness research presupposes a fairly mature level of technical development in a clinical field. The symptoms, problems, disease states, etc. must have been proven remediable - that is, treatments must have been shown to be *effective* to at least some degree - and at least two treatments that target the same clinical effects must be available for comparison. The treatments should in most cases be easily discriminable, manifesting differences that warrant testing. In many cases, there will be an overriding consideration favoring one treatment vs. another - lower cost, greater accessibility, greater effectiveness - which will drive the health care system's interest in a cost-effectiveness comparison.

Figure 2-4

Cost-Effectiveness Analysis

Type of Study	Inputs	Outcomes	Unit	Compares Alternatives
CBA	$	$	Economic	Yes/No
CEA	$	Health Effect	Natural Unit	Yes

The cost-effectiveness study is a form of socioeconomic analysis in which two or more treatments are evaluated on the basis of relative cost, relative effectiveness, or both. Inputs are measured in economic terms, and outcomes are measured in nonmonetary but naturally quantitative terms of a desired health effect. Results are always given competitively, favoring one treatment over another in a socioeconomic "horserace."

Unlike the case of cost-benefit analysis, in cost-effectiveness research the prospect for achieving the clinical effects of the treatments should already have been established as worthwhile; little interest would be shown in a cost-effectiveness trial when the effects of the treatments are unstable, trivial, or otherwise unacceptable. Though formerly overwhelmed in most literatures by the less clinically demanding tradition of cost-benefit research, CEA studies are growing in influence as health care reaches levels of clinical maturity and proficiency in various domains, and can be expected to be used more frequently in addictions research as the basic parameters of raw treatment effectiveness become established and accepted throughout the field.

Second, the cost-effectiveness researcher must show considerable powers of discernment, being able to identify and measure with some precision all relevant costs, direct and indirect, associated with each treatment. Only those costs that are very small, or that have equal weight in each treatment being compared, can be safely disregarded, and because final differences between the treatments being compared may depend on slender cost differentials, costs take on an importance in CEA research not seen elsewhere. Cost estimation, at least with the subtlety required for quality CEA analyses, has been historically an underdeveloped technical area in socioeconomic research, and may have hindered the progress of this research tradition.

Third, a quality CEA that purports to evaluate the overall effectiveness of two or more treatments must include patients with mild, as well as those with severe symptoms. Excluding more severe cases limits the generalizability of the results to only the patient population that was tested. This is perhaps the most difficult requirement of CEA. For ethical reasons, patients who are in clear need of more intensive treatment cannot be put in less intensive environments. In a number of otherwise technically sound CEA studies, the more severe cases - those with medical or psychiatric complications - were excluded which then limits the generalizability of the results. Although these limitations are often pointed out in the study, the outcomes may be distorted in further reports of the findings.

Fourth, CEA requires that treatments be evaluated for identical outcomes, which may not be matters of agreement between different clinical traditions in the same general area of health care. For example, different programs to enhance longevity - one that targets improvement in cardiovascular health, and another that focuses on stress reduction - may not be comparable for purposes of cost-effectiveness analysis in the absence of a large, longitudinal body of mortality data.

In the field of addictions treatment, a drug-satiation treatment like methadone maintenance is founded on different principles entirely from the highly controlled therapeutic community (TC) in the Synanon tradition, though both are specific interventions for serious narcotics addiction. CEA techniques could be applied to some of the more distal outcomes of both methadone and TC treatment - reductions, for example, in property crime - but an extra layer of inference is necessary for that kind of analysis, while the proximal outcomes of the two treatments - drug satiation in the first case, denial of opportunity to use drugs in the second - are incompatible and could not be evaluated via the cost-effectiveness paradigm.

Cost-effectiveness analysis also proceeds in six steps (Spiegel & Hyman, 1991). These are (1) to clearly specify the objectives of the intervention or treatment, and (2) to identify at least two alternative means for achieving the identical objective, (3) to specify and scale all costs associated with each alternative, (4) to select a quantifiable measure of effectiveness in reaching the program objective held in common by both alternatives, (5) to determine the effectiveness of each alternative in achieving the objective, and (6) to compare the alternative treatments for differences in cost, effectiveness, or both.

CEA inputs costs in monetary terms and consequences in natural units. Many outcome vectors may be used, but they must, again, be the same for the different treatments being compared. Typically, results are expressed in costs per unit of outcome - e.g., $1,000 to achieve one year of drug abstinence for Treatment A, compared to $2,000 to achieve the same result for Treatment B - though they may simply take the form of a table of comparisons of different treatments on different outcome vectors.

Figure 2-5

Cost-Offset Analysis

Type of Study	Inputs	Outcomes	Unit	Compares Alternatives
CBA	$	$	Economic	Yes/No
CEA	$	Health Effect	Natural Unit	Yes
COA	Care	Utilization	Economic	Yes

The cost-offset study is a form of socioeconomic analysis in which a treatment is evaluated for its ability to reduce the subsequent utilization of health care services. Results are usually given as annual cost savings that can in future be anticipated if treatment is delivered now. Cost-offset effects for different treatments can in theory be compared, though competitive advantages of one treatment over another are not usually a focus of cost-offset research.

Just as CBA results may be misleading, so may CEA results unless thoroughly understood. All things being equal, CEA analysis will give the advantage to the less costly of the treatments being tested. Thus, treatments much less clinically effective than others may be preferred on the basis of cost-effectiveness if their proportional cost advantage exceeds their proportional clinical disadvantage. On the sheer basis of cost-effectiveness, a treatment that costs $1,000 and in the average patient reduces days per year of intravenous drug use by 50% will be preferred to a $2,000 treatment that reduces intravenous drug use by 99%, and a treatment that reduces use by 1% for $19 will be preferred to both. It is therefore necessary to bear in mind many factors - maximal efficacy, marginal costs per unit of outcome, the larger social dimensions of outcome, and the need for a balanced mix of services in most health care sectors - when considering the results of even the highest quality cost-effectiveness research.

Cost-Offset Studies

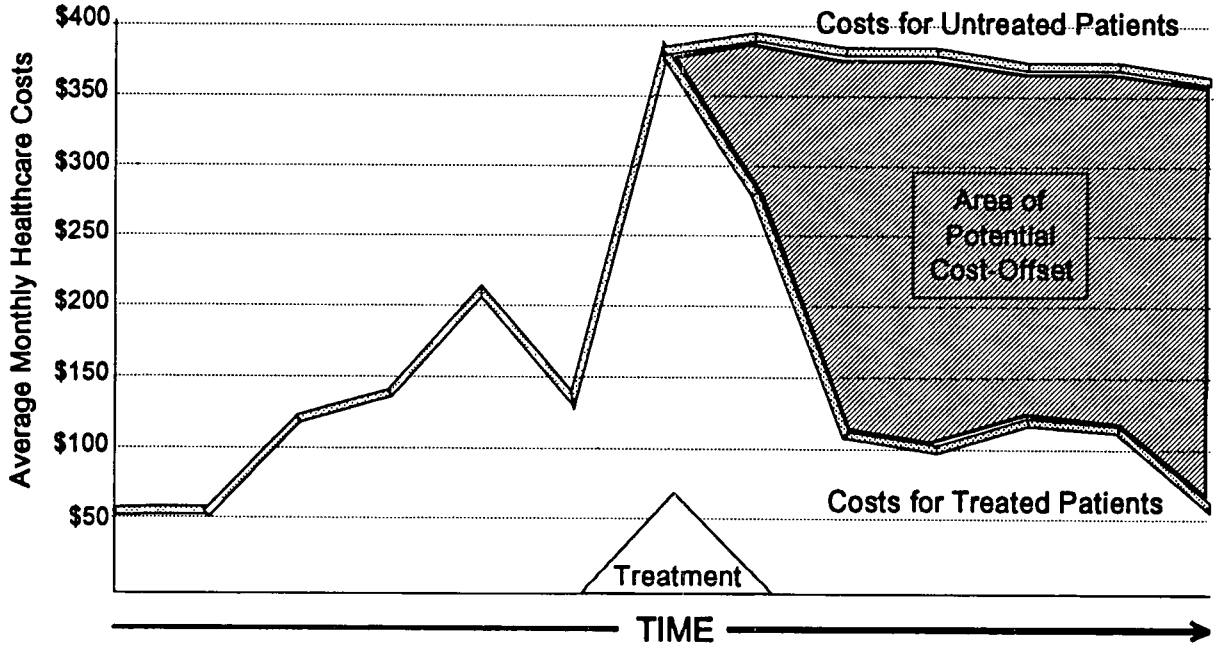
In the cost-offset study, the outcome of a treatment that receives attention is "averted cost," (Spiegel & Hyman 1991), particularly reductions in health care in the future that can be anticipated when a treatment is applied in the present. Speaking in terms of cost-offset research in alcoholism, but formulating an idea that transfers as well to other addictions, Holder and Schachtman (1987) offered the following definition:

> Offset: the reduction in total health care costs associated with alcoholism treatment based on what general health care costs would have been in the absence of treatment; that is, [offset consists of] the general health care costs estimated for an untreated alcoholic minus the total health care costs including the cost of alcoholism treatment, for a treated alcoholic. (p. 67)

Cost-offset research (Figure 2-5), unlike the other modes of socioeconomic evaluation discussed above, is often "archival" in nature, requiring access to large bodies of data, which in the main consist of utilization records - service logs, insurance claims, and so on. Most studies of cost-offsets in addictions treatment are observational only, requiring three elements: (1) the identification of a group of patients with an alcohol or drug abuse problem, (2) the availability to them of treatment for that problem, and (3) records of their health care utilization before, during and after treatment for the alcohol or drug problem is received. Treatment can vary greatly between cases. Few cost-offset studies specify in any degree of detail the treatment(s) actually

Figure 2-6

Graphical Representation of the Cost-Offset Concept



received, though such specification would be a technical advance that should be encouraged. It is also useful - it is in fact necessary when treatment has an incremental, additive or gradual effect on health and health care utilization - to have access to utilization data for several years after treatment is instituted. It is not unusual, therefore, to find cost-offset studies which have followed patients for five years and more after initial identification and referral for treatment.

Cost-offset analysis in health care can be regarded as a special mode combining elements of both the cost-benefit and cost-effectiveness study. Like CBA the outcome measure in cost-offset analysis is a direct and indirect benefit - reductions in health care utilization - that will occur over a long course of time. Yet, like CEA, cost-offset analysis compares alternative courses of action available to the health care system. These are not, though, typically alternative treatments; instead, the health care utilization behavior of patients under treated conditions is usually compared to their behavior under "no-treatment" conditions, as shown in Figure 2-6.

Unfortunately, this need for data on health care utilization under conditions of no treatment poses a number of obstacles to the cost-offset researcher. Patients who receive no treatment for a problem like alcohol or drug addiction often have no contact with a health care delivery system that could identify them as diagnosable cases and track their utilization. Even when such patients do have contact with a system that can track their health care use, the fact that they decline treatment for their alcohol or drug abuse probably has significant implications for their case generally: These may be patients with compliance problems or with severe problems before which they feel helpless. Alternately, they may have mild addictions that fail to concern them. In any case, it is hazardous to assume that patients who decline service are good matches, scientifically, for other patients who elect to receive a treatment.

Of course, patients who would make good experimental comparison subjects for actively treated patients in a cost-offset study - namely, patients who would elect to have treatment but remain untreated nonetheless - cannot ethically be denied care, especially for conditions with the potentially grave consequences of alcohol and drug addiction.

These difficulties - the methodological problems with using utilization records from inappropriate comparison subjects who decline treatment, and the ethical proscription against denying treatment to patients who would be comparable to the treated experimental group - has posed serious problems for the cost-offset study, which depends on a comparison of health care utilization behavior under treated vs. untreated conditions. This difficulty has sparked a surge of sophisticated computer modeling techniques in cost-offset research, whereby logic and statistical procedures are used to estimate what the future health care utilization of treated alcohol and drug abusers *would be* like if they had, in fact, not received treatment at all.

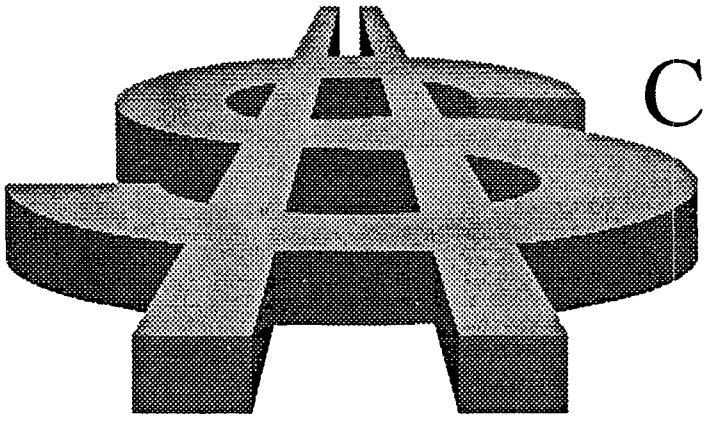
Different estimation procedures produce very different cost-offset results, and disagreement now centers around which estimation procedures are most appropriate. These are examined in more detail in the cost-offset section of Chapter 4, *Addictions Treatment in General Clinical Populations*, and the reader is referred there. Also examined there will be an exciting new area of research on *collateral cost-offsets*, an examination of the ability of treatment for an alcohol or drug abuser to result in lower health care utilization for his or her family members as well as for the patient him/herself.

Summary

Socioeconomic evaluation methods have a long history of general applications, but a short history in health care, and a history shorter still in the evaluation of mental health programs and of addictions treatment. In some areas - the evaluation of occupational addictions programs, for example, and some applications of treatment for narcotics users who are often criminally involved - a substantial body of cost-benefit research has developed. Some reliable facts are known from cost-of-illness studies, reviewed in the next chapter. A substantial body of cost-offset research on alcoholism treatment in the general clinical population has also been developed. Other study types, though, such as cost-minimization, cost-utility and quality-of-life, have yet to be deployed in addictions research, and one of the most pragmatic and often called for - cost-effectiveness - has been used too rarely, and for too brief a time.

Despite this warning, however, evidence has been marshaled and is reviewed in detail in the following chapters. It should be kept in mind that not only the clinical scientist or the health economist bears responsibility for the development and use of socioeconomic research.

> The results of any good and appropriately conducted socioeconomic evaluation are worthless, unless the health care organization ... is prepared to adopt the information and transform it into better actions in order to improve the performance of the system and the quality of the outcome. For this, the organizational design must be flexible to allow for modifications in existing behavior. (Horisberger, 1990, p. 163)



3 COST-OF-ILLNESS STUDIES OF ADDICTIONS

COST-OF-ILLNESS STUDIES make up one of the most basic units of socioeconomic analysis. Cost-of-illness studies are typically one of the first areas of concern when socioeconomic researchers begin to explore a new area in health care. This is not because cost-of-illness studies are the simplest or easiest to conduct. Quite the opposite: Cost-of-illness studies are extremely demanding, requiring the in-depth work of highly trained health economists and other experts.

Rather, cost-of-illness studies are often some of the first to emerge from socioeconomic research because they make the fewest assumptions about the level of technical development of a health care area and are ready to be deployed when little more is known about an illness than (1) its presence in the population, (2) its prevalence, and (3) some of its direct and indirect effects. Unlike cost-benefit, cost-effectiveness and cost-offset studies, all of which look at the absolute or comparative outcomes of applying a treatment to a problem, cost-of-illness studies can be conducted before any treatment is available. As Luce and Elixhauser (1990) explain:

> Cost of illness studies may be thought of as precursors to socioeconomic evaluations ... Rather than looking at the impact of treatments, cost of illness studies focus on the economic consequences of the medical conditions themselves. In essence, cost of illness studies illustrate the socioeconomic relevance of the disease or condition. (p. 39)

The information necessary to conduct a quality cost-of-illness study, however, is often very difficult to extract from an array of incomplete and alien information. Most of these data are collected for a different purpose altogether than for performing a cost-of-illness analysis; for instance, alcohol-related motor vehicle accidents are one of many costs of addictions, yet they are monitored for a host of reasons concerning police procedures, drinking-age legislation, auto safety regulations, and so on. Rarely is a cost-of-illness analysis in mind when alcohol-related crashes are monitored. The data may thus be poorly scaled, out-of-date, inappropriately sorted, and otherwise unwieldy for the health economist, making the use of these data as cost-of-illness indicators risky and inferential.

For instance, Harwood (1991) found that cost-of-illness estimates for drug abuse in the United States rose from around $10 billion in studies published between 1973 and 1975, to $16.4 billion in 1977, to $46.9 billion in 1980, to $58.3 billion in 1988. This was a nearly six-fold increase that was not justified by any inflationary or epidemiological trend. Rather, this escalation was in Harwood's view due to "... increased and improved knowledge about the nature of impacts of drug abuse on society and to differences in estimation methodology." (p. 48). Demands on the skill, creativity and discernment of the socioeconomic researcher are probably nowhere greater than in studies on cost-of-illness. Thus, cost-of-illness studies have the paradoxical property of being some of the first studies to emerge when an illness is identified, and among the last to come forth with any firmness and quality. It is for this reason that Chapter 3, *Cost-of-Illness Studies of Addictions,* relies on fewer sources than the succeeding chapters.

In the overall dynamics of socioeconomic analysis, cost-of-illness studies serve three general functions, as

Table 3-1

Use of Cost-of-Illness Studies

GENERAL EFFECT	MODE OF EFFECTS
Problem Recognition	COI analysis alerts policymakers and the public to the presence of a problem with strong economic consequences, thus helping to focus attention
Problem Prioritization	COI analysis, with results expressed in a common metric, enables policymakers to compare the relative economic "weights" of different problems, thus helping to inform debate when research and intervention resources are scarce
Socioeconomic Analysis	By estimating the economic and social impact of an illness, COI analysis can be fed into other socioeconomic arguments to suggest the savings which can be realized under different assumptions of treatment or prevention effectiveness

illustrated in Table 3-1. First, they help the public and its policymakers to realize that a problem exists, that it is of a measurable (and usually alarming) magnitude and that, therefore, it is a problem that must be taken into account in allocating resources. Cost-of-illness studies therefore play a role in focusing attention, in setting the stage for debate over resource allocation by introducing a new element in the form of a costly illness.

Second, cost-of-illness estimates of a particular problem can be compared to those of another problem, and the relative economic impacts of disparate problems can be identified. Cost-of-illness studies therefore inform and guide the policymaker, lending economic weight to one side of a complex argument. Frequently, the level of policy debate can be elevated in this way, by calling forth from advocates of treatments directed at low-cost problems justifications based on social, humanitarian or other nonutilitarian grounds.

Third, cost-of-illness results are useful in other forms of socioeconomic analysis directly tied to treatment impact, such as cost-benefit, cost-effectiveness and cost-offset analyses. It is usually reductions in some of the cost vectors identified and quantified in the cost-of-illness study that are the benefits, effects or offsets that are documented in these other study types. Cost-of-illness studies thus serve to prime later research with more direct clinical relevance.

When such later research data (bearing on cost-effectiveness, cost-benefit and cost-offsets) are available, however, cost-of-illness studies should never be reviewed except with reference to them.

> In allocating resources, the guiding principle should not be the costs of disease per se but which policies and levels of expenditure would produce the greatest savings to society. ... [Although some diseases are costly to society, additional expenditures on treatment or prevention will not necessarily be productive. First, we may not know how to treat a problem ... Furthermore, given what society already has spent on a problem or accomplished in terms of treatment, little productivity "on the margin" may be attributed to additional expenditures. (Sindelar, 1991, p.34)

These are matters for cost-benefit, cost-effectiveness and cost-offset analyses, which should be introduced along with cost-of-illness data into debate whenever a treatment technology has grown up in response to an illness with high associated costs. One reason for this is that the growth of a treatment or intervention program itself feeds back into cost-of-illness estimates, which may thereby become swollen when treatment is very expensive, when it is of poor quality and must be frequently repeated, and so on. The relationship between cost-of-illness and treatment for the illness is therefore circular, especially when addictions are the focus of cost-of-illness analysis:

> This circularity may be acute with regard to drugs. For example, the government spends substantial sums on controlling drug-related crime, such as law enforcement, the judicial system, and the prison system. The more the government spends on crime control related to drug use, the greater the calculated costs of drugs to society. This would imply then, according to the implications of the COI viewpoint, that greater dollar expenditures should flow to drug policies. (p. 35)

Cost-of-Illness Methodology

Luce and Elixhauser (1990) define the classic cost-of-illness study as a form of evaluation which computes the current economic impact of a disease, including the costs of treating the disease when such treatment is available. Ideally, all logical cost vectors are accounted for in the analysis, and in most cases costs are expressed in a common economic metric, though other illness outcomes (deaths, serious casualties that resist economic quantification) may also be part of the output. Cost-of-illness methods have been formalized in a standard methodology developed by the Public Health Service of the Department of Health and Human Services, to which most quality cost-of-illness studies closely conform.

Cost-of-illness studies have been published in the general area of mental health for the past 35 years (e.g., Fein, 1958). Though not typically given the importance or media attention of cost-of-illness studies of other high-profile illnesses, they appear particularly appropriate in the field of addictions research and treatment for a variety of reasons. Rice et al (1990) remark:

> Alcohol abuse, drug abuse, and mental illness (ADM) are major causes of widespread illness, disability, and premature death in the United States. The burden on society of these disorders encompasses the use of costly medical resources, significant losses of productivity, serious motor vehicle accidents, fire destruction, and devastating criminal activity resulting in property destruction, and incarceration. Victims of these disorders experience pain and suffering. They may be forced into economic dependence, homelessness, social isolation, unwanted job changes, loss of opportunities for promotion and education, and other undesired disruptions in life plans. Families and friends of victims may also be affected and their lives disrupted. (p. 1)

Rice et al (1990) also warn, though, that "The monetary burden on society of many of the serious consequences of alcohol, drug, and mental health disorders can be measured, although pain, suffering, and family disruption are not quantifiable," (p. 1). Cost-of-illness studies therefore highlight the gross economic dimensions of health problems such as alcoholism and other drug addictions, but they inevitably yield somewhat conservative measures of illness impact. Features of illnesses that sometimes have more immediacy and persuasive power - their subjective cost - may often not be measurable in economic terms at all.

Several different approaches have been tested to assign values to health, illnesses, and their outcomes for purposes of cost-of-illness research. One method, the *willingness-to-pay approach* (Schelling, 1968), finds a value for a health status equal to the amount that reasonable individuals are willing to pay to achieve that status (if the event is positive) or to avoid the status (if it is negative).

In this way, the cost of a particular case of an illness - a broken limb, for example, a diseased kidney, an anxiety attack, or any other health or psychiatric problem - can be derived by averaging across many survey respondents the amount that members of a social group would be willing to pay to avoid this health state or to have it remedied if remediation were possible. Then, the cost of that illness or negative health state to the larger social group can be estimated by multiplying the average amount that members would be willing to pay to avoid or remedy it by its prevalence in the population.

Based on empirical analyses of subjectively assigned values calculated in this way, willingness-to-pay studies can find consensual dollar values for health events ranging from the avoiding the common cold to preserving human life itself, an event most recently appraised at a value of from $1.0 million to $3.1 million per case, with a mean of $1.95 million (Miller, 1989).

Willingness-to-pay as a cost-of-illness methodology has, though, been extensively criticized for its subjectivity, circularity, exceeding difficulty of application (Robinson, 1986), for its variability depending on the affluence and value structures of survey respondents, and especially for its tendency to produce increasingly unlimited cost figures when applied to large population statistics. Willingness-to-pay would, because of the serious health implications of so many addictions, be a most misleading approach for cost-of-illness analyses in this area, something that will be avoided in this chapter.

For example, taking Miller's (1989) estimate of a willingness to pay $1.95 million to avoid a premature death and applying it to the 4,000 to 6,000 deaths attributed annually to illicit drug use, yields a cost of $7.9 billion to $11.7 billion for this drug-related mortality problem; applied to the 30,000 or so victims of lethal alcohol-related motor vehicle accidents, we reach $58.5 billion, to which is added $136.5 billion for the other 70,000 or so lives lost yearly to alcohol abuse; considering the 400,000 deaths caused each year by tobacco smoking, we see a mortality cost of $780 billion. Willingness-to-pay methods could thus be used to suggest a cost-of-illness for drug and alcohol addiction of nearly $1 trillion annually, considering only mortality costs, which may be a minority of those associated with the problem.

Further confusion would be added were we to continue in this vein and, as is often done with cost-of-illness estimates, use ours to indicate the amount of savings that can be expected from addictions treatment. Using the $1 trillion mortality cost as our outcome vector and ignoring completely the value of any other clinical improvement, the value of a treatment which reduces mortality by 50% across the board could be given as half a trillion dollars, the value of a treatment that reduces mortality by 25% (perhaps a reasonable expectation) could be given as a quarter of a trillion dollars, and so on. Since only mortality costs would be included in the calculation, these savings could be reported as conservative estimates.

By this route it would not be difficult to argue that addictions treatment which touches less than 1% of the population and is administered by an even smaller number of people has a monetary value, in terms of willingness-to-pay for the outcomes it produces, of 5% or more of the gross domestic product, a ridiculous conclusion. For these and other reasons, we know of no COI studies in the area of addictions that rely exclusively on willingness-to-pay data.

In contrast, the *human capital approach* (Rice, 1966) assigns a value to health events based strictly on their impact on economic productivity. Illnesses, recovery, remission and relapse are evaluated solely in terms of their implications for the individual's future earnings stream. Relying on readily available data, the human

capital study estimates direct (e.g., outlays) and indirect costs (e.g., resources and opportunities lost) for every health event.

Unfortunately, the human capital method is bound to depreciate the illnesses and health states of homemakers, the retired, the unskilled, and others with limited dollar valuations of their economic worth. It takes no cognizance of the "softer" cost elements and subjective worth of health events, something which the willingness-to-pay approach does take into account.

But, while being vulnerable to a long list of its own shortcomings and criticisms, the human capital approach is by far the most broadly applied method to estimate the costs of various illnesses, and is the only form in which cost-of-illness data on substance abuse is available.

COI Estimates

Though using 1985-based dollar accounting procedures, still the most thorough and best respected cost-of-illness analysis of alcohol and other drug problems is *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985*, published by researchers at the Institute for Health and Aging, UC San Francisco (Rice, Kelman, Miller & Dunmeyer, 1990).

Rice et al (1990) use a human capital technique. If the cost-of-illness study, as noted above, is one way by which to assess the seriousness of a problem, then the Rice et al (1990) study indeed demonstrates the seriousness of alcohol and other drug abuse from an economic point of view.

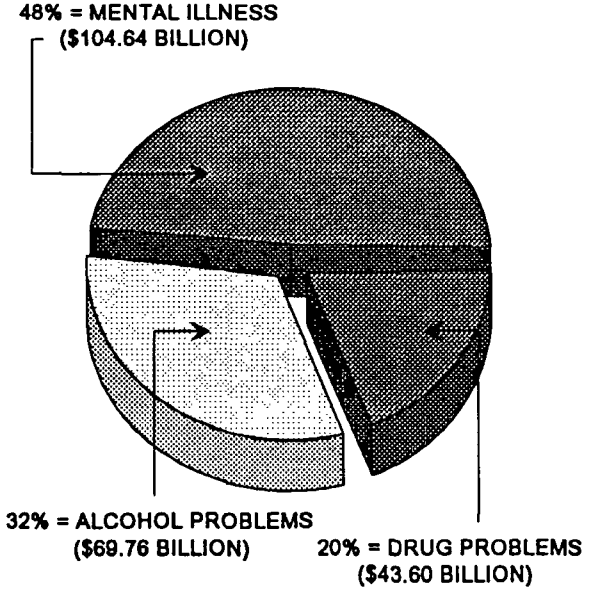
The goals of the researchers were:

> To measure as precisely as possible the economic costs to society of the ravages of [alcohol abuse, drug abuse and mental illness], three related behavioral disorders, by estimating the economic costs for 1985, the most recent year for which reliable data are available.
>
> To update previous cost estimates on the basis of comprehensive data sources and improved methodology.
>
> To develop an improved methodological approach ... [and]
>
> To conduct a review of the literature on the economic costs of illness, with emphasis on studies related to [alcohol abuse, drug abuse and mental illness], and to provide a current descriptive list of recent empirical and methodological research in this area. (p. 1)

Accordingly, Rice et al (1990) is a huge, book-length report with nine chapters and four appendices, only

Figure 3-1

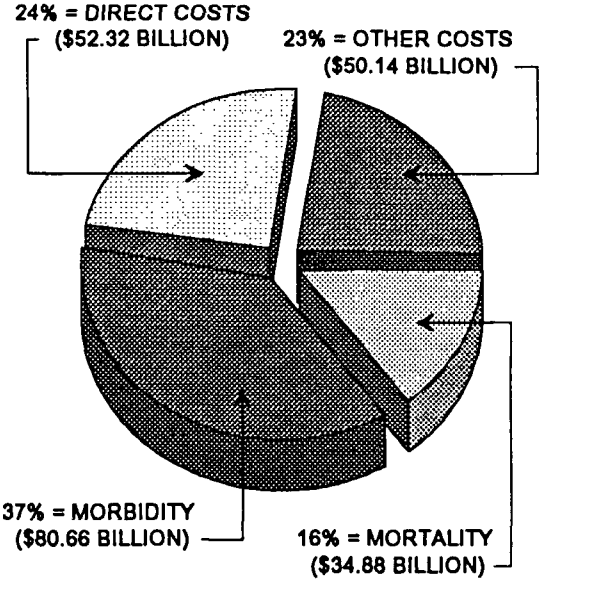
Costs of Alcohol Abuse, Drug Abuse, and Mental Illness by Diagnostic Category, 1985



Adapted from: Rice et al, 1990

Figure 3-2

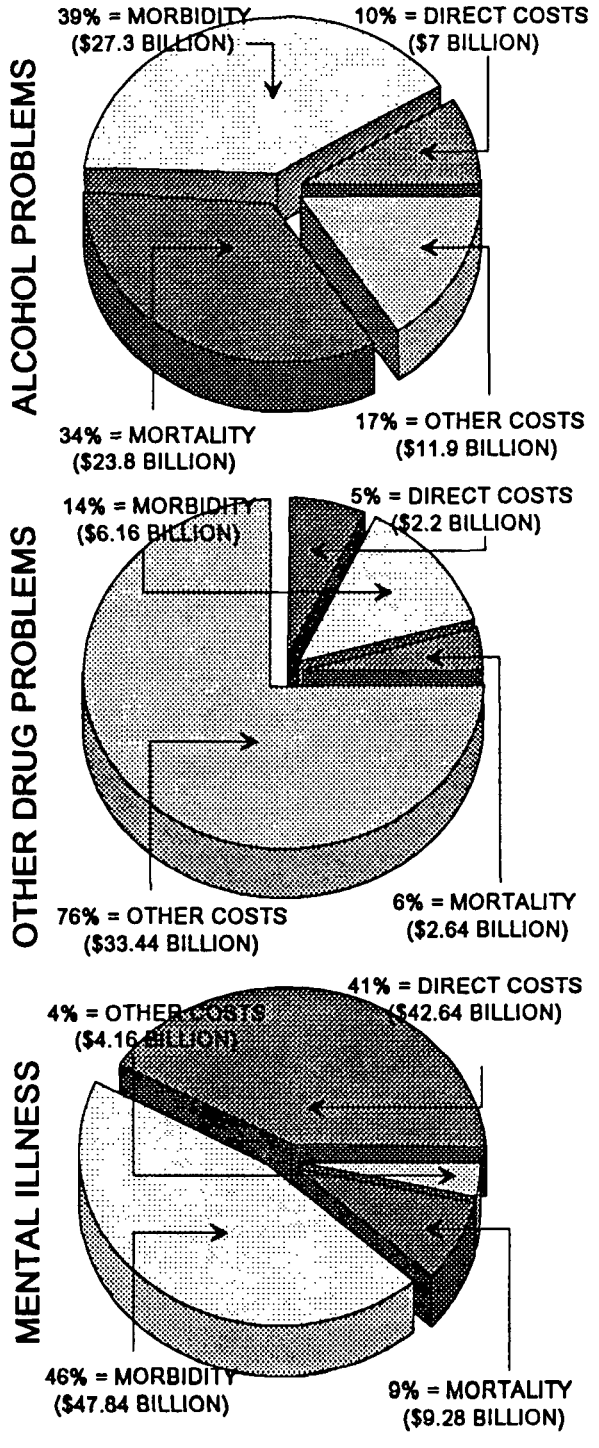
Costs of Alcohol Abuse, Drug Abuse, and Mental Illness by Cost Type, 1985



Adapted from: Rice et al, 1990

Figure 3-3

Cost Breakdown of Alcohol Abuse, Drug Abuse and Mental Illness by Type of Cost



Adapted from: Rice et al, 1990

some of which inform this Technical Appraisal. First, the report found that, in 1985, all alcohol, other drug problems and psychiatric disorders had a combined cost of $218 billion to the American economy. Remarkably, though alcohol and other drug addictions account for only a small proportion of the total diagnoses, Rice et al show that they account for a majority of the economic costs of all alcohol, drug and mental health disorders, about 52% (or $114 billion) in 1985 (Figure 3-1). In later analyses, they show that by 1988 the cost had risen to $144.1 billion. Assuming this level of cost remains stable, in 1993 inflation alone would push the cost for alcohol and drug problems to more than $160 billion.

Yet this would probably be a somewhat low estimate. All published estimates show a fairly steep increase over time when the latest figures are compared to earlier ones, as more becomes known about the distal effects of addictions. Rice et al are unusual in taking a fairly conservative tack, and are recommended here for that reason.

For instance, they contrast their findings with estimates released in 1980 by the Research Triangle Institute (RTI), and find in most respects that their total cost estimates are somewhat lower than RTI's after accounting for inflation and medical care cost expansion. Other estimates given by Rice, as well - costs deriving from special populations such as persons affected by AIDS or FAS, or the homeless - are modest. There is every reason, then, to suppose that Rice's figures for costs due to alcohol and other drug abuse in 1985 and projected for 1988, $114 and $144.1 billion, respectively, are "low-ball" estimates.

This is even more the case since other cost components of addiction - the continued deterioration of the crack-cocaine phenomenon, the spread of HIV infection due to intravenous drug use, the arrival each year of at least 500,000 seriously alcohol, nicotine and other drug-exposed infants with their phenomenally expensive intensive neonatal care costs, etc. - are not well reflected yet in any cost-of-illness study and will eventually be factored in. These and other cost vectors which are harder to track have caused some experts (Gardner, 1992; Kozel, 1986) to suggest a current cost of between $250 and $300 billion, total, for all substance use problems in the United States. Certainly, an estimate of the cost-of-illness for alcohol and other drug problems in the United States in 1993 that lies well into the upper half of the $150-200 billion range is justified by all findings, including Rice's conservative ones.

In breaking down their cost analysis by cost type, Rice et al showed that only about a quarter of the total cost of $218 billion in 1985 for all alcohol problems, drug

Table 3-2

Direct and Indirect Costs ($ billions) of Alcohol and Other Drug Problems

TYPE OF COST	TYPE OF SUBSTANCE ABUSE: ALCOHOL	DRUGS
Total Costs in 1985	$70.3	$44.1
Costs Due to Treatment in All Settings	6.3	1.9
Support Costs (Research, Training of Specialists, Program Administration, and Net Insurance)	0.5	0.2
Morbidity	27.4	8.5
Mortality	24	2.6
Other Direct	7.4	13.2
Other Indirect	3.1	19.2
Acquired Immune Deficiency Syndrome	-	1
Fetal Alcohol Syndrome/Effects	1.8	-

Source: Rice et al, 1990

problems, and other mental health problems (hereafter called "ADM problems") was in the form of *direct costs* or costs directly related to the treatment or support of persons with the disorders (Figure 3-2). About an equal amount was attributable to *other related costs* such as costs of crime, motor vehicle accidents, and social welfare activities. *Mortality costs*, or the loss of potential lifetime earnings by those who succumbed to death because of their illnesses, accounted for the smallest proportion, only 16%.

The largest proportion of cost, 37%, was due to *morbidity costs*, which are "... the value of goods and services not produced ..." because of illness, a reflection of "... the degree [to which alcohol, drug and other psychiatric illnesses] prevent or deter people from producing goods and services in the marketplace, in the public sector, or in their homes ..," (p. 17).

However, when viewed independently of one another as in Figure 3-3, important differences between alcohol, other drug, and mental health problems stand out. For instance, while direct costs (treatment resources, training and research, overhead for the mental health infrastructure, and so on) accounted for 41% of the costs due to mental health illnesses, direct costs accounted for a relatively insignificant proportion (10% and (5%) of the costs of alcohol and other drug addictions, respectively. In fact, of the total of $51 billion spent on direct costs for the treatment and treatment-related support activities for persons with ADM problems in 1985, less than 17% was spent on the treatment and treatment-support of alcohol and other drug abusers.

Figure 3-3 and Table 3-2 show another important finding of the report, one supported by numerous prior studies. In general, a disproportionate share (39% of the total) of the costs incident to alcohol abuse are due to morbidity, which can be loosely defined as a loss of functional capacity due to the effects of an illness state - for example, deterioration of the ability to earn income or care for a family. Nearly as large a share, 34%, is due to mortality, the 95,000 lives lost to alcohol-related causes in 1985. Of these, only about a fifth could be linked to alcohol as the main or sole cause. Most of these deaths were indirectly linked - suicides, accidents, etc. - but their total effect was devastating: Each victim's life was cut short, on the average, by more than 28 years, resulting in the loss of a quarter of a million dollars per death from the human

Table 3-3

Number and Causes of Deaths in 1985 Associated with Alcoholism

CAUSE OF DEATH	TOTAL	ALC-RELATED	% OF TOTAL
Alcohol Diagnosis (e.g., cirrhosis, poisoning, withdrawal, etc.))	17,611	17,611	100
Alcohol-Related Causes			
Malignant GI Neoplasms	41,165	15,883	38
Injuries and Accidents	92,132	34,863	38
Suicide, Homicide, Justified Deaths	49,276	12,157	25
Other Diseases Associated with or Aggravated by Alcoholism	131,132	14,254	11
TOTAL	331,316	94,768	29

Source: Rice et al, 1990

Table 3-4

Number and Causes of Deaths in 1985 Associated with Drug Abuse

CAUSE OF DEATH	NUMBER
Drug Psychoses	11
Drug Dependence	1,165
Nondependent Drug Abuse	524
Neonatal Drug Withdrawal	1
Accidental Drug Poisoning and Overdose	3,552
Other Adverse Drug Effects	33
Accidental or Purposeful Injury or Poisoning	832
TOTAL	6,118

Source: Rice et al, 1990

capital perspective favored by Rice and an even greater one from the sheerly humane point of view.

Smaller in number, but even larger in economic impact per case (average loss of $418, 857) are the 6,000 lives lost yearly to drug addiction as the direct cause. Altogether, alcohol and other drug abuse, not including tobacco use, cost about 100,886 American lives in 1985, accounting for about 4.8% of deaths that year. Mortality results for both alcohol and other drug abuse are given in Table 3-3 and 3-4.

Combine these data with other losses due to alcohol (destruction of property in motor vehicle crashes and fires, etc.) and we learn that more than 77% of the economic costs of alcohol abuse, $54.6 billion in 1985, are in the form of mortality, morbidity and property damage. The clear emphasis in the alcohol cost-of-illness data in Rice *et al* (1990) and elsewhere is on the loss of life, property and functional capacity due to drinking, a logical result given the confidence with which alcohol is linked to a variety of pathophysiological processes and to failure of judgment and impulse control.

This implies that cost savings from the treatment of alcoholism can be looked for in two places. The first is in the form of increased functional capacity as a result of successful treatment for alcoholism. This is likely to take the form of a cost-benefit finding, and cost-benefit studies showing increases in functional capacity and productivity on the job will be reviewed in Chapter 5, *Addictions Treatment in Workforce Populations.* There is another area, though, where cost savings can be expected on the basis of these cost-of-illness data. This is in the form of lowered health care costs if treatment for alcohol abuse is successful, and we will review a number of such cost-offset studies in Chapter 4, *Addictions Treatment in General Clinical Populations.* Cost-of-illness data showing the potential for such savings were assiduously examined in the Rice et al report.

As suggested by the high proportion of costs related to mortality and morbidity, health-related costs are the principal burden on society of alcohol abuse, accounting for nearly three-quarters of the total economic encumbrance. Rice *et al* (1990) show a charge for direct treatment in general medical centers of more than $3 billion, without accounting for the very large share of alcohol-related medical admissions that are not diagnosed or otherwise available to COI data coders. The National Institute on Alcohol Abuse and Alcoholism (1989) *Hospital Discharge Survey* found 594,234 discharges from medical centers in 1985 attributed to alcoholism as the primary condition, and an additional 516,000 attributable to alcoholism as a secondary illness - or more than 1 million total cases. In 1985, the total short-term hospital bill for alcohol problems came to more than $3 billion, and to more than $4.25 billion when the charges due to other drug problems were added.

Not just frequency of hospitalization for alcohol and drug problems as primary conditions, but length of stay for other medical problems, is another health care parameter adversely affected by alcohol and other drug problems that are present in a secondary or *comorbid* form. Depending on the primary admitting medical condition, a secondary diagnosis of alcohol or drug dependence can increase the average length of stay in a short-term medical unit by up to four days, thus locking up costly medical resources that could be better deployed elsewhere, or the cost saved entirely. In addition to these costs due to alcoholism, Rice et al find additional costs in 1985 as shown in Table 3-5. Basic and additional health care costs attributable to other drug problems are also found in this table.

It should be borne in mind throughout this discussion that, however well designed the cost study of health care outlays, all research on costs attributable to easily denied, socially undesirable, and perhaps not personally well understood behavior patterns is bound to underestimate true costs, perhaps by a wide margin. Attempts to tease out of the overall medical cost picture the portion due to alcohol and other drug abuse when these are not the main presenting complaints - when they are, rather, secondary or comorbid diagnoses - are typically not very successful. Cost-of-illness studies which factor in secondary or comorbid costs of alcohol and other drug abuse have even been discouraged, since (1) they veer from the conservative path of estimation that is preferred by cost-of-illness researchers, and (2) the proportion of hazard added by alcohol or other drug involvement to some disease or injuries is not very well understood.

Table 3-5

Costs of Treating ($ billions) Alcohol and Other Drug Problems in 1985

TYPE OF SUBSTANCE ABUSE

TYPE OF COST	*ALCOHOL*	*DRUGS*
Total	$6.8	$2.1
Medical Center	3	$1.1
Federal Providers	0.7	0.2
Municip. Psych. Hospitals	0.2	0.1
Private Psych. Hospitals	0.1	0.03
Specialty Hospitals	1.3	0.3
Nursing Homes	0.7	-
Office-based MD, PhD, etc.	0.3	0.1
Other Support Services	0.5	0.2

Source: Rice et al, 1990

Therefore, even a fairly broad literature on the covert presence of alcohol problems in a substantial proportion of the country's general medical service beds (many experts settle on figures of 20 to 25% as average for most hospitals) cannot be well accounted for, so far, in cost-of-illness studies, and it is likely that problems with other drugs, where they contributed to medical hospitalization, are similarly underrepresented.

Therefore, even Rice et al (1990), an otherwise valuable source, can be expected to underestimate the true costs to the economy, hidden and overt, of alcohol and drug abusers' utilization of health care resources. Also not well reflected in the cost-of-illness data are the costs for health care that is administered to non-abusers (typically, spouses and children of alcohol and other drug users) but that is nevertheless due to alcoholism and other drug dependence. These kinds of collateral health effects of addictions are just beginning to receive some attention, and necessarily represent another huge hidden cost burden of alcohol and other drug abuse.

If much of the cost-of-illness data on alcoholism concerns mortality, morbidity and other issues relevant to health care, cost-of-illness analysis of other drug addiction yields a different picture. Costs due to morbidity and mortality, 19.4% of the total, account for little more than a quarter, proportionately, of the burden they bear in the case of alcoholism. Instead, the clear emphasis in the data on other drugs is the cost due to drug-related phenomena ("Other Direct" and "Other Indirect" in Table 3-2).

This is not to say that significant medical care costs are not attributable to addiction to drugs other than alcohol: A recent NIDA study (Gfroerer, Adams & Moien, 1988) in which researchers were able to segregate discharge diagnosis for drug problems by drug of abuse and by age of patient found that, of the 263 million hospital discharges in the United States during the period 1979-1985, 0.8%, or about 2 million cases, showed evidence of non-alcohol drug problems. These were concentrated in young working-age males 25 to 34 years old. More than 700,000 cases were diagnosed as drug dependence (25% dependent on opiates, 14% on cannabis, 6% on cocaine and the remainder unspecified) and about 45% of the total 2 million were diagnosed as drug abusers, also distributed among opiates, cannabis, cocaine, and a large unspecified or polysubstance group. Thus, problems with drugs other than alcohol are indeed implicated to some extent in preventable illnesses and overuse of health care resources. However, two other elements of the drug abuse phenomenon appear more costly to society.

The first element is contained in the observation that nearly a third of the costs due to abuse of drugs other than alcohol are due to police activity and criminal justice system processing ($11.1 billion in 1985) and related elements such as legal defense fees, incarceration, drug interdiction, property destruction, costs to crime victims, and a myriad of others. Table 3-6 shows legal and other indirect costs associated with drug abuse, with alcohol figures also given for purposes of comparison. As seen there, the total criminal justice cost for drug problems is almost three times as large as for alcohol control; legal defense costs, incarceration costs, property damage, and so on, are all much higher for drugs than for alcohol, with the exception of alcohol-related fires and motor vehicle accidents.

The most significant cost vector, however - the largest element in the drug abuse data reviewed by Rice et al - is loss to the legitimate economy from drug abusers' *crime careers* ($14 billion), or their tendency to not participate in the legitimate economy in preference for marginal, illegal, or underground employment. Most of these crime career costs, it is believed, are contributed by users of heroin and/or cocaine Altogether,

Table 3-6

Legal and Indirect Costs ($ millions) Due to Alcohol and Other Drug Problems

TYPE OF SUBSTANCE ABUSE TYPE OF COST	ALCOHOL	OTHER DRUGS
Criminal Justice System		
Police Protection	$1,338	$5,810
Legal and Adjudication	274	1,108
State and Federal Prisons	884	2,130
Local Jails	1,238	460
Total CJS	3,734	9,508
Drug Traffic Control		
Prevention	-	175
Law Enforcement	-	1,380
Total Drug Traffic Control	-	1,555
Other Legal Costs		
Private Legal Defense	342	1,381
Property Destruction	175	759
Total Other Legal Costs	517	2,140
Other Direct Costs		
Motor Vehicle Accidents	2,584	-
Fire Destruction	457	-
Social Welfare Administration	88	6
Total Other Direct Costs	3,129	6
Indirect Costs		
Victims of Crime	465	842
Incarceration	2,701	4,434
Crime Careers	-	13,976
Total Indirect Costs	3,166	19,252
TOTAL	10,546	32,461

Source: Rice et al, 1990

crime-related costs to society due to drug abuse totaled in 1985 to more than $32.5 billion, an amount more than three times the crime-related costs of alcohol abuse ($10 billion) and nearly equal to three-quarters of the total social cost burden of drug problems other than alcohol. Even more than is true of alcoholism, a disproportionate share of these total costs attributed to drug abuse are contributed by the young and very young.

If the costs of alcohol abuse, then, are borne disproportionately by health problems and their effects on productivity and longevity, the costs of other drug addiction (not including nicotine) are borne in large amount by crime, by marginal utility of drug abusers to the legitimate economy, and by other elements of drug abuse's illicit quality. It is therefore possible to anticipate in these data the kinds of treatment cost-benefit and cost-offset studies to be reviewed later.

We will see there that while a good deal of evidence from alcoholism treatment studies can be marshaled to show positive returns on productivity, the most elegant and convincing studies demonstrate useful effects of alcoholism treatment on medical care utilization. In contrast, we can find no well done study showing positive effects of drug abuse treatment on medical care cost-offsets; instead, a powerful body of evidence has been developed to show a good rate of return to society in terms of lowered crime and social welfare costs. It is no coincidence that the outcome indicators preferred by drug abuse researchers, and those reviewed in detail in Chapter 6, *Addictions Treatment in CJS Populations and Narcotics Users*, bear on lower rates of crime and higher rates of gainful employment.

Two significant issues, however, have come even more to the fore since the data available to Rice et al (1990) were gathered and which can be expected to materially alter the view of cost-of-illness data, particularly in regard to abuse of drugs other than alcohol.

The first is the rapid escalation of HIV seropositivity in populations of addicts, their sexual partners and offspring, and the direct attribution of this spread to proximal drug-taking practices (e.g., needle-sharing) and effects (drug-induced toxic suppression of autoimmune function). HIV is, of course, an issue of urgent concern to a variety of decision-makers and cannot be much addressed here, except to indicate that HIV seropositivity, still hidden in most of the cost-of-illness data of the 1980's, is likely to become a major direct cost-of-illness vector in the 1990's.

Of total AIDS cases, about 20% are intravenous drug users, and high-risk health practices constellating around intravenous drug use must be viewed as one of the main transmission channels for the HIV virus. In a different study, Rice (Scitovsky & Rice, 1987) estimated that total direct and indirect costs for AIDS, about 20% of which could be attributed to intravenous drug abuse, would rise from $4.9 billion in 1985 to $66.5 billion in 1991, a more than 13-fold increase in only six years. Much of this cost is borne directly by the health care sector, especially as desperately ill individuals come more and more to depend on the public hospital for emergency management and even long-term care and hospice. Therefore, drug abuse treatment, especially treatment targeted at reduction of HIV risk behaviors (intravenous use, needle-sharing, unsafe sex practices) is bound to yield a very substantial new crop of medical care cost-offsets in the next few years.

The other cost-of-illness issue of more concern in recent years, one addressed more substantively in this Technical Appraisal, consists of complications to perinatal and pediatric health caused by drug and alcohol abuse by the parent. Estimates of the number of infants exposed to alcohol and other drugs each year vary, but a sense of the problem's scope is beginning to emerge. Data published by the Institute of Medicine (1990) indicate that between 350,000 and 625,000 infants are drug exposed each year. Cost-of-illness studies concerning fetal alcohol and drug effects are addressed in detail in Chapter 7, *Addictions Treatment*

Table 3-7

Descriptions and Representative Costs in 1988 of Alcohol and Other Drug Treatment Programs

TREATMENT MODALITY AND SETTING	*COST*
Alcohol Education Program	$150-350
Course of Social Detoxification	$150-500
Employee Assistance Counseling and Referral	$250-1000
Halfway-House or other Sheltered Living Program	$750-2000
Course of Treatment with a Medical or Other Mental Health Practitioner, Including Outpatient Detoxification	$1000-1500
Inpatient Medical Detoxification	$1500-3500
High Intensity (Partial Hospital) Outpatient Program	$2000-5000
Short-Term (14-28 day) Rehabilitation Program with Low-Intensity Aftercare	$5000-10000
Short-Term (14-28 day) Relapse Program with High-Intensity, Extended Aftercare	$8000-15000
Specialty Hospital Intermediate Program (1-6 Months Inpatient Care with Extended Aftercare and Sheltered Living Setting Post-Discharge)	$10000-25000
Long-Term (6-24 month) Rehabilitative Program or Therapeutic Community (with Custodial Care Capabilities)	$15000-30000
Medically Intensive Intermediate Rehabilitation (with Intensive Medical and Rehabilitative Care)	$15000-50000

Source: Wright, 1988

with Pregnant Women.

Costs of Treatment

In all of the data examined by Rice et al (1990) and others it is quite clear that a relatively modest portion of the costs of alcohol and other drug abuse borne by society are in the form of payments for treatment or prevention. While treatment and activities that support treatment account for more than 40% of the costs to society of most psychiatric disorders, they account for only 10% of the costs of alcoholism, and 5% of the costs of drug abuse. In 1985, $6.8 billion and $2.1 billion were spent directly on treatment for alcohol and other drug abuse respectively, an amount far out of proportion to their costs to society.

It would be quite difficult to argue in light of these figures that the treatment infrastructure of alcohol and drug treatment is "overbuilt" or even overutilized. In one recent study, O'Neill (1990) found that for the average managed care company in his survey of 473 HMOs, "... the total cost for chemical dependency treatment was approximately 60 cents per plan member per month," (p. 42). Altogether, alcohol and other drug treatment accounts for only 1.23 % of total HMO costs, and an even smaller proportion (between 1 and 4%, depending on the study) of the costs of other health insurers.

Expansions in coverage and in the availability of treatment does not have much effect on utilization of alcohol and drug treatment, which in most ways has an "inelastic" demand, or a demand for the service that is relatively unresponsive to price and supply. Thus, unlike many other benefits, especially other psychiatric benefits, few patients access insurance coverage for alcohol or other drug treatment. Hallan (1981) noted "The available data ... suggest ... that utilization of alcoholism treatment benefits is remarkably low, usually less than one-half of 1 percent," (p. 21), a figure that has proven fairly stable across a variety of studies where utilization - or what some program developers call the "penetration rate" - has been an object of study.

In a recent survey, MEDSTAT (1991) examined the health care claims of over 3 million employees from approximately 50 commercial insurance companies. They found that only one-third of one percent were admitted to inpatient addictions treatment in 1989. These inpatient claims accounted for only 3.4% of all inpatient admissions and 3.8% of all claims (compared, for example, to 10.6% for psychiatric claims). The average cost of addictions treatment was $7,676 for adults and $12,551 for adolescents.

Most significantly, only 21% of those patients who completed a 22-30 day treatment were readmitted to the hospital for any reason (including relapse) in the year following treatment. In comparison, 48% of those treated for seven days or less were readmitted within a year.

Thus, while psychiatric coverage often promotes a "woodwork effect," whereby new service candidates elect service when rules are eased or coverage is expanded, little additional utilization, particularly of inpatient services, is expected when coverage for addictions is expanded, and it has already been demonstrated that the baseline of utilization is comparatively low.

This quality of addictions treatment can be demonstrated empirically. In one study, Siegel, Haugland, Goodman and Wanderling (1984) compared the direct costs of care of alcoholic patients to costs of treating psychiatric patients in a large sample of 841 individuals, consisting of 325 alcoholics and 516 patients with psychiatric diagnoses. The costs for care of each patient over a two-year post-intake period were tracked, including both inpatient days and outpatient services.

The authors found that although alcoholics were the single largest diagnostic group in the cohort, 39% of the total, the costs of their care were only 22% of the total. Inpatient admissions in particular were much briefer for the alcoholics, averaging a total of 28 days during the two-year follow-up compared to 108 days for the other patients. "Thus alcoholics, who essentially reside in the community and who are the largest diagnostic subgroup among users of inpatient and outpatient services of the mental health system, do not overutilize the system in terms of services received or costs incurred," (p. 508).

Conclusions

Cost-of-illness data associated with alcohol and other drug abuse reveal very substantial costs to society in many forms. Alcoholism especially promotes high health care costs, but these are less for the direct care of alcoholism than for the symptomatic and often tertiary treatment of organ damage and traumatic injuries due to alcoholism and hazardous drinking practices.

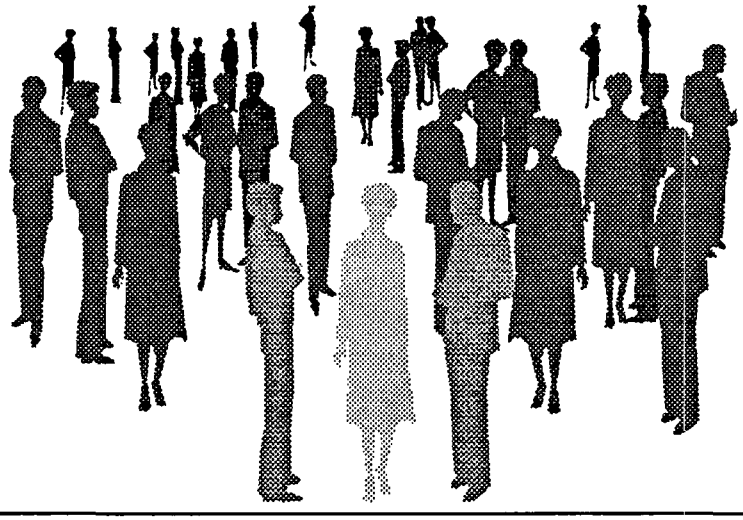
The absolute dimensions of the health care costs due to alcohol and other drugs are not known, because of the hidden or covert nature of these problems, but some estimate that as much as 15% of the national health care budget is spent for the treatment of conditions related to addictions, explicit or covert. In addition, an interesting new line of research on *collateral health care costs*, or the tendency of close family members of alcohol and other drug users to develop themselves physical problems - perhaps in reaction to the stress of living with an active addict - is examined in Chapter 4, and is another cost-of-illness factor that may be entered in future COI estimates.

Add to this the phenomenal health care cost implications of HIV transmission and effects of alcohol, nicotine and other drug exposure on developing fetuses, and swollen health care costs due to the pernicious effects of alcohol and other drug abuse must loom large in the current debate over health care reform. The effects of treatment for alcohol and drug abuse on these health care cost vectors is a prime focus of this Technical Appraisal, covered in detail in Chapters 4, 5, 6 and 7.

Other costs too, though, have been documented. Also implicated in alcohol abuse and other drug problems, are large morbidity costs or loss of productive capacity due to alcohol or other drug impairment. The single largest cost factor associated with alcohol abuse, and a significant factor as well in abuse of other drugs, comes in the form of impaired productive capacity - time out of work, accidents on the job, early retirements, waste of skills and experience, etc. - that so troubles American industry and its competitive position. These are costs that are explored in further detail in Chapter 5, *Addictions Treatment in Workforce Populations.*

Other significant costs appear most burdensome when drugs other than alcohol are considered. Especially in the case of heroin, cocaine and other narcotics, large numbers of youthful, healthy and otherwise promising individuals are regularly diverted from a path of productivity and into a marginal "crime career," that contributes nothing to the legitimate economy or social good, but rather has very significant costs in property theft, criminal violence, maintenance of the legal control apparatus, and other elements. In fact, about three-quarters of the total cost of drug abuse, not including alcohol, is in the form of these "other direct" costs, mostly the effects of the crime career.

Surprisingly, despite these huge medical and morbidity costs in general clinical populations and workforce groups and among pregnant women, and the large social costs and crime career losses among narcotics users, very few resources are actually targeted at the treatment of alcoholism (rather than of the liver disease that is caused by alcoholism), or of drug abuse (rather than of the urban crime problem it generates). These are issues that, in these difficult economic circumstances, only firm evidence bearing on cost-benefits, cost-effectiveness, and cost-offsets with general clinical populations, workforce populations, criminal justice populations, and pregnant women, can address.



4 ADDICTIONS TREATMENT IN GENERAL CLINICAL POPULATIONS

GENERAL CLINICAL POPULATIONS include both Medicaid and Medicare, Blue Cross / Blue Shield, and private insurance eligibles. Members of these groups differ in financial control and accountability for their substance abuse treatment. They show as well substantial differences in some demographic characteristics. Their avenues of access to most treatment, though, and the contingencies under which they seek treatment, are sufficiently similar that they are treated here as they tend to be in the clinical setting, as common members of a general clinical population. Obviously, many members of the general clinical population are employed, and so overlap substantially with the workforce population studied in Chapter 5. Yet, even when they are employed, or are studied because of their membership in an insurance plan available through their place of work, it is their health care utilization as part of a general population sample, rather than their work performance, that is of interest to researchers. Many additional members of the general clinical population seek treatment as dependents of employed and insured workers, and of course the larger general clinical population includes the economically disadvantaged who are neither employed nor insured, but seek treatment through the public mental health and addictions treatment sector.

For purposes of socioeconomic evaluation, general clinical populations differ from the other groups reviewed in this Technical Appraisal - workforce populations, narcotics users, criminal justice populations, and pregnant women - in many important respects. Cost-benefit ratios, for instance, may be harder to calculate in general clinical populations, since these patients are not being tracked for treatment-related drops in criminal activity and its associated costs as is usually true of studies of criminally-involved narcotics users, nor for increases in productivity, as is true in studies of workforce populations. There are then, in some ways, fewer sources of data to search for evidence on the socioeconomic effectiveness of addictions treatment in general clinical populations, and this may be a limitation of this literature.

On the other hand, use of medical resources, rather than of criminal justice resources or of vocational resources that would be better devoted to other workers, is a principal interest in research with general clinical populations. So, it is here that budget analysts and policy planners are likely to look for the cost-offset analyses that will justify, as part of the healthcare reform movement, continued outlay of treatment dollars for care of the addictions. Though cost-benefit analysis may be an underdeveloped component of the socioeconomic literature on general clinical populations, we will find that cost-offset analysis is quite well developed, and it is here that people with the power to make real differences are likely to look when healthcare budgets, rather than drug control budgets or corporate development plans, are on the table.

In a different vein, socioeconomic evaluations of addictions treatment in general clinical populations typically focus, almost exclusively, on problems with alcohol, while other drug problems are represented in the literatures on narcotics users and, in an incomplete way, in the still nascent literature on pregnant women. It is possible that the applicability of findings reviewed here on alcoholism - which are based, after all, on treatment for the abuse of a highly accessible, licit, socially approved and culturally significant substance - to other

drug problems may be only a matter of conjecture. On the other hand, there are some lines of connection of work on alcohol problems in general clinical populations to other literatures. Alcohol can be itself the focus of criminal complaints and of interventions carried out within the criminal justice system, such as drunken-driver intervention and court-mandated referrals in cases of alcohol-related violence; by the same token, many patients with mixed drug problems who are criminally involved now seek treatment in traditionally alcohol-focused settings; and substitutive alcohol use is frequently a focus of studies on narcotics users; some evaluations of workforce programs focus on both alcohol and other drug abuse, and so on.

There is, in short, significantly more overlap in the actual case material worked with by researchers than is reflected in the reports they produce. To some extent, divisions in the literature between general clinical populations, narcotics users, and workforce populations, are forced. It will not be surprising to see socioeconomic evaluations in future focus broadly, on more drugs of abuse and on more cost and benefit vectors, in more kinds of cases than has been characteristic of the field so far.

Other changes, these taking place at the clinical level, are likely to occur which are bound to change the kinds of questions pursued by socioeconomists. Cost-effectiveness - with its important bearings on availability of treatment, its attractiveness to third-party reimbursers, and the place of prestige for addictions treatment within the larger health care community - is likely to gain ground as both a research area and venue for professional debate. Other issues that are anticipated are addressed below.

Below, important socioeconomic analyses of these and other issues concerning the treatment of alcohol and other drug abuse in the general clinical population are presented. Unfortunately, there are a number of problems with much of this literature (Holder & Hallan, 1986).

In many instances, only small numbers of patients participated as subjects in even influential studies, making generalization of their results difficult. Many studies lack appropriate comparison groups. Others present results taken during only a brief window of time immediately before and after treatment, a characteristic especially of older studies that may overestimate the impact of addictions treatment when patient functioning is at its nadir just prior to treatment, and at its maximum for a brief period of time just after the patient is discharged.

Still other studies have had to rely for logistical reasons only on surrogate measures of impact such as reduced sick days or sickness and accident benefits, rather than on direct measures of utilization and cost. We have selected for review studies of high quality, but cover as well those that are well known in the field, or that use unusual techniques.

It should again be mentioned that, in historical terms, socioeconomic evaluation of addictions treatment is new and the field, as of this writing, is incomplete. With few exceptions, socioeconomic findings on the treatment of general clinical populations, based principally on alcoholism treatment, can only with great care be generalized to other drug problems. However, some transfer of findings, as there has been of clinical technique, is possible.

Cost-Benefit Studies

Among socioeconomic analyses of addictions treatment in general clinical populations, cost-benefit studies are underrepresented. Cost-benefit analyses are prominent in studies of addictions treatment in workforce populations (Chapter 5), and are also well represented in studies of criminal justice groups (Chapter 6), but in general clinical populations they are much more limited in number for the reasons explained above. Also in general clinical populations, they pay little respect to problems with drugs other than alcohol.

Cicchinelli, Binner & Halpern (1978)

One of the earliest cost-benefit studies to appear in the literature on general clinical populations involved the application to community-financed alcoholism treatment of a special, very limited type of cost-benefit analysis called *output-value analysis* (Cicchinelli, Binner & Halpern, 1978). As used by the researchers, output value analysis is a form of cost-benefit analysis limited in that "... only the discharged patient is considered in estimating the benefits of a program, and only direct treatment costs are considered in estimating costs of a program. Other costs or benefits to society, the patient, or family and friends are not considered within this simplified framework," (p. 435). Cicchinelli et al (1978) should therefore be understood as quite limited in scope. Many direct costs and benefits and nearly all indirect costs are explicitly excluded from OVA at the outset.

There are at the same time, though, some significant attractions of the Cicchinelli study, not the least of which was its early appearance at a time when socioeconomic evaluations of addictions treatment were rarely contemplated, or even thought really necessary. The sample size was also quite large and the research

included females. The authors worked with the records of 2,299 male and female patients admitted to the Fort Logan Mental Health Center in Colorado.

Another very important aspect of the Cicchinelli study is its ability to compare the benefits of dollar outlays for addictions treatment to dollar outlays for the treatment of major mental illnesses. The researchers had unusual access to cost-benefit data from adult psychiatric programs in the Fort Logan system, making this kind of direct comparison possible. The authors estimated the benefits of each program - addictions treatment vs. adult psychiatry - by estimating the enhanced economic productivity of patients that could be attributed to the treatment they'd received.

To carry out this design, the authors measured outcome on a response-to-treatment dimension, a variable created by combining a 1-4 scale of impairment at admission with a 1-5 scale of response-to-treatment for each patient, ranging from marked improvement to clinical deterioration. In this way, a unique value for the clinical outcome, or response-to-treatment, could be calculated for each patient. Thus, clinical deterioration during treatment in a patient who was only slightly impaired at admission would have a negative implication for the program's output-value. On the other hand, marked clinical improvement observed in a patient who was severely impaired at intake would be given the maximum output-value. This unique approach proved useful to Cicchinelli's study of the relative efficiency of treating patients at differing levels of illness severity at intake. Predictably, they found that the efficiency of the program - the average output-value or response-to-treatment - tended to decline with the severity of the problem.

This is not an unusual finding in any area of health care, where the most ill 20% of many patient groups absorb 80% of the clinical resources and still respond poorly, if at all. This is a finding that should be viewed in humane terms, larger than merely economic ones.

Within the stated limitations of the Cicchinelli study and the kinds of cost and outcome data evaluated, the results are impressive. Overall, the authors found a return of $9.69 for each $1.00 spent on treatment. "Over the years studied, the program returned approximately $8 to $12 in value for every dollar invested in the program," (p. 441).

Significantly, the authors found that this ratio compared very favorably to the $3/1 ratio observed in some adult psychiatry programs. They also noted that the superior ratio for alcoholism treatment could be due to the lower average cost of alcoholism treatment, and to the higher estimated economic potential of alcoholic patients. In short, Cicchinelli et al (1978) indicated that alcoholism treatment has a sound financial payoff even separate from reductions in later health care costs, but as a mechanism to improve the economic viability of the individual.

Rundell & Paredes (1979)

Another of the earliest and most intriguing cost-benefit analyses to reach the literature was reported by Rundell and Paredes (1979). These researchers conducted a cost-benefit analysis of the treatment in the mid-1970's of 3,034 individuals seen at state-monitored alcoholism programs in Oklahoma.

These programs operated under state contracts with arrangements to bill the state on a fee-for-service basis for treatment activities, allowing Rundell and Paredes to calculate with considerable accuracy the cost of services by simply reviewing the fee-for-service records sent in to the state health department by participating service providers. The researchers were also able to estimate, on an actuarial basis, a number of benefit vectors, including subsequent taxable earnings for the patients, costs attributable to alcohol-related motor vehicle accidents, and other crime and legal costs, with post-treatment figures being available, in many cases, for a total of 18 months.

The large sample, the diversity of programs and treatments represented, and the array of cost and benefit vectors examined, are strong points of Rundell and Paredes. The report, though, gives very little detail regarding the means by which these benefit vectors were calculated, and some clients can be expected to have received additional medical and perhaps mental health services in other settings, so that total treatment costs may be underestimated. Also, while the researchers did attempt to gather data on a variety of outcome (benefit) dimensions, they were not able to access future medical care cost offsets, collateral benefits experienced by families, and so on, so that total treatment benefits may be underestimated as well.

A comparison group was available, consisting of those patients who contacted the system of treatment sites but then received less than $14 in care. There are a number of reasons for suspecting that this comparison group differed from the experimental group (partial or full treatment) in many ways, but fortunately the authors used this comparison's group's results as a correction factor for the cost-benefit ratio experienced by the treated group.

To apply this correction factor, the authors generated their main findings by subtracting the costs of treatment for the treated group from the value of the benefits, defined before as subsequent earnings, reduced costs for motor vehicle accidents, for other crime and legal affairs. This is the classic cost-benefit approach. The authors then corrected their results by subtracting the benefits derived by the untreated group from those derived by the treated group, as an attempt to remove

from the cost-benefit ratio benefits that could not be ascribed to treatment, but rather to maturation, spontaneous improvement, or other history effects.
The final result suggested that, for every $1.00 invested by the State of Oklahoma in its treatment efforts, $1.98 was earned back. There was, for example, an increase in earnings of about $1,130 per client per year, averaged across 682 clients with 18-month follow-ups. The authors found, however, that very little additional savings could be attributed to treatment costs in excess of about $300, which purchased "about 3 weeks of intermediate care with daily group therapy." (p. 329).

This is in direct contrast to main findings with narcotics users and criminal justice populations, which have shown with some consistency just the opposite effect: Treatment-derived benefits tend not to be observed in narcotics users prior to the receipt of a substantial "dose" of treatment, often three months, six months, or more. However, the findings of Rundell and Paredes were overall quite positive, though somewhat less so than a much larger study, reviewed next.

The JWK Study of NIAAA Alcoholism Treatment Centers (1976)

In the mid 1970's, the JWK corporation received a contract to perform an ambitious cost-benefit analysis of the treatment of more than 4,700 individuals who received treatment for alcoholism through the federally-sponsored system of Alcoholism Treatment Centers or ATCs. During the early 1970's the National Institute on Alcohol Abuse and Alcoholism (NIAAA) was heavily involved in direct service work, using the nearly national system of ATCs to develop services and train researchers and service personnel. Research feedback from this arrangement was possible, since patients treated at these ATCs could serve as research subjects to address treatment research questions.

The JWK study examined the outcome of the treatment of a group of 4,777 individuals who entered any of 41 NIAAA-sponsored ATCs in 26 states in 1974. These advantages of size and geographic dispersion are typically only possible in studies using federally owned or sponsored clinical services or health care databases. The JWK researchers also designed elegant methods for showing the costs and benefits of alcoholism treatment at several "levels," a method for developing data not usually encountered in cost-benefit analysis.

These levels include: (1) the national level (costs of treatment in federal tax dollars, and benefits in reduced tax expenditures that can be expected as the result of treatment), (2) the community level (local concessions and in-kind contributions to the clinical service matched against anticipated benefits to the community), and (3) the individual level (out-of-pocket expenses, time out of work and other opportunity costs of receiving treatment, balanced against increases in earnings and other benefits). This multilevel mode of analysis is unique in the literature, and assists policymakers at different levels to assess the possible benefits of addictions treatment which they, in particular, can expect.

There are many problems with this study. The lack of a comparison group is troubling. The follow-up period did not allow for a full recruitment of potential benefits. Subjects were almost all male. Many of the means used to calculate estimates are not well explicated in the report. However, the sample size is very large, the multilevel analysis of results is an important refinement, and the status of this ambitious study as one of the first socioeconomic studies of its scale and type is worthy of respect.

With all its flaws, the results of the study are impressive. At the national level, the researchers found a $2.96/$1 benefit-to-cost ratio, most of this in reduced costs for subsequent hospitalization in federally-funded facilities.

Significantly, the costs experienced by communities were very low, since most treatment burden was borne by NIAAA, but many of the benefits of treatment - in reduced motor vehicle accidents, criminal justice activity and so on - accrued at the community level, so that the cost-benefit ratio for the community was very large: The researchers estimated that communities could expect $11.46 in savings for every $1.00 spent on treatment or the support of treatment activities.

At the individual level of analysis, the ratio, while not as attractive, was still very substantial: Fewer hospitalizations, less cost of alcohol consumption, increased time on the job and resulting earnings, reduced criminal justice involvement and motor vehicle accidents, etc., combined to yield a $6.21 payoff for every $1.00 of expense borne by the individual. Some collateral effects were also noted, including a change in welfare dependency of 410 families at pre-treatment, to only 162 families at the six-month follow-up.

Summing up their findings, the researchers noted:

> In theory, the major part of the earnings increase resulting from alcoholism treatment occurs during a long period of time following treatment. By the time he seeks treatment, the typical alcoholic has developed a pattern of living which involves a growing productivity deficit relative to the norm for his earnings group. The beneficial results of successful treatment enable the client to control the alcoholic impairment which has brought on this productivity deficit. The client's earning deficit is not eliminated immediately, instead, his productivity and earnings begin a long-term upward movement. This growth trend will generally continue, diminishing and eventually removing his earnings deficit, allowing the person to regain the

> earnings norm for his age-sex-education group. (Sec. II, p. 18)

This argument is persuasive, of course, to the extent that alcoholism treatment and, by extension, treatment for other drug problems as well, has effects that are significant and especially *enduring*, or that have additive effects across the treatment career.

Saxe, Dougherty, Esty & Fine (1983)

Much of the literature published up until the time of the studies just reviewed was surveyed by Saxe and colleagues in 1983 as Case Study #22 in a much larger program of cost-benefit and cost-effectiveness analysis of American medical care, under contract to the Office of Technology Assessment (OTA) of the U.S. Congress. This fine overview is often referred to as the "OTA Study" or the "Saxe Study," though it is in fact not a study at all but rather a literature review with a strong section on cost-benefit analysis, probably the most incisive and detailed review of its kind published to date.

Altogether, Saxe et al (1983) reviewed six quality studies on the cost-benefit and cost-effectiveness of alcoholism treatment. Several of these, however, were reviewed earlier by Jones and Vischi (1979, see below), others are cost-offset studies of alcoholism treatment in general clinical populations, and still others are worksite-based studies, and so are reviewed in Chapter 5. The conclusions of this broadly based, if empirically limited, review, however, are worth studying as a summary for this section and introduction to the next:

> There is some evidence to support the hypothesis that alcoholism treatment is cost-beneficial. The benefits of alcoholism treatment, even if they fall short of what may be claimed, seem to be in excess of the costs of providing such treatment. ... (p. 66).

Cost-Effectiveness Studies

As outlined in this review, although treatment has, in the last 20 years, demonstrated itself to be effective and cost-beneficial, cost-effectiveness research has been methodologically difficult to conduct (see Chapter 2). Recent advances in patient assessment and treatment matching promises better CEAs in the future. However, ethical issues continue to complicate this type of analysis.

The first major review of the effectiveness literature with general clinical populations was published in 1942 by Voegtlin and Lemere (1942), scholars who examined more than 100 published reports that appeared between 1909 and 1940. Disappointingly, none of the treatments offered in those days to alcoholics in the general clinical population appeared effective under the authors' scrutiny. Over the next decades, however, as the service delivery sector continued to expand, as treatments proliferated and clinical outcome research was boosted by NIAAA in the early 1970's, more encouraging results appeared.

Soon, other major reviews, including those of Emrick (1974, 1975), Baekeland, Lundwall and Kissin (1975), Costello (1975, 1977), Lettierie et al (1985), Miller and Hester (1986), Nathan and Skinstad (1987), NIAAA (1987), the Institute of Medicine (1989), and still others were to appear. While some ambiguities and uncertainties continued to nag, most recent sources have found that, at the minimum, *some treatments* are effective for *some patients* under *some conditions,* and the actual state of clinical efficacy may be somewhat more encouraging than that.

In fact, that most typically administered treatments provide measurable benefits of some stability to a majority of their patients is a conclusion with which most reviewers would agree. Nonetheless,

> There are continuing policy discussions concerning the need and/or value of health insurance benefits for alcoholism treatment. This discussion can be aided by more objective analysis of the effectiveness of treatment and the cost of such treatment. The results of such analysis are unlikely either to abolish all alcoholism treatment as non-cost beneficial or to sanction all such treatment as cost-beneficial. Rather, specific modalities for alcoholism treatment can be compared on the basis of their effectiveness and the costs involved in providing the treatment. Despite the obvious need for such a policy analysis, to date it has not been done. (Holder et al, 1991, p. 517)

Holder, Longabaugh, Miller & Rubonis (1991)

"A first approximation" of the cost-effectiveness of alcoholism treatment in the general clinical population is contained in the document just excerpted, a review of the costs, typical applications, appropriate settings for, and both negative and positive empirical findings for 33 tested clinical treatments for alcohol problems, some of which are applied as well to the treatment of other drug problems. This is one of the most complex and informative studies to appear in the socioeconomic literature on addictions treatment. As the authors remark at the outset:

> The goal of this study is limited to addressing questions of cost and effectiveness by reviewing the best available information for a determination of whether the variety of alcoholism treatment modalities are differentially effective, and what the expected costs are for each modality. ... [This] requires the use and synthesis of data on treatment effectiveness, estimated treatment cost and recommended treatment providers, settings and intensities ... We expect that the contribution of our effort will be to provide an initial step in which cost and effects research are joined for the first time to establish a base upon which future analysis can

Table 4-1

Alcoholism Treatments Classified by Cost and Effectiveness

EFFECT \ COST	MINIMAL ($0-99)	LOW ($100-199)	MED-LOW ($200-599)	M-HIGH ($600-999)	HIGH (≥ $1,000)
Good Evidence	Brief Motivat'l Counseling	Self-Control; Stress-Mgmt	Social Skills; Community Reinforce't; Behav'l Mar'l Ther.		
Fair Evidence		Behavior Contracting	Aversion; Covert Sensitiz'n; Antidepressant Med'n	Antabuse	
Indeterminate Evidence			Marital Ther.; Cognitive Ther.; Lithium	Hypnosis	
No Evidence		Educ'l Ther.	Confront'n; Electrical Aversion; Video Self-Confront'n; Group Ther.	Antianxiety Med'n; Psychedelics; Metronidazole; General Counseling	Nausea Aversion; Residential Milieu; Psychodynamic Ther.
Insufficient Evidence	Alcoholics Anonymous		Apnea Aversion	Calcium Carbimide; Antipsychotic Med'n; Acupuncture; Halfway House	Minnesota Residential Programs

Source: Holder et al, 1991

build. (p. 518)

The authors first described 33 specific treatment modalities and self-change vehicles, representing 21 general categories of activity, including acupuncture, Alcoholics Anonymous, antidipsotropic medication (e.g., "Antabuse"), aversion therapy, behavior contracting, brief motivational counseling, cognitive therapy, community reinforcement, confrontational interventions, directive and supportive counseling, educational lectures and films, group psychotherapy, hypnosis, marital therapy, psychodynamic psychotherapy, psychotropic medication, residential milieu therapy, self-control training, social skills training, stress-management training, and videotape self-confrontation. Rules of evidence for evaluating their effectiveness were carefully specified.

The authors then "costed out" representative regimes of each treatment and summarized the evidence bearing on their effectiveness, weighting this evidence for quantity and quality and finally classifying each treatment as having good evidence of effectiveness, fair evidence, indeterminate, insufficient or no evidence. The findings are summarized in Table 4-1.

The reader should bear in mind that while the cost estimates for all treatments appear reliable, insufficiency of evidence for good effect should not be interpreted as "no evidence," or as evidence contravening these treatments' effectiveness. Those treatments classified by the authors as lying in the "no evidence of effectiveness" category may indeed be poor clinical bets. Those in the "insufficient evidence" category, on the other hand, such as Alcoholics Anonymous, may have discouraged research, or may simply not have been well tested yet.

Summarizing, Holder et al noted and Table 4-1 shows a generally negative relationship between the cost of a treatment and the evidence for its effectiveness.

The conclusions of this "first approximation" of the cost-effectiveness of various treatments for alcoholism are particularly persuasive, given the authors' care in appealing to evidence not just on treatment effectiveness as others have done, but on cost-effectiveness. Yet they were aware of the limitations of much of the research they reviewed. Many designs, for instance, used subject selection criteria that injected a bias toward less severe cases that would be more likely to benefit from brief treatments or low levels of care, and some of the more costly alcoholism treatments simply had not yielded a body of evaluation literature that would permit a firm conclusion about their cost-effectiveness. Thus,

> As a first step in developing cost/effectiveness estimates, we do not propose that major treatment planning or funding decisions be based on this single study. Our study is to stimulate the interest of other researchers in conducting the types of studies need to settle cost/effectiveness analyses. (p. 533)

HAYASHIDA ET AL (1991)

Another treatment measure that has been subjected to cost-effectiveness analysis is detoxification, which is one of the most frequently utilized initial treatment regimens for alcohol and narcotic addicts beginning the treatment continuum. Though most commonly performed on an inpatient unit or with 24-hour observation in a "social detoxification" setting in order to guard against the medical emergencies that sometimes accompany withdrawal, experimentation with ambulatory or outpatient detoxification began in the 1970's (e.g., Feldman et al, 1975) with encouraging results, at least for the 90% or so of patients without serious withdrawal histories. The Hayashida study is a first look at the comparative costs and effectiveness of inpatient vs. outpatient detoxification.

Patients were male veterans, recruited from those applying for detoxification services to the Philadelphia Veterans Administration Medical Center in 1985-1987. These men, with mild to moderate withdrawal, were randomly assigned to either the inpatient or outpatient detoxification condition, and were followed for six months thereafter. Results strongly support the superior cost-effectiveness of outpatient vs. inpatient detoxification for many patients. The exclusion of severely addicted patients from the study, though, because of the potential hazards of some alcohol withdrawal syndromes and the need for close medical supervision in such cases, should be borne in mind.

Though more patients (95%) completed inpatient detoxification (72% completed the outpatient program), no differences in subsequent enrollment of the subjects in long-term rehabilitation, inpatient rehabilitation, or outpatient treatment were found. Also, though a higher proportion of inpatients (81%) remained sober for the first month follow-up (compared to 66% of outpatients), these differences disappeared at six months.

The only striking differences between the two programs for patients with mild to moderate withdrawal were in terms the greater proportion of patients who completed inpatient compared to outpatient treatment. This 23% difference was viewed as "highly significant" by Hayashida (page 361) and may well have distorted the results particularly if the dropouts were the more severely ill. The other differences were in terms of opportunity cost to the patients - 6.5 days for outpatient detoxification, during which they could pursue many normal activities, compared to 9.2 days for inpatient care, during which the activity of patients was completely restricted - and dollar outlay to provide the service - $175-388 for outpatient detoxification, compared to $3,319-3,665 for the inpatient program.

McCrady et al (1986)

Another important report, and one of the few in the literature reviewed in this Technical Appraisal to use a randomized clinical trial design, is *Cost Effectiveness of Alcoholism Treatment in Partial Hospital versus Inpatient Setting After Brief Inpatient Treatment: 12-Month Outcomes* (McCrady et al, 1986). This was one of several reports by this group to focus on the effectiveness and cost-effectiveness of what was at that time an innovative setting for addictions treatment, the partial hospital.

Though the concept has since become more familiar under the rubric of "intensive outpatient treatment," the partial hospital program as a level of care for the treatment of addictions, and as applied by the McCrady team, grew out of the inpatient treatment tradition, as a "... cost-effective alternative to inpatient treatment ... [which is] less restrictive than inpatient treatment, allowing patients to maintain some job and community responsibilities," (p. 708)

In a previous report (Longabaugh et al, 1983), the authors had reported on the outcome of a randomized clinical trial in which a large group of patients, after being briefly detoxified and stabilized on an inpatient basis, were then assigned to either (1) continued stay on the inpatient treatment units of a private psychiatric hospital in Providence, Rhode Island, or (2) treatment in a partial hospital setting at the same facility. In the partial hospital, patients received cognitive-behavioral treatment for alcohol problems during a six and a-half hour treatment day Monday through Friday, with stays at home overnight and on weekends. The 1983 report found no differences between the groups at six months posttreatment on measures of drinking, psychological and social functioning. There was a one-third reduction in treatment costs in the partial hospital setting, resulting in a more cost-effective profile for that setting as the treatment mode for these patients. In the 1986 report, 12-month outcomes are reported, and more detailed cost-effectiveness results are presented, making this one of the cleanest and most methodologically sound study designs in the socioeconomic literature on general clinical populations.

There are some problems with the study that must be noted. Most significantly, the study did not meet one of the requirements of a CEA study. Here, all patients were treated in the same program and shared the same therapy for 6 1/2 hours a day. Members of the partial hospitalization group went home at night. In addition, the patient population was limited in that they were a "middle-class and socially stable" group of alcoholics. The sample did not include more severe cases, the unemployed, the polydrug addicted or those having a dual diagnosis. Also in this study, subjects needed to be recruited a second time in order to participate in this longer-term follow-up, since the original design called only for six-month follow-up data, and subjects' informed consents had expired by the time of the new wave of data collection. For this reason, 30.7% of partial hospital patients and 38.3% of inpatients could not be re-recruited. Fortunately, an extensive series of checks failed to find any significant differences between the continuing and noncontinuing patients. Drug use, which was most likely a significant problem with at least a portion of both patient groups, was not well queried in the assessment battery. The most significant problem with the study was that "partial hospital treatment" was not conducted wholly on an ambulatory basis, but commenced with an average of almost seven days of inpatient care. For this reason, large inpatient treatment costs accrued to even the partial hospital patients (total inpatient costs averaged $3,164 for the partial hospital patients, vs. $4,851 for the extended inpatient subjects). Other important study design elements, however, more than made up for these deficiencies.

Table 4-2

Alcoholism Treatments Classified by Cost and Effectiveness

COST-EFFECTIVENESS MEASURE	PARTIAL HOSPITAL	EXTENDED INPATIENT
Abstinent Days per $100 Tx Cost	5.4	4.2
Ounce Reduction in Quantity/ Frequency per $100 Tx Cost	0.2	0.1
Total Treatment Costs per Abstinent Subject	$18,935	$21,637
Total Treatment Costs per Abstinent or Moderate Drinking Subject	$9,966	$13,222

Source: McCrady et al, 1986

First, the assessment protocol took a sophisticated approach to scaling the outcome of alcoholism treatment. It required monthly telephone contacts with patients, verified their self-reports by cross-checking with a close friend or family member, and evaluated baseline and outcome functioning in the domains of alcohol use, occupational functioning, legal problems, interpersonal and psychological functioning, and physical health. Second, the authors did a thorough job of calculating treatment costs. Not just direct costs of treatment (or posted charges) were used, but indirect cost vectors were also scaled, including lost wages, child care while inpatient or at the partial hospital, and extended care costs (rehospitalization and outpatient visits).

Most importantly, the authors calculated straightforward cost-effectiveness ratios, or average costs to produce equivalent outcomes under each treatment condition, in terms of abstinent days per $100 in treatment costs, changes in the quantity and frequency of drinking per $100 in treatment costs, and total treatment costs per abstinent subject and per abstinent or moderate drinking subject. These are the clearest cost-effectiveness data in the literature on general clinical populations.

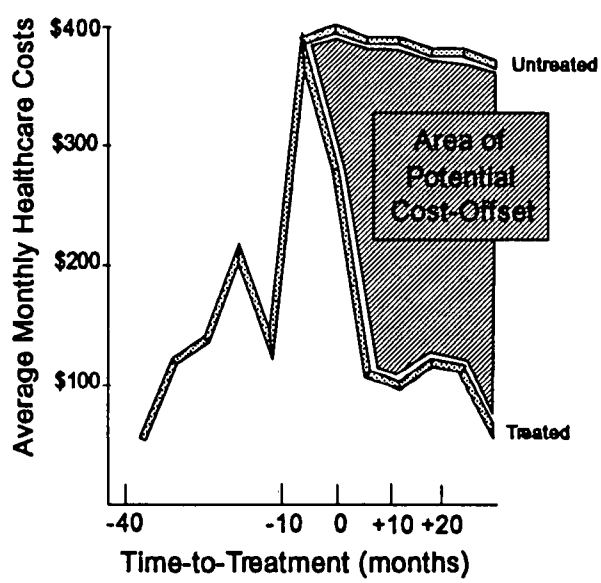
Main results are given in Table 4-2. As shown there, partial hospital treatment has a decided cost-effectiveness advantage over extended inpatient treatment when applied to patients who are able to benefit from it. More current partial hospital or intensive outpatient programs would probably show even more impressive results, since treatment costs for this kind of program have continued to decline relative to inpatient costs, and since few programs commence treatment with the week of expensive treatment called for in the McCrady study.

To summarize, cost-effectiveness studies of alcoholism treatment in socially stable, middle-class general clinical populations tend to favor low levels-of-care treatment vehicles. This result follows directly from the low cost of these treatments, and the great difficulty in demonstrating the superior, durable effectiveness of one treatment over another. As noted in Chapter 2, in most cost-effectiveness horseraces, the advantage lies with the lowest cost treatment, which may even be *less clinically effective* than its higher cost competitors and still show a *more attractive* cost-to-effect ratio.

At some point, this tendency to favor low-cost solutions runs against a limit: An ineffective or barely effective treatment, no matter how cheap, is no bargain and should not be an element of the clinical armamentarium when more promising treatments are available, even at somewhat higher cost. Fortunately, this has not been the finding in cost-effectiveness studies of alcoholism treatment in the general clinical population. Lower cost treatments are shown there to be at least as effective as the higher cost options, at least with patients who are able to manage at these lower care levels. To some extent, though, these issues fade in the examination of the next area, cost-offset studies, which consistently show high payoffs, in terms of reduced medical care to alcohol and other drug abusers and their families. Treatment of (primarily) alcohol problems in the general clinical population will be seen in the next section to have an attractive "bottom line," when measured against its ability to reduce subsequent

Figure 4-1

Cost-Offset Effect of Treatment



health care costs. The next challenge to socioeconomic analysts may well rest in examining differences in the ability of treatments of various costs to deliver good medical care cost-offsets. This is a matter of great socioeconomic sensitivity that has only been approached by studies such as those in the next section.

Cost-Offset Studies

In terms of costs to society, one of the most troubling characteristics of alcohol and other drug abusers lies in their susceptibility to a variety of traumas and disease states, their frequent failure to take proper preventive or health-restorative steps, and their consequent tendency to be some of the highest cost users of medical services in the country (Zook & Moore, 1980). An impressive early finding of the socioeconomic literature was its demonstration that alcohol abusers reliably consume significantly more in insurance-reimbursed health care than they pay in insurance premiums, thus driving up costs for other policyholders and overloading an already strained health care delivery system.

Accordingly, the negative effects of alcohol and other drug problems on medical care utilization and, more importantly, the potential for *treatment* of alcohol and other drug problems to significantly reduce medical care utilization, is one of the most important socioeconomic issues now raised in the field of addictions research and treatment.

This interest fits nicely with other developments in the clinical approach to addictions in the medical center, where alcoholism and other drug addictions have been traditionally treated under the cover of other diagnoses (e.g., pancreatitis, gastric disease, cellulitis, etc.), without proper assessment and treatment. Sometimes, insufficient understanding of the alcohol or drug abuse underlying the admission of a medical patient can set up a pattern of fruitless, repeat admissions. Covert alcohol and other drug problems are matters of increasing clinical as well as socioeconomic concern, forcing addiction medicine and related fields to search for effective detection measures, as well as brief intervention and referral techniques, that will promote the use of the medical center as an identification and treatment site, rather than a hiding place, for patients with addictions.

The concept of the cost-offset is shown graphically in Figure 4-1. In this figure, monthly health care costs for the untreated alcoholic behave in typical fashion: From a position already somewhat in advance of the health care costs of nonalcoholic patients, their utilization of medical services and attendant costs "ramp up" sharply in the year or few months preceding a medical crisis and resultant hospital admission. This ramping may take the form of repeated visits to the family doctor, to the emergency room or specialist's office, or to the hospital ward, with increasingly severe complaints or loss of function which, if the drinking itself is not treated, continue to escalate to the point of crisis and hospitalization. Brief, unsuccessful admissions to the medical center are now the common course for the patient, but care is not properly targeted. The alcohol and other drug abuse is denied or minimized by the patient and silently colluded with by the medical team, who resist the potential for confrontation and possible unpleasantness that proper identification of the primary problem - alcoholism - implies.

They instead send the patient home in a briefly stabilized but essentially unimproved condition, to be readmitted at frequent intervals thereafter. The medical problems of the patient can no longer be ignored. Instead, they require constant maintenance at a high level of health care investment, as the essential irritant of the gastric, cardiac, neurological or other problem - the addiction - keeps the patient symptomatic and complaining. It is this kind of constant exacerbation of a physical health problem, and the use of increasingly urgent, specialized and expensive medical services to treat the symptomatic aftereffects of drinking, that cause alcohol and other drug problems to absorb as much as 15% of the nation's health care budget, though without any real relief for the patient or benefit for society.

On the other hand, successful treatment for the underlying addictive disorder can remove the element - excessive drinking - that drives the illness process and need for treatment. In all cases, health care utilization of such a treated patient group is observed to fall dramatically and, over time and in most cases, will converge to very near the level of use of the normal population. Only in cases where the physical damage done by drinking or drug use is permanent, or where the patient is no longer physically resilient, will significant convergence not be observed, but even in these cases there may well be attractive cost-offsets as the medical problems still complained of by the patient and treated by his or her doctors, no longer curable, are at least unexacerbated and contained.

This is the heart of cost-offset analysis in medical care, a research area that is in the field of the addictions best developed in studies of the general clinical population, though even here much remains to be known. Unfortunately, research is almost silent on the issue of cost-offsets for the treatment of addictive illnesses other than alcoholism. There may be still too great a dichotomy, with treatment of alcohol problems viewed from within the medical domain and so subjected to cost-offset studies, while intervention with other drug problems is viewed from the criminal justice

Table 4-3

Addictions Studies Included in the Jones & Vischi (1979) Review

STUDY TITLE	AUTHOR(S) & YEAR
Illinois Bell Telephone Study	Hilker, 1974
Philadelphia Police Department Study	City of Philadelphia, 1975
Philadelphia Fire Department Study	City of Philadelphia, 1975
Oldsmobile Study	Alander & Campbell, 1975
Kennecott Study	Kennecott Corp., 1976
JWK Study	NIAAA, 1976
General Motors of Canada Study	Lunn, 1976
California Pilot Program Study	Holder & Hallan, 1976
U.S. Navy Study	Edwards et al, 1977
Arizona Health Plan Study	Hunter, 1978
GHAA Study	Brock & Boyaly, 1978
Kaiser-Permanente of So. Cal.	Sherman et al, 1979

Source: Jones & Vischi, 1979

perspective, and so studied for cost-benefits in reduced crime and social disruption. It is also true that, until the influx of cocaine-induced cardiac crises into emergency rooms around the country, problems with drugs other than alcohol were not as frequently the province of the medical professional, except for sporadic detoxifications, provision of methadone maintenance, or management of the occasional overdose.

Though limited almost exclusively to alcoholism treatment, a variety of cost-offset studies have been reported, with generally encouraging results. Several different research teams are now quite active in the area, and the gathering momentum of health care reform is certain to focus increasing attention on cost-offset studies of alcoholism, as well as other drug, treatment. Below, the best studies, as well as those best known, are reviewed, beginning with a major literature review that is also discussed in the next chapter.

Jones & Vischi (1979)

This major review, *Impact of Alcohol, Drug Abuse and Mental Health Treatment on Medical Care Utilization* was published as a special issue of the journal *Medical Care* by scholars in the federal Alcohol, Drug Abuse and Mental Health Administration. The Jones and Vischi review emphasized studies done in employee-based programs or organized care settings, and thus lay unequal stress on low-cost and minimal level-of-care programs, especially those that do not take the patient away from the workplace. This conservatism may put cost-offset findings in the review at a disadvantage, and it is possible that the Jones and Vischi review helped set the, at first, ambiguous tone about cost-offsets of addictions treatment.

Few quality studies, though, do not match those in the Jones and Vischi review in some way, either through conduct at the worksite or in an organized health care setting like an HMO. These are simply the structured environments, with access to naturally accruing, large longitudinal samples of health care utilization behavior, that can accommodate this kind of research. Therefore, this criticism should not detract from the value of the work, and may merely indicate that Jones and Vischi provided a conservative test of cost-offset and cost-benefit effects. The review is even more valuable given (1) its early date, (2) its broad coverage of alcohol, drug abuse, and mental health treatments, (3) the large number of studies in each tradition which the authors examined, and (4) its focus on cost-offsets, then an area which was barely emerging in the addictions field. Jones and Vischi planned to examine two questions: (1) Do alcohol, drug abuse and mental health treatment have effects on medical care utilization? If so, (2) what are the policy implications of this impact? The focus of the study was therefore to be on what is now called cost-offset, and what was then termed the "treatment spillover" effect.

The promise of treatment was advanced in the following way:

> When a patient receives an [alcohol, drug abuse and mental health treatment] service, the payor of that patient's medical care services may receive a free, unexpected, spillover benefit in the form of reduced expenditures for that patient's medical care. (p. 1)

The authors then went on to look in great detail at 25 studies, 12 in the area of alcohol and drug treatment, as shown in Table 4-3. Five of the studies used only surrogate measures of health care cost offsets (reduced sick days, sickness and accident benefits). This is a real weakness, but another five used some form of comparison group, an unusual feature in the socioeconomic literature being developed then. A number of the specific studies are reviewed independently elsewhere in this Technical Appraisal, and so are not covered in any detail here.

Summarizing, all 12 studies of alcohol and other addictions treatment found "very substantial" reductions in later utilization of medical care or its "surrogates," such as sick days and sickness and accident benefits. Decreases of utilization of various measures following treatment ranged from 26% to 69%, with a mean of 40%. Across the studies, sick days fell from 38% to 47%, and sickness and accident benefit collection fell from 33% to 48%., depending on the specific report.

It should be remarked that these "very substantial" results would only have been described as such in the literature of that day. The most modern studies, some of

which are reviewed below, show much larger decreases in health care utilization following addictions treatment, when follow-up periods are long enough and patients are not restricted in age or problem severity.

In Jones and Vischi's review, few studies used windows of observation - pre-treatment overutilization of medical care or its surrogates compared to post-treatment reductions - longer than a year or two. Also, while the reductions observed typically exceeded those obtained for the comparison group in those studies where comparison figures were available, the subjects were, pre-treatment, very high users of sick days and sickness and accident benefits, and the reductions noted, while very substantial in relative terms, left the subjects still in the range of very high service and benefit use. Overall, the authors came ultimately to conclude that the impact of addictions treatment on utilization is due principally to declines in utilization by previously high-volume users of health care. The findings, though, are more of interest for their impact at the time than they are for their currency.

Speaking more particularly to the issue of drug abuse, 15% of the Oldsmobile study group (Alander & Campbell, 1975) were found to have problems with drug abuse, and this sample as a whole had a 33% decline in sickness and accident benefits, suggesting that at least a portion of the improvement noted in the studies generally for alcoholism treatment obtains for other addictive patterns as well. This is merely speculative, and it is possible that the drug users in the Oldsmobile plant showed no improvement while their alcohol-only coworkers showed even greater improvement than the 33% group average. However, the Illinois Bell Study (Hilker, 1974) found that a drug rehabilitation program offered to the users in that work group had the same job rehabilitation rate, 72%, as the equivalent alcoholism program.

Thus, the mild conclusions on drug abuse treatment voiced by Jones and Vischi appear plausible: "The scant evidence available is at least consistent with the hypothesis that the impact [of treatment] would be similar to that of treatment for alcohol abuse." (p. 14).

Holder (1987)

The next incisive review of the literature was published by Holder in 1987, also in the journal *Medical Care*. The goal of the review was to look at studies on changes in health care utilization following alcoholism treatment published in the period 1979-1987, or after the Jones and Vischi (1979) appraisal. His intent was to articulate the view that

> Many health insurance companies see alcoholism treatment costs as only "add-on" to existing general health costs. An alternative perspective is that alcoholism treatment serves two positive functions: 1) it serves as an appropriate primary diagnosis other than "surrogate diagnoses" and thus is a basis of more appropriate treatment, and (2) it provides rehabilitation and contributes to improved patient health and thus lower overall health care utilization and associated costs. (p. 52-53)

In the tradition of Saxe et al (1983), Holder's approach was less broad than Jones and Vischi, as he chose to discuss just six each of controlled studies - Edwards et al (1977), Longabaugh et al (1983), McLellan et al (1982), Reiff (1981), Forsythe et al (1982) and Hayami and Freeborn (1981) - and naturalistic studies - Gregory et al (1981), Holder & Hallan (1976, 1981), Plotnick et al (1982), Becker and Sanders (1984), Lawrence Johnson and Associates (1985) and Holder et al (1985). Several of these - e.g., Edwards et al (1977), Longabaugh et al (1983) and McLellan et al (1982) - were less in the tradition of socioeconomic research than of straightforward treatment outcome research and won't be reviewed here. Several others are reviewed independently elsewhere in this Technical Appraisal. We note, though, that Holder presaged in his remarks the continued development of this literature, saying:

> The recent set of studies has a number of improvements. Most studies employ a pre-treatment and post-treatment or longitudinal design ... Study groups are larger, with consequently greater statistical robustness. ... The majority of recent studies has developed comparison groups of either "low to minimum" treatment or a matched nonalcoholic group for baseline comparison. (p. 66)

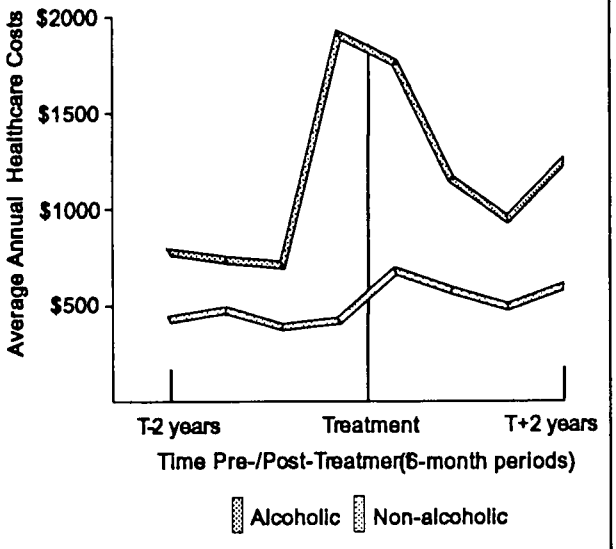
Holder and his group had been largely responsible for establishing in a series of reports (e.g., Holder & Hallan, 1976, 1981) the real health-economic implications of untreated alcoholism, and the potential for catastrophic growth in expenditures for medical services directed at the aftereffects rather than the pattern itself of abusive drinking. In his 1987 review he summarized:

> On the average, untreated alcoholics usually incur general health care costs that are at least 100% higher than those of nonalcoholics over pretreatment levels, and as such untreated alcoholics are greater risks for above-average health care utilization and costs. This difference ... increases over time prior to alcoholism treatment ... [In the last 12 months before treatment, the alcoholic's costs are close to 300% higher than costs of comparable nonalcoholics. Most of this difference is attributable to inpatient utilization resulting from higher inpatient days per month per person for alcoholics. (p. 66).

Against this pattern of heavy utilization, once alcoholism treatment is applied, the resultant cost-offsets can be impressive. For instance, the study by Becker and Sanders (1984), reviewed below, of the health care costs of 176 alcoholic Medicaid patients suggested a

Figure 4-2

Annual HMO Utilization by Alcoholic vs. Nonalcoholic Patients



Source: Forsythe et al, 1982

savings of more than a third of a million dollars over a 18 months. As more generally summarized by Holder (1987):

> Four studies found that post-treatment initiation costs converge to the level of a comparable group of nonalcoholics. Holder and Hallan found convergence after five years for families with alcoholic members enrolled with Blue Cross-Blue Shield. ... Taken as a group, the studies reviewed confirm the potential of alcoholism treatment to contribute to sustained reductions in total health care utilization and costs. They also suggest that reductions in post-treatment costs are likely to continue ... into the fourth and fifth year following the start of alcoholism treatment. (pp. 68-69).

As is obvious from these remarks, the literature available for Holder to review was of a much higher caliber than that available to Jones and Vischi (1979). As he himself had noted, larger samples and the inclusion of comparison groups, much wider observation windows and the use of more direct measures than the mere surrogates of sick days and sickness and accident benefits were to become commonplace in the more sophisticated research environment of the 1980's.

Under these much more rigorous conditions, what kinds of pre-treatment "cost ramps" and post-treatment "cost convergences" would be observed? As with the early Jones and Vischi review, the earliest of the improved studies produced results that appeared more mixed and less optimistic than currently.

Forsythe, Griffiths & Reiff (1982)

One of the earlier studies reviewed by Holder, the experiment of Forsythe, Griffiths and Reiff (1982), had at best a tepid view of the potential of addictions treatment for reducing medical costs. Using samples drawn from the Kaiser-Permanente HMO system in California, these scientists tracked the health care utilization of matched samples of 191 alcoholics and 191 nonalcoholics for a four-year period in the mid-1970's, including two years prior to the referral of the alcoholic group for comprehensive treatment within the Kaiser-Permanente system, and two years after referral.

The kind of criticism already voiced by Saxe et al (1983) about cost-benefit studies, as well as others, are already evident in the Forsythe study, including a relatively small sample, restriction to a highly managed health care setting and, in this case, lack of geographic dispersion.

To begin, the authors added evidence to the already robust argument of Holder and his colleagues: People who use alcohol experience vastly increased levels of healthcare expenditure. The alcoholic subjects in the Forsythe study showed significantly greater inpatient and outpatient medical care costs than normal comparison subjects, even two years prior to identification and referral (Figure 4-2).

The researchers also found, though, that referral of these patients to the Kaiser-Permanente alcoholism clinic reduced subsequent healthcare utilization, though alcoholic subjects were still using significantly more outpatient care, and more than three times as much inpatient care, even two years following their treatment. The authors summarize:

> Even though costs began to decline for alcoholics following referral and participation in the comprehensive treatment program, after two years they were still considerably higher for alcoholics than for nonalcoholics. Alcoholism is associated with chronic medical problems which require continued medical care. Many alcoholics, although referred for treatment, do not participate. After a period of sobriety, the alcoholic may "slip" causing a medical crisis which forces him to return for treatment (the "revolving door" syndrome). On the other hand, although alcoholics who do participate in treatment tend to increase outpatient costs, the overall expenses of participants are lower than those of nonparticipants. (p. 601)

Overall, the results of the Forsythe study are encouraging, but not overwhelmingly so. The study, though, has several important weaknesses as a source of information on cost-offsets. The most important liability is its choice of comparison group. In the Forsythe study, subjects served as their "own controls" (pre-treatment to post-treatment), a quasi-experimental

design that confounds intervention effects with historical and maturational processes. The other selected source of contrast, nonalcoholic comparison subjects, bears little relationship to the central issue of cost-offset research. Ideally, this kind of study would have random assignment of alcohol and drug using patients to one of two conditions, the first of which would receive treatment, the other of which would receive no treatment, or perhaps an innocuous "placebo" treatment. Obvious ethical proscriptions make such a study impossible.

However, the real question in cost-offset research - To what extent are the post-treatment healthcare utilization histories of patients, and other measures of functioning as well, mediated by the treatment experience? - can be addressed in other ways than the randomized clinical trial. A series of reports published during the late 1970's and early 1980's, described in the next section, is an excellent example of the large-scale observational study.

The GHAA Study (1982)

Alcoholism Treatment Programs Within Prepaid Group Practice HMOs: A Final Report (Plotnick, Adams, Hunter & Rowe, 1982) is the third and final account of three released by the Group Health Association of America (GHAA), the others being *Alcoholism Within Prepaid Group Practice HMOs* (1978) and *Alcoholism Treatment Programs Within Prepaid Group Practice HMOs: an Update* (1980). Each version, particularly the 1978 report by Brock and Boyajy, has been referred to as "The GHAA Study," though the *Final Report*, reviewed here, is most authoritative.

Altogether, these reports chronicle the multidimensional outcome of seven years of clinical alcohol and other drug research at four large HMO's. Originally, three sites participated, (1) the Health Alliance Plan of Detroit, (2) the Arizona Health Plan of Phoenix, and (3) the Kaiser-Permanente Medical Care Program of Portland. This latter site, though, dropped out of the study for administrative reasons in 1978; Kaiser-Permanente of Los Angeles replaced her sister health care program in 1979. Researchers used two methods to collect data, from patients themselves (via a Patient Assessment Form) and from their medical records as kept by their HMO (via a Chart Abstraction Form).

With these methods, GHAA collected a wealth of information on over 1,000 alcoholics in treatment, over 200 spouses and other family members (at Arizona Health Plan and the Kaiser-Permanente Los Angeles site only), and over 700 HMO members matched to the experimental group for age, sex, and length of enrollment. Data were gathered on health care services dispensed by the participating sites in the mid- to late 1970's. The data "window" was long for the research designs of that era, with up to two years of pre-treatment and four years of post-treatment data available for some patients.

The study as a whole pursued a number of objectives concerning the pattern of service utilization by alcoholics and their families both before and after intervention in the drinking problem, the role of demographic variables, patient functioning variables, total health services utilization, and so on. The advantages of this study deserve special note. They include (1) its large sample size, (2) its multiple self-report and objective measures, involving not just medical care behavior but indicators of social and vocational well-being as well, (3) the long pre- and posttreatment periods, (4) a large and appropriate matched comparison group, and (5) the geographic dispersion of the study sample which, while not as great as that of some national samples discussed below, still included subjects from the Industrial Midwest, the Southwest, and the West Coast.

The results of the study confirmed a number of impressions about, first, the delivery of alcoholism treatment services to alcoholics in the general clinical population. There was a problem with gender-based treatment access (86% of the study subjects were male), and even with patient access generally: Less than 1% of total patients received alcoholism treatment services over the course of this multiyear study conducted at a consortium of highly vigilant and cost-conscious organized care settings. This translates to success in reaching less than 10% of patients who would probably be treatment eligible, not an encouraging figure for these primary health care settings with powerful motives to identify and treat the underlying addiction, not mere symptoms.

Additional findings went on to discuss patterns of health care utilization observed prior to treatment. The average alcoholic, it was found, lost 32 days to illness per year, almost one day in ten, prior to intake.

Most impressive, though, was a strong treatment effect: Days lost to illness by treated alcoholics declined by 50% by the 18-month follow-up. In general, rates of hospitalization for treated alcoholics declined by nearly 50% at three of four sites, the exception being the Detroit site with a much more chronic population.

In terms of outpatient care, prior to treatment alcoholics had seven times as many ambulatory encounters as their matched comparison subjects, a ratio that fell to three to four times as many ambulatory visits as comparison subjects during the first six to 24 months post-treatment, then finally to three times as many visits during the remaining 24 months. And though ambulatory visits remained frequent, an effect of treatment was to render them more planned, scheduled, and appropriate: "Decreases in utilization may be caused by treatment; the patient becomes a more appropriate utilizer with treatment visits substituting for inappropriate

medical visits in some cases," (p. 44). Again:

> Alcoholics show an immediate decline in the percentage of [their encounters that are through the emergency room] (from 31 to 9 percent at six months) and an increase in the percentage of regularly scheduled visits (from 59 to 78 percent at six months). (p. 49)

An additional very important early finding of the GHAA study was the indication that family members, also, can show a significant decline in service utilization following the treatment of their alcohol relative, a phenomenon discussed later under the heading of collateral cost offsets.

Finally, across sites the number of reprimands at work reported by patients declined by 75% at six months. All of these results, however, did not occur in every case. In fact, the authors took care to describe four kinds of treatment and health outcomes for plan members utilizing the addictions treatment services at their HMOs.

First, Good Treatment Outcomes / Good Medical Outcomes accounted for approximately 20 to 25% of cases. These patients were younger, less chronic, and more likely to be married. Treatment with them could be less expensive than that offered to more resistant patients, and the cost-offsets were often immediately perceptible as these essentially healthy, resilient and well cared for individuals were helped by treatment to return to a fairly high level of functioning.

The largest group of patients, from 35 to 40% of cases, consisted of Poor Treatment Outcomes / Good Medical Outcomes. As the authors explained:

> These cases are enigmatic. From the therapist point of view, the patient did not comply with treatment or appear to benefit. Yet medical utilization decreased and/or changed to reflect apparent improved health. ... the patient may have relied on other family or community resources to effect positive change. (p. 55)

The smallest group, 15% of the sample, was the most expensive to treat and perhaps the most poignant to witness, consisting of Good Alcoholism Treatment Outcomes / Poor Medical Care Outcomes. These patients tended to be older, more chronic, and were typically never married or divorced. Their alcoholism treatment, unfortunately, could not reverse the already severe systemic damage they'd sustained and, overall, this group may be the most intensive service users in the population, accepting and not refusing addiction services, and so raising utilization rates in that way, but showing no offsetting decline in the demand for other health care services.

> Diseases, most often of the cardiovascular, cardiopulmonary, or digestive systems, seem to be discovered for the first time or go out of control as treatment continues and drinking declines. ... it seems likely that the success of the referral was in part traceable to motivation on the part of the patient who has developed illness and is told frankly by health care personnel that alcoholism treatment is an essential part of medical recovery. It may be these patients who are responsible for most of the hospital days in the post treatment period. (p. 56)

The final group consisted of Poor Treatment Outcomes / Poor Medical Outcomes, about 20 to 30% of plan members. These patients would typically refuse to be involved with addictions services, but would instead persist in demanding inappropriate and symptomatic treatment for the secondary effects of their drinking. This patient group might be considered an untreated control group, but these patients were older in general than members of the other groups and much more severe in terms of alcoholic, social, and medical problems generally. They were described in fact in the report as similar in many ways to the public inebriate population, and therefore are not an appropriate comparison group.

The findings of the study overall are summed up in a brief executive summary:

> The sustained improvement of alcoholic clients in treatment over the three year treatment period is shown by comparing client functioning data collected at treatment at intake with functioning data collected at six month intervals for a three year treatment period. Quantity/Frequency of alcohol consumed declined by 65% six months after intake. ... Alcoholic clients in treatment also showed sustained improvement on work-related dimensions, as measured through reduced reprimands (seventy-two to ninety percent decline from intake) throughout the three-year follow-up. Days sick or absent from work declined by fifty percent throughout this period ... Clients showed sustained reductions in ambulatory health care service utilization ... Client ambulatory utilization declined eleven percent from the pre-treatment value six months after intake to a twenty-nine percent decline four years after intake. Alcoholics remain higher utilizers of ambulatory services than their matches throughout the study. Relative utilization changed, however, from seven times as many encounters with health care providers as their matches for the pre-treatment period to three times as many encounters four years after intake.. Sustained reductions extend to family members of alcoholics as well; three times as many encounters with health care providers were found for family members prior to client intake; this decline (sic) to two times as many encounters than the matched group four years after intake. ... Hospital utilization experience is more equivocal, with modest reductions relative to matches in three sites and substantial increases in a fourth site," (pp. ii-iii).

Though the focus was principally on health care

offsets, the authors were careful to highlight the implications of some of their work improvement data:

> The project (and any research centered in an HMO) has to concentrate on the medical care offsets. Nevertheless, the real offsets may be elsewhere. The data contained in the body of this report demonstrate that for the population treated absenteeism rates, reprimands at work (and by implication productivity) and rates of time lost due to contacts with the criminal justice system all improved. It may be here that the real payoff occurs. (Appendix 4, p. 3).

To summarize, the GHAA Study stands out in the socioeconomic literature on addictions treatment in several respects. It was one of the first of the large sample, multisite studies that were later to become an ideal of research in mental health, and its designers were sufficiently talented to include in it many advanced technical elements that would become standard.

It also showed that addictions treatment, even if the patient were merely identified as treatment appropriate but then declined service, can produce improvements in physical health, and consequent reductions in healthcare utilization, that are substantial. Still stronger studies on medical care cost-offsets in general clinical populations, however, were to shortly become available.

The Illinois Medicaid Study (1984)

The GHAA study reviewed above was one of the few studies of its type to include in its sample of treated alcohol and other drug abusers patients from disadvantaged backgrounds. The only cost-offset study of any quality to focus exclusively on such patients was conducted in the early 1980's by Becker and Sanders (1984) of the Center for Policy Studies and Program Evaluation at Sangamon State University in Springfield, Illinois.

The Illinois Medicare/Medicaid Alcoholism Services Demonstration: Medicaid Cost Trends and Utilization Patterns, often called the Illinois Medicaid Study, is a straightforward cost-offset study similar in some ways to those presented elsewhere in the Technical Appraisal. It is not published, but is available in manuscript form and was made available to the authors of the Technical Appraisal through the Illinois Alcoholism and Drug Dependence Association, in response to our *Call for Data* in December, 1992.

Becker and Sanders explain the background for their study in the following way:

> In the spring of 1984, the Illinois Department of Alcohol and Substance Abuse (IDASA) contracted with the Center for Policy Studies and Program Evaluation of Sangamon State University to perform a program analysis of the Illinois Medicare/Medicaid Alcoholism Services Demonstration. The scope of the contract was limited to examining health expenditures, client characteristics, and utilization patterns of 176 Medicaid clients who received services under the auspices of the program in [state fiscal year 1983].
>
> The 176 Medicaid clients studied in this report were determined to be at the bottom of the socioeconomic ladder, and prospects for improvement of their position were slight. It was of no surprise to learn that these clients placed high demands upon the public health assistance system. On the average, it cost the State of Illinois approximately $188 in health care costs for every month that each of these clients was eligible to receive benefits. (p. i).

The goals of the study, coming shortly after the expansion of the Medicare/Medicaid role in addictions treatment funding in the early 1980's, were (1) to explore patterns of utilization of the expanded Medicare/Medicaid benefits for addictions treatment, and (2) to discover the relationship between use of addictions services and other health care access in these medically indigent program enrollees.

The Illinois Medicaid Study has a number of serious flaws. First, the sample size is not large. In order to manage a complex project with a very limited budget, the authors were forced to consider the health care behaviors of only Medicaid patients, and only those who accessed addictions services through the system in fiscal year 1983, yielding a mere 176 cases.

Second, the window of observation of health care behavior, before and after treatment, was extremely narrow, only 18.3 months for the average case.

Third, the data are at times presented in a confusing way: For example, the authors charted changes in health care utilization behavior over the course of the study without respect to the onset of treatment, so that

Table 4-4

Health Care Utilization of Medicaid Patients with Alcoholism Coverage

COST CATEGORY	TOTAL $	% OF TOTAL	AVG PER CLIENT	MEDIAN
Inpatient Hospital	$378,572	62.4	$2,151	$248
Outpatient Hosp.	59,484	9.8	338	126
NIPS[1] General	36,707	6	209	97
NIPS Supplies	11,339	1.9	64	≤ 1
Drugs/Pharmacy	26,457	4.4	150	44
Alcohol Treatment	94,012	15.5	534	231
TOTAL	$606,571	100	$3,446	$1,588

[1] Non-Institutional Providers

Source: Becker & Sanders, 1984

the utilization behavior of some patients who received treatment early in the study period was lumped in with the utilization behavior of other patients who received treatment much later. The historical event of opening up access to addictions treatment is contained within the observation window, and changes in utilization behavior for patients as a whole who accessed that treatment at some point are apparent, but other factors that may have influenced the drinking and drug use and demand for health care (such as changes in drug availability, the Illinois economy, etc.) cannot be ruled out.

There are also, though, some significant advantages to the study. First, it is the only study of its kind to focus exclusively on Medicaid-eligibles, and is capable of indicating the extent to which the socioeconomic literature on general clinical populations - most of it derived from studies of middle-class patients - generalizes to the medically indigent and socially disadvantaged.

Second, the quality of the basic units of data themselves is high: Becker and Sanders had access to fairly comprehensive records of their subject sample, including a variety of demographic markers as well as health care and other service utilization data from the Illinois Department of Public Aid and the Illinois Department of Alcohol and Substance Abuse. They had access, as well, to the types of addictions treatment received by their sample, a variable rarely made much of in the cost-offset literature, where researchers often simply contrast the health care utilization behavior of "treated" vs. comparison groups, without accounting for the type of treatment received, much less its effectiveness.

The limitations of these data, as well, were treated quite respectfully by the authors, who took great care to edit and limit their analyses and conclusions. Most importantly, though, the authors had access to a comparison sample of 176 Medicaid enrollees matched on a variety of important indices. This type of experimental control for observed cost-offsets was joined in the Illinois Medicaid Study by the use, too, of statistically predicted values for health care utilization that may have obtained had the treated patients not, in fact, received treatment. This more subtle form of experimental control using raw regression techniques does not have the elegance of Holder and Schachtman's (1987) method, for example, but it was a fair effort of Becker and Sanders to impose some appropriate controls over their data and the conclusions drawn.

The authors commenced with a look at the utilization of addictions treatment and other medical services accessed by their patients when treatment for alcoholism and drug abuse became reimbursable under the Illinois Demonstration Project. Results are shown in Table 4-4.

A point of similarity between these patients and those studied elsewhere is that most of the cost of their general health care derives from inpatient hospital stays. Very little (15.8% total) goes to outpatient care providers in either institutional or non-institutional settings. About an equal amount, 15.5%, went to alcoholism treatment when this became available to the Medicaid Demonstration patients. As will be seen later, the new availability of addictions treatment that became effective during the demonstration project caused a temporary increase in care costs as patients availed themselves of addictions treatment. This is an extra limiting condition which did not obtain in any of the other cost-offset studies. Obviously, the authors would need to find an even more robust cost-offset effect if this increase in overall health care costs due to the new availability of addiction services were to be effectively countered.

Though the figures given in Table 4-4 show averages of utilization, the authors were also able to show a marked concentration of addictions treatment services in a relatively few cases (Table 4-5). In this table, patients are divided according to intensity of resource use.

Table 4-5

Concentration of Service Resources in Medium- and High-Resource Users

TYPE OF RESOURCE USER		LOW-RESOURCE		MEDIUM-RESOURCE		HIGH-RESOURCE	
COST CATEGORY	TOTAL NUMBER OF PATIENTS USING	% OF PATIENTS USING SERVICE	% OF SERVICE RESOURCES USED	% OF PATIENTS USING SERVICE	% OF SERVICE RESOURCES USED	% OF PATIENTS USING SERVICE	% OF SERVICE RESOURCES USED
Outpatient Services	124	26.6	2.7	62.9	52.5	10.5	44.7
Inpatient Detoxification	39	30.8	7.1	59	53	10.3	39.9
Inpatient Rehabilitation	37	13.5	1.7	70.3	71.4	16.2	27

Source: Becker & Sanders, 1984

For example, the 124 users of outpatient services were categorized as low-resource users is if they had less than two but greater than zero outpatient counseling hours during the study period, high-resource users if they had more than 26 hours of counseling, and medium-resource users if they had intermediate use. The 39 users of detoxification services were categorized as low-, medium- or high-resource users if they had more than zero but less than two, from two to seven, and more than seven days of detoxification, respectively; and the 37 users of inpatient rehabilitation services were similarly categorized if they had more than zero but less than 4, from four to 30, and more than 30 days, respectively.

As is clear from this table, the relatively large number of low-resource users consume very little of outpatient, detoxification or inpatient rehabilitation services, while the relatively few high-resource users consume services at a rate two to four times what their numbers would justify. This kind of resource concentration is a feature of the socioeconomics of addictions treatment that is rarely brought into the discussion, though a few of the studies reviewed in Chapter 6, *Addictions Treatment in CJS Populations and Narcotics Users*, have segregated patients by intensity of service use and have shown how that clinical feature relates to outcome.

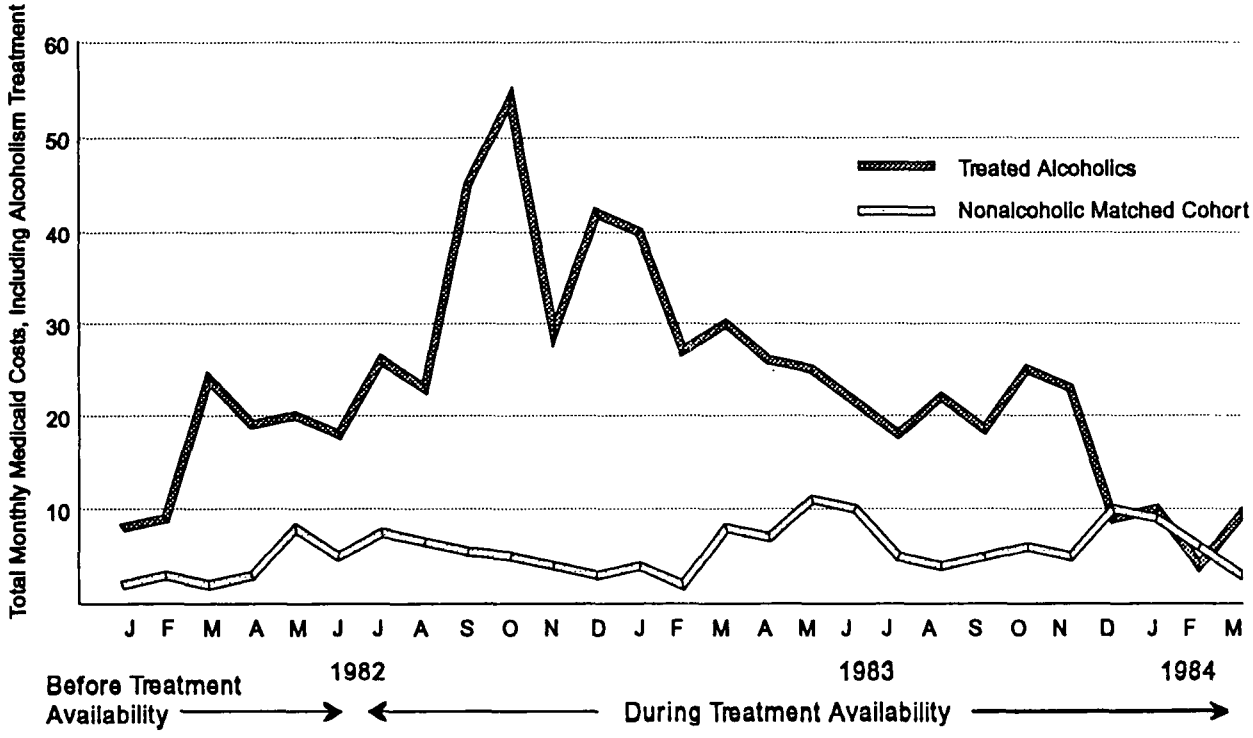
This was not done in the Illinois Medicaid Study, but the data do show that intensity of service use is not sheerly a function of ability to pay, at least in the public sector. All patients in the study were, in terms of health care resources, equally indigent, so that the concentration of resources among a relative few may be more a function of clinical need than is typically shown by other utilization surveys.

Finally, the authors presented data (Figure 4-3) showing trend lines for health care utilization of both the treated alcoholic and comparison groups. It has already been noted that these data are charted according to the calendar of when treatment became available, rather than according to the beginning of treatment for the subjects themselves.

It might appear that, with the onset of treatment availability, the health care costs for the treated alcoholic group increased. Table 4-4 shows that about 15.5% of the whole, or about 18.3% of the former total health care costs, was an alcoholism treatment "add-on" that Medicaid had first to absorb at the beginning of the demonstration program. However, the authors explain

Figure 4-3

Monthly Medicaid Health Care Costs 1-1-82 to 3-30-84
Before and After Availability of Alcoholism Treatment



Source: Becker & Sanders, 1984

that the observed costs escalation in fact shows the characteristic cost "ramping" effect found in other similar evaluations. This is shown clearly in other figures in the report, which chart sharp rises and declines in costs for health care other than alcoholism treatment:

> The first month of treatment ... reflects a substantial increase in other health care costs. Due to [the] method of collecting expenditure data (i.e., by month), the coincidence of this high level of other health expenditures with the beginning of treatment was unavoidable. However, this increase in other health costs is not due to the alcoholism treatment: rather, this increase immediately precedes treatment. This is clear by examining the individual client files. Probably, the substantial increase indicates a crisis in health which is the motivating factor for the client seeking treatment or for case managers insisting that such treatment be sought. (p. 28)

Following this rise, which is characteristic of health care users with all types of serious, chronic illnesses, there appears a steady decline in health care costs for these medically indigent alcoholics, with their utilization rates mirroring those of the comparison subjects within a year and a-half of treatment availability.

The actual treatment cost-offsets began to accrue shortly into the demonstration period - in about the fifth month - and by the authors' calculations reduced the estimated costs, had treatment not been available, by about half over the course of the demonstration project. Assuming, had treatment not been available, that health care utilization would have remained at a high level following the cost ramp immediately preceding treatment, the authors calculated that total health care costs for the treated alcoholics, including those for alcoholism treatment, would have equaled in some months less than 10% of this high predicted level under a "no treatment" condition.

In other analyses, the authors made the following points, excerpted here:

> 1) Most of the major gains in terms of impacting other health care costs occur within the first seven months of treatment.
>
> 2) For savings to continue, treatment must continue. The increase in health costs the first month of leaving treatment are dramatic. This supports the notion that perhaps the limits upon outpatient services should be liberal to insure continued savings and successful treatment outcomes.
>
> 3) Those clients who leave treatment have "crises" at intervals of approximately every four months. For many, however, there are "residual" impacts of the alcoholism treatment. After every crisis, health care costs decline - each time to a lower level.
>
> 4) ... [Some successful outcomes require long treatment cycles. This implies that no absolute limits should be placed upon length of eligibility to receive alcoholism outpatient services.
>
> 5) Allowing a client to miss two consecutive months of treatment almost ensures that previous gains will be lost ... This implies the need for an aggressive follow-up system by therapists. (pp. 28-32)

To summarize, the Illinois Medicaid Study, despite some ambiguities in the interpretation of the data, appears to show substantial cost-offset effects for alcoholism treatment, even when applied to persons for whom "prospects for improvement ... were slight." These offsets more than compensate for the expense of conducting the treatment. Cost-effectiveness of the various treatments applied to patients in the study - outpatient counseling, detoxification and inpatient rehabilitation - was not addressed, but the concentration of treatment resources among a few individuals is an interesting observation that suggests the role of more than merely ability to pay in the utilization of more costly treatment resources in some communities.

The Aetna Study (1985)

Among the largest and most influential studies of a general clinical population is the detailed report, *Alcoholism Treatment Impact on Total Health Care Utilization and Costs: Analysis of the Federal Employee Health Benefit Program with Aetna Life Insurance Company* (NIAAA, 1985). This huge effort, ultimately to become known as the "Aetna Study," was a large, controlled program evaluation with four objectives: (1) to compare the healthcare utilization and costs of families with at least one alcoholic member with families without alcoholism, (2) to examine the pattern of service utilization by alcoholics in a large sample of federal employees, (3) to study changes in health care utilization attributable to alcoholism treatment, and (4) to estimate the potential health care cost-offsets from alcoholism treatment.

Table 4-6

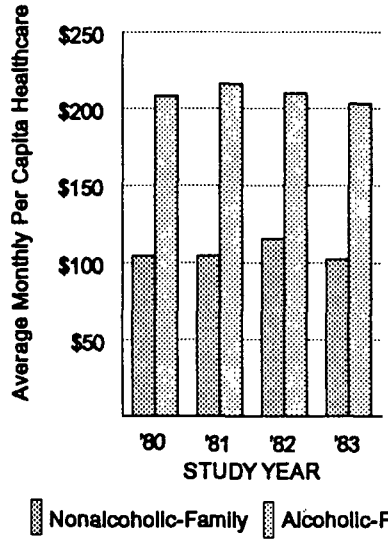
Average Costs of Alcoholism Treatment in the Aetna Study

UTILIZATION / COSTS	*4-YEAR AVERAGE*
Inpatient stays per person	1.22
Mean length of stay	21.7 days
Average cost	$3,125
Proportion paid by policy	64.8%
Utilization rate	.076%
Cost per average enrollee	$3.43 annually

Source: NIAAA, 1985

Figure 4-4

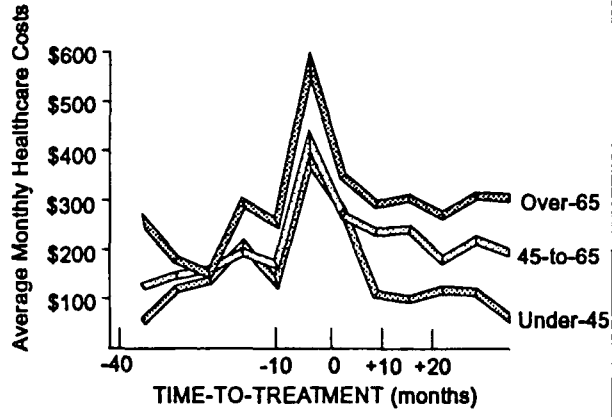
Monthly Healthcare Utilization by Alcoholic vs. Nonalcoholic Families



Source: NIAAA, 1985

Figure 4-5

Monthly Healthcare Costs by Alcoholics Approaching Treatment



Source: NIAAA, 1985

It should be noted that objectives 1 and 3 include an examination of "collateral health effects," following an intriguing body of evidence that began to develop in another large project, the "California Pilot Program" (Holder & Hallan, 1976, 1978, 1981) showing that alcohol and drug use causes higher-than-expected health care utilization in family members of the alcohol (and perhaps drug) user and that, therefore, cost-offsets of addictions treatment should be looked for, not just in the later health care bills of the successfully treated drinker or drug user, but in the health care bills of spouses and children.

The Aetna Study researchers produced, with the Midwestern Study (reviewed below), one of the two strongest designs in the addictions literature bearing on cost-offsets in general clinical populations. No fewer than 20 million health insurance claims filed over a three-year period by nearly a half-million families were scrutinized, and about 3,000 families with at least one alcoholic member were identified by the researchers.

Ultimately, large samples of both alcoholic (n = 1,645) and nonalcoholic (n = 3,598) families were selected. Using Aetna's archive of healthcare claims, the service utilization patterns of these groups were tracked for as long as six years (depending on the length of participation of the claimant in the Aetna plan), allowing a true longitudinal contrast between the health care utilization patterns of alcoholics, their family members, and the total alcoholic family, on the one hand, and a matched comparison group on the other. Type and amount of treatment delivered explicitly for alcohol problems was examined, and results were broken down by gender, age range, and family type. Families of alcoholics of both sexes and various age ranges were studied, and subjects resided in all 50 states of the union. The study's inclusion of information on treatments of varying intensity and duration, and the researchers' application of very sophisticated data-analytic strategies including probabilistic modeling of cost-offset effects, add still more weight to this very strong research design.

The results are complex, and illustrate convincingly the broad influence of alcohol problems on the health care utilization of alcohol-affected individuals. The patterning and costs of alcoholism treatment itself were also explicated clearly (Table 4-6).

More importantly, the study found very strong evidence of attractive cost-offsets for alcoholism treatment, and the extension of these benefits to members of alcoholic families, as well. In addition, a set of elaborate relationships between offset effects and both gender and age of patient was suggested. Some of the more important results are presented below.

In terms of the comparative health care utilization of alcoholic vs. nonalcoholics and their families, the findings of the Aetna study are clear and impressive for

their ability to show the broad influence of alcoholism on the utilization patterns not just of alcoholics, but of their nonalcoholic family members as well (Figure 4-4): Policyholders in alcoholic families used roughly twice the services of nonalcoholic families. Nearly all of this was a greater use of inpatient resources, since the groups did not differ in terms of ambulatory care utilization, at least in the service environment of the early 1980's.

In terms of the study's second objective, assaying patterns of service utilization by alcoholics, the results are similarly remarkable: The vast majority of alcoholism treatment services utilized were inpatient services (only 37% of the treated group received any "ambulatory" or outpatient treatment), accounting for 95% of the care costs. Rates paid for inpatient stays varied from $83/day to more than $193/day in specialized addictions hospitals. It should be borne in mind that these costs are computed in 1980-83 dollars. Results of alcoholism treatment utilization are given in Table 4-6.

An additional important finding of the Aetna study, similar to that of Forsythe *et al* (1982) was a clear demonstration of the phenomenon called "peaking" (Figure 4-5), wherein the health care charges incurred by alcoholic patients ramp up steeply in the months prior to treatment for their drinking problem. Peaking is common in the health care histories of many patients with a variety of chronic disease, and reflects the development of a severe illness that normally precipitates a hospitalization or other expensive service.

In the Aetna study, for example, costs for the average alcoholic claimant averaged $167/month during the period of 36 to six months prior to receiving treatment for their alcoholism. During the six months immediately preceding treatment, their costs rose to $452/month, and during the final month prior to treatment, costs rocketed to as much as $1,370/month. In Figure 4-5, this effect is seen in the sharp ramp for all age cohorts occurring around the time of treatment onset. Also apparent in this figure, though, is a strong cost-offset argument for alcoholism treatment based on substantial downturn in health care utilization following treatment.

No comparable data bearing on other drugs problems are available at this time, but these results are suggestive, as stated in the report: "After alcoholics start treatment, their health care costs drop significantly and eventually reach approximately the level that existed several years prior to treatment," (p. 2), that is, prior to the sharp, upward pre-treatment ramp. This is most significant in younger patients, as shown in Figure 4-5, and it is these patients who are most likely to be experiencing problems with drugs other than alcohol.

Older patients show less of a post-treatment decline. This is due to a number of factors, including natural aging and illness onset, and perhaps the serious medical sequelae of the kinds of health crises that provoke treatment referrals in the first place, and to which the more compromised older drinker is less resilient. The role of patient age as a mediator of cost-offsets has been suggested elsewhere (Blose & Holder, 1991; Holder & Blose, 1986) and is the particular focus of another study reviewed in detail in this section.

Interestingly, the authors of the Aetna study concluded their data analyses with a series of probabilistic models of cost-offsets that Aetna could expect to receive from the alcoholism treatment provided to these patients. These researchers, of course, did not have access to a true control group - a group of treatment eligible alcoholics who in fact receive no treatment - because of the obvious ethical problems with refusing treatment to persons with serious illnesses, as already discussed. Instead, they used a variety of mathematical modeling techniques to estimate what treatment costs would have been like in the "post-treatment" period, if these same individuals, who received treatment in the study, had instead received none. The models selected by the researchers are based on two different forecasting techniques.

The first is *regression analysis*, in which observed trends are presumed merely to continue in some linear upward fashion indefinitely. The second is a more subtle technique that will be demonstrated in Figure 4-6, *Markov Chain modeling*, which uses advanced statistics to generate change curves that don't continue indefinitely at a constant slope, but that rather stabilize at a high level, as health care utilization in the aftermath of a severe illness might be expected to do. This latter method is presented in more detail when the Holder and Schachtman study is reviewed below.

In both techniques used by the Aetna researchers, costs are then projected, and are contrasted to the medical care costs of alcoholic patients who received treatment. The difference is the anticipated cost-offset. Cost-offsets were calculated by the researchers according to

Table 4-7

Three-Year Cost-Offsets Projected from Aetna Data

CUMULATIVE COST SAVINGS AFTER TX	36-MONTH PRE-TX RAMP	24-MONTH PRE-TX RAMP	12-MONTH PRE-TX RAMP	MARKOV CHAIN MODEL
After 1 year	(-$2,159)	(-$1,501)	(-$671)	(-$1,063)
After 2 years	(-$1,116)	$658	$3,372	$705
After 3 years	$405	$3,751	$9,400	$2,515

Source: NIAAA, 1985

the different methods shown in Table 4-7, which are an excellent methodological illustration of the ability for socioeconomic analysis to generate different findings as a function of the assumptions made at the start of the analysis. In this case, the assumptions governed whether the continued rise in health care utilization shown by untreated alcoholics would resemble the gentle upward trend observed 36 months prior to treatment, the more pronounced slope of 24 months out, the steep ascent at 12 months, or the nonlinear growth of the Markov Chain.

Regardless of the method used to estimate the cost trends had patients in the Aetna study not received the treatment to which they were in fact exposed, the results are clear. Using the sharply ramping cost curve observed immediately prior to treatment to estimate anticipated future costs under conditions of no-treatment results in a very generous estimated cost-offset (the 12-Month column in Table 4-7).

This sharp continued increase is unlikely, though. More likely, continued health care utilization would follow the nonlinear, plateauing course predicted by the Markov model. Even with this more conservative expectation, the costly series of procedures constellating around a successful referral to alcoholism treatment can be offset or essentially "paid for" by reduced medical costs within two years of treatment. As noted earlier, other studies (e.g., Brock & Boyajy, 1978; Sherman, Reiff & Forsythe, 1979) and critical reviews (Saxe, Dougherty, Esty & Fine, 1983) show a material cost-offset effect for appropriate addictions treatment, a phenomenon very well presented in the Aetna study.

Holder & Blose (1986)

Data excerpted from the Aetna study data base were used by Holder and Blose (1986) for another cost-offset study reviewed here. Briefly, using in large part the methods already described for the Aetna study, the authors studied health insurance claims filed between 1980-1983 for a large group (1,645 individuals) of enrollees. Health care utilization, and changes attributable to alcoholism treatment, could be studied under these circumstances.

As in other studies, the results showed clear contrasts between the health care utilization of untreated alcoholics and their families, compared to the health practices of normal families. Overall, the four-year average per capita monthly health care cost (in 1980 dollars) for families with an alcoholic member was $209.60, most of this ($164.50) being for by inpatient care costs, compared to about half this figure ($106.54 per capita per month) for families without alcoholic members.

As in the Aetna data already described, pre-treatment peaking, the effect of treatment, and resulting good cost-offsets, were observed by the researchers:

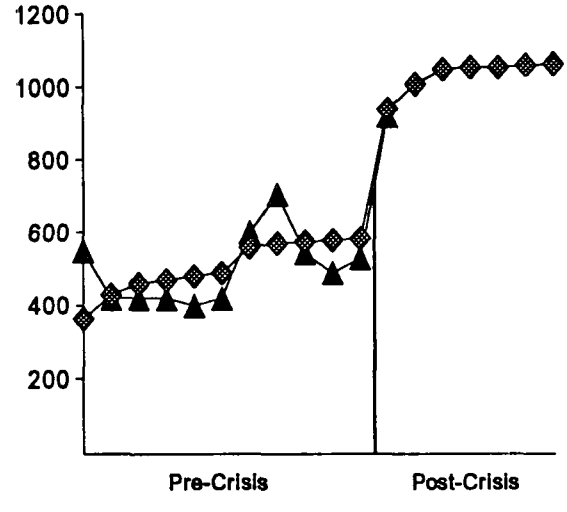
> [On the average, from 36 to 12 months before alcoholics begin treatment their medical care costs gradually increase, with average monthly costs per person rising from approximately $130 to $179. During the year before treatment begins, however, total medical care costs rise much faster. The average monthly medical care cost rose to $452 in the six-month period before alcoholism treatment and to $1,370 in the final month. After treatment begins, total medical care costs drop fairly rapidly for about 12 months. This drop continues, though more slowly, during the next two years. Total health care costs averaged $294 per month during the six months following treatment initiation, but only $190 per month by the third post-treatment initiation year. (p. 1459)

Explaining this sharply ramping and declining pattern, the authors note:

> It appears that within the six months prior to the start of alcoholism treatment, the emotional and physical problems of the average alcoholic escalate. These worsening problems manifest themselves in the use of additional health care services. This sharp upward ramp is not unique to alcoholism but also occurs for other chronic diseases (p. 1459).

Figure 4-6

Quarterly Mean Health Costs for Alcoholics, Actual and Markov



Adapted from: Holder & Schachtman, 1987

Table 4-8

Three-Year Cost-Offsets Projected from Aetna Data

POSTTREATMENT PERIOD	PROJECTED SAVINGS BASED ON MARKOV MODEL
Year 1, First Quarter	(- $2070)
Year 1, Second Quarter	+ $178
Year 1, Third Quarter	+ $404
Year 1, Fourth Quarter	+ $425
Year 2, First Quarter	+ $440
Year 2, Second Quarter	+ $460
Year 2, Third Quarter (Break-Even)	+ $462
Year 2, Fourth Quarter	+ $406
Year 3, First Quarter	+ $426
Year 3, Second Quarter	+ $454
Year 3, Third Quarter	+ $424
Year 3, Fourth Quarter	+ $506
Estimated Savings After 3 Years	+ $2515

Source: Holder & Schachtman, 1987

Holder & Schachtman (1987)

The same database of 1,645 alcoholic Aetna enrollees under the Federal Employees Health Benefit Program (FEHBP) was used by Holder and Schachtman (1987) to further experiment with Markov modeling and other methods for projecting anticipated cost-offset results.

The authors justify the use of statistical modeling with the remark that "It is not an unreasonable assumption that the same factors which influence health care utilization before a treatment opportunity continue to operate once the opportunity passes," (p. 67). This logic is difficult to argue with, and appears to justify statistical modeling as a substitute for the randomly-assigned untreated control group in circumstances in which such assignment would be unethical and inhumane. The probabilistic modeling techniques adapted by these researchers to socioeconomic analyses appear to render the untreated control group superfluous in this type of research.

The Holder and Schachtman study discusses a variety of these methods, which now include growth-curve analysis, life tables (survivorship) analysis, and time-series (Box-Jenkins) methods. It presents a series of elegant figures demonstrating the means by which two of them - ordinary least square regression and Markov Chain analysis (both of which, it will be recalled, were applied to statistical models of the main Aetna data) - simulate the continued consumption of health care resources that would be observed if treated alcoholics were to receive instead no treatment, but were merely to continue on as before.

The results of projecting health care costs by Markov modeling, the reasonableness of the estimates and their coherence with actual data, are given in Figure 4-6. As can be seen in this figure, the health care costs of alcoholic patients gradually rise over time, and then ramp up sharply in the months just prior to treatment onset.

However, it would be unreasonable to expect that health care costs, were treatment not received, would continue to soar upward as was the assumption in the 12-Month column of Table 4-7, derived from the first Aetna report. Instead, the Markov Chain shows the expected plateauing of costs at a high level, within the range of expectation for persons with untreated serious medical illnesses, and well below estimates that would be otherwise derived by the (probably unrealistic) regression models.

As in the Aetna study, the Markov estimates are used to calculate probable medical care utilization costs under assumptions of "no treatment." Then, because the patients in the Aetna database did, in fact, receive treatment, the medical care utilization costs later observed for them in the years following treatment can be subtracted from the Markov estimates of utilization costs under "no treatment" conditions, and an elegant mathematical solution to the problem of estimating cost-offsets under actual conditions is obtained.

The resulting estimates of cost savings as time progresses, using the Markov model to estimate savings three years into the future, are given in Table 4-8. The authors summed up:

> [O]ne can conclude that the cost of alcoholism treatment can be offset in reduced other health care costs *at least* by the end of the 3rd year following treatment initiation... Abstinence as a central goal in most alcoholism treatment programs can retard and in some cases stop physical health deterioration associated with heavy drinking. Thus reductions in general health care utilization and associated costs are possible long after alcoholism treatment has ended.
>
> ... During these times of cost consciousness in health care and efforts to contain costs, the potential for alcoholism treatment to reduce general health care costs as shown in this study and to yield a dollar-to-dollar return for treatment costs has important implications for health insurance carriers, Health Maintenance Organizations, and self-insured employers. (p. 71)

The Midwestern Study (1991)

Amplifying some of these results, the last major series of cost-offset studies of addictions treatment in the

general clinical population to be reviewed here is a series of reports by Holder and colleagues (Blose & Holder, 1991; Holder & Blose, 1991), from which an increasingly intricate model of cost-offsets is beginning to emerge. These papers focus on data derived from the health care utilization patterns of a large midwestern manufacturing company, and are called collectively the "Midwestern Study." The Midwestern research plan (Blose & Holder, 1991) has, like the Aetna study, several components, including a study of utilization patterns (reviewed in Section 4, American Social Responses) and a strong section on the effects of alcoholism treatment on medical care utilization.

Advantages of the Midwestern study resemble in some respects those of the Aetna study, including the use of a large treatment population (n = 2,259), each member of which was matched to six nonalcoholic comparison subjects (n = 13,397), the availability of extremely long time windows, up to 14 years of data in some cases, during which healthcare utilization could be observed, and the use of data from patients receiving a variety of alcoholism treatment regimens (the costs and characteristics of which are detailed in Holder & Blose, 1991) with, presumably, a variety of degrees of effectiveness and resultant offset effects on subsequent healthcare utilization.

The study aims, though, are focused on different questions than are those of the Aetna study. These aims are (1) to explore gender-based and age-based influences on healthcare and addictions treatment costs for treated alcoholics, (2) to examine the role of patient age in mediating healthcare costs before and after treatment, and (3) to look at shifts in the type of healthcare received by treated alcoholics, and to relate this shift in service mix to observed cost-offsets. These are the most sophisticated study hypotheses yet to emerge in cost-offset research in general clinical populations or elsewhere.

The authors accessed the health care records of a large, self-insured manufacturing company, covering employees enrolled in the plan for at least six years during the period 1974 to 1987. Of the entire workforce and covered collaterals, more than 3,000 were identified as having been treated under an alcohol-related diagnosis during the study period.

A total of 1,788 males and 469 females were eventually identified as meeting the six-year coverage requirement, and:

> Various measures of monthly medical care cost were developed for each individual, defining months in terms of the time prior to and following the initiation of alcoholism treatment. ... Costs were defined as total health care charges from providers. Duplicate charges and multiple billings were eliminated. All dollar figures ... were adjusted for inflation and are reported in constant December 1985 dollars. (pp. 15-16)

Table 4-9

Six-Year Changes in Average Monthly Health Care Costs for 3 Age Cohorts of Alcoholic Patients

AGE COHORT	AVERAGE COSTS DURING FINAL PRE-TX YEAR	AVERAGE COSTS DURING 6TH POST-TX YEAR	PRE-POST DIFFERENCE
30 Years Old and Under	$115	$81	(-$34)
31-50 Years Old	$179	$120	(-$59)
51 Years Old and Over	$198	$332	$133

Source: Blose & Holder, 1991

There were two additional advantages to this study. The first was the provision of the largest comparison sample yet achieved, more than 13,000 individuals. The second was the implicit test of the cost-offset effects of alcoholism treatment generally (and, almost certainly, of other drug addiction treatment, as well) since patients were treated in a wide variety of clinical settings accessible in the communities where the manufacturing company was located.

> Treatment settings, modalities, and effectiveness are likely to vary widely in the large population studied here. The results presented represent aggregate changes in medical care costs for the entire population (or specific subgroups), including a diverse mix of treatment services and ranges of treatment effectiveness. (p. 16)

The results of the Midwestern Study fit in well to a picture of gathering complexity in the cost-offset question. First, gender was observed to have little impact on either the costs or cost-offsets of general medical care as well as of alcoholism treatment. This finding may not stand out at first glance, but the importance of this result can hardly be underestimated, given the gender bias in health care generally - women consume substantially more health care than men - and the more limited representation and vulnerable position of women in addictions treatment populations.

A firm set of beliefs - that female alcoholics and other substance abusers are more severe, are more character-disordered, are more fragile physically and, in most ways, are simply *sicker* than males - was challenged in this study's results. A question that might otherwise have poisoned policy debates - Do female patients, despite their relatively small numbers in addictions treatment populations, account for the same disproportionate share of treatment costs that they tally

in the general medical center, and is their addictions treatment then less cost-beneficial, and a poorer use of society's resources? - appears to have been met, with a negative response, in the Midwestern Study. "Male and female alcoholics in treatment have quite similar pretreatment cost patterns, and similar posttreatment initiation patterns as well," (p. 25). The finding is unambiguous, and is presented graphically in convincing form in the Blose and Holder (1991) report.

Otherwise, trend lines published in the report are almost identical to those in the Aetna study, with two exceptions. First, average costs during all time periods, pre- and post-treatment, are higher in the Midwestern Study, probably because of the effects of price inflation and because of more liberal reimbursement policies followed by the Midwestern insurance carrier.

A more substantive finding in the Blose and Holder (1991) report, however, is a clear indication of the role of patient age as a mediator of cost-offsets from alcoholism treatment. Older patients (51 years old and above) had significantly higher health care costs in nearly all periods than did younger patients, and, moreover, they showed far less decline, pre- to post-treatment, in health care utilization, as in Table 4-9. Two factors are clearly evident here.

First, the treatment provided to younger patients (50 years old and below) had a powerful impact on medical care utilization. Tracked against the costs registered by the nonalcoholic matched comparison sample in the study, the authors remark:

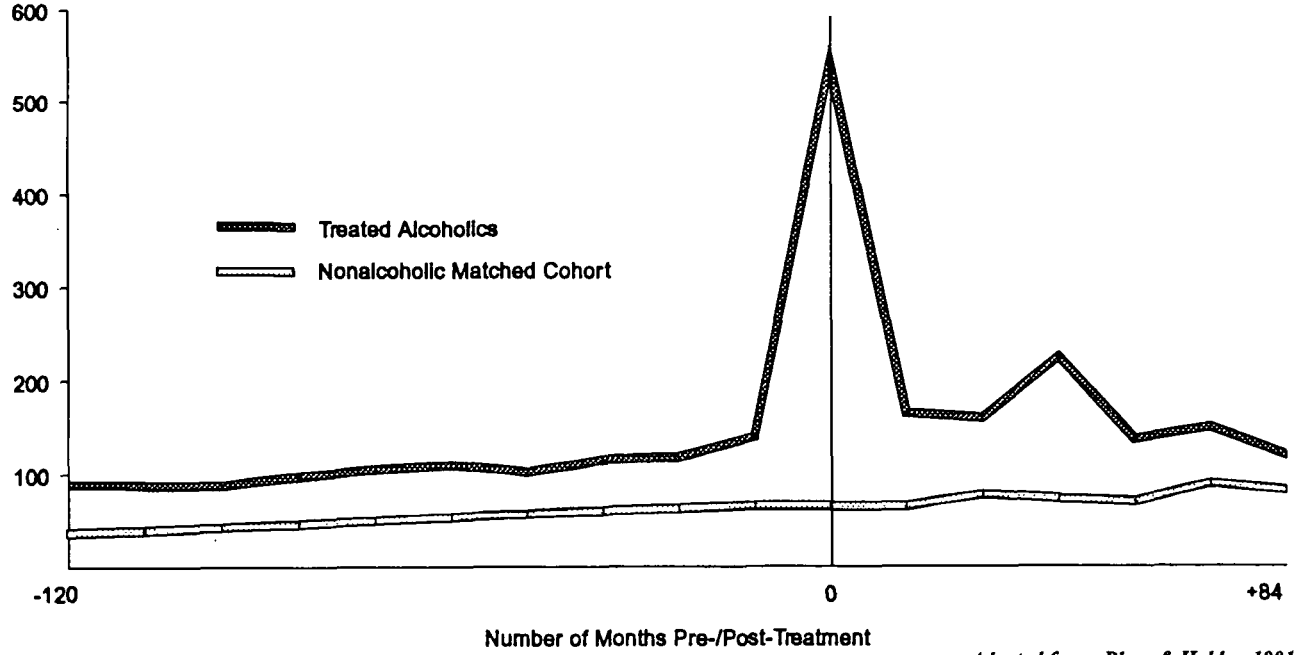
> Around the time of alcoholism treatment initiation the total health care cost levels of alcoholics rise dramatically for a brief period, after which they stabilize and then begin a downward posttreatment trend... Although the trends for the alcoholic and nonalcoholic groups do not converge by the end of the study period [six years from treatment initiation], convergence would occur at some point if the trends shown here were to continue (pp. 23-25)

This trend toward convergence is striking, in view of the fact that the alcoholic group, prior to treatment for their drinking, had experienced health care costs nearly twice those of the matched comparison sample, a cost differential that was clearly apparent even *10 years prior to identification and referral*, as the availability of up to 14 years of data on some individuals in the Midwestern Study was able to show. These data are shown in Figure 4-7.

Second, the picture for older alcoholics is less optimistic. They showed little if any decline in health care use following treatment. In fact, the long-term trend of

Figure 4-7

Total Monthly Health Care Costs Over Annual Intervals Before and After Alcoholism Treatment: Treated Alcoholics and Matched Cohort



Adapted from: Blose & Holder, 1991

service utilization in this group is generally upward as health care continues to be utilized to counter the long-term pathophysiologic effects of drinking.

This continued upward trend, however, does not indicate a lack of cost-offset from treatment, since the stabilization of the upward cost curve, or even reduction in its degree of slope, should be considered a cost-offset in its true sense. Blose and Holder (1991) conclude:

> These data imply that when initial alcoholism treatment does not occur until later in life, it is less likely that total health care costs will decline following treatment to levels as low as those which existed prior to treatment. This may indicate that alcoholism treatment interventions which occur earlier in an individual's drinking career are more likely to produce reductions in total health care costs... [However], one cannot conclude from our analysis that the treatment of older alcoholics is financially disadvantageous. Although the data show that posttreatment medical care costs for older alcoholics ... do not decline to their pretreatment levels, this does not preclude the possibility that the posttreatment costs experienced by this group are lower than would have occurred had treatment not been undertaken (p. 25).

What emerges from the study, then, is a clearly optimistic picture of the financial advantages of alcohol treatment with younger patients, diminished expectations if not less humanitarian urgency in providing this treatment to older individuals, and a manifest premium on interventions performed well and *early*, before illness processes are intractable and requiring of ever-ascending levels of remedial resources.

A much clearer view of the female alcoholic, too, comes forward in these data, relatively free of the sexist bias that pervades so much of the addictions literature. Overall, the convergence of the health care utilization lines of treated alcoholic versus matched comparison samples is clearly and unambiguously visible in the ability of the Midwestern research team to follow this large group of patients for up to seven years post-treatment.

To summarize, cost-offset research in general clinical populations is one of the most convincing demonstrations yet of the financial worth to society of investment in alcoholism treatment and by extension, in addictions treatment generally. All studies show impressive cost-offsets, perhaps somewhat less substantial in the treatment of older or more physically deteriorated patients, that "pay for" the cost of even the more expensive forms of alcoholism treatment within two to three years of clinical contact. These results appear durable for up to seven years out, and are equally marked in female and male treatment populations.

In addition, the fact that cost-offsets are most marked in the treatment of younger patient cohorts, with their more prominent mixed and polysubstance abuse patterns (that are often only reimbursable when coded as alcohol problems, thus raising the suspicion that a great number of the nicely responding younger patients in the Aetna and Midwestern Studies are, in fact, drug users) lends weight to the argument that medical care cost-offsets can be expected from less specifically alcohol-focused (or CD) treatment in the general clinical population.

Other benefits of drug treatment, of course, are discussed in the following chapters, and still another benefit observable in the general clinical population is discussed below.

Collateral Cost-Offsets

A final report that builds on the Aetna study, based in an EAP evaluation effort but reviewed here because of its illustration of the kinds of collateral health effects suggested in the Aetna and Midwestern studies, was recently published by Spear and Mason (1991). Collateral health effects and cost-offsets - that is, health benefits and changes in service utilization that are observed in other family members when one member of the family is treated for alcohol or drug addiction - is an intriguing new area with broad relevance not only to the socioeconomics of addictions treatment, but to family medicine, psychiatry, and other disciplines.

Spear & Mason (1991)

Spear and Mason (1991) reported an interesting cost-offset study similar in some respects to the research just reviewed. In this study of collateral cost-offsets, , they excluded health claims of the primary alcohol or drug abuser, and instead searched their archive of insurance claims and other utilization data for signs of collateral changes in health care utilization when the alcoholic member of a family receives treatment.

Table 4-10

Pre- to Posttreatment (4-year) Changes in Total Sample Health care Costs, 71 Employees and Families

CLAIMANT	PRE-TX	POST-TX	PRE-POST
Employees	$241,858	$117,975	(-$123,883)
Other Family	$412,814	$207,339	(-$205,476)
Total	$654,672	$325,314	(-$329,359)

Source: Spear & Mason, 1991

The study is not a particularly strong one - for example, the sample size is small (*n* of treated alcoholics = 71), the only treatment to which the primary patients were exposed was a 28-day inpatient program, and the study uses an "own control" design. Its window of observation (four years) is respectable, though, and its use of a generic "chemical dependency" rather than alcohol-specific treatment base and concentration on collateral health care cost-offsets warrants review here.

The authors analyzed personnel files, EAP records and insurance claims for 71 employees of a manufacturing firm and their covered family members between 1981 and 1983. Most of the employees were referred to the EAP by their supervisor or shop steward, and all were referred on for short-term residential treatment in a 28-day rehabilitation program offering general chemical dependency treatment that included a family therapy component. For these patients and their families, four years of healthcare records, two years on either side of EAP referral and inpatient treatment, were then scrutinized.

The results (Table 4-10) are striking: The healthcare claims of the treated alcoholics fell off markedly following their referral - claims for the treated employees fell off by nearly 49%, and claims for the families as a whole, including the alcoholic member, declined by 49.6%.

Even more marked, though, was the decline in health care utilization by family members other than the individuals treated for alcohol and other drug abuse: 50.2%. In fact, of the total decline in health care costs of almost a third of a million dollars over two years, more than 62% was attributable to decreased claims by family members. The authors make the further point that "... this decrease took place during a time period when medical costs and the medical insurance claims that reflect those costs were rising rapidly. If the claims had been computed in constant dollars, even larger decreases could be expected," (p. 186). It should be noted that the employee group studied here was fairly young (mean age = 38) and, again, was referred for and treated for alcohol and other substance abuse.

Thus, though the important studies reviewed earlier in this section have shown substantial post-treatment decreases in health care utilization and even positive projected cost-offsets from alcoholism treatment, Spear and Mason (1991) have specifically focused on broad effects beyond those exclusive to alcoholism treatment, and have revealed an addictions treatment cost-offset at least as large as that seen in the health care records of treated substance users: Namely, a shrinkage of healthcare bills by other family members of marked proportions, more than 50% in this study. As can be seen, nearly two-thirds of the total family health care cost-offsets are due to reduced health care seeking by other family members, a sum made possible by their larger numbers and their heavy service seeking.

Holder & Hallan (1986)

The last study to be examined in this chapter returns us again to the important work of Holder and his colleagues. Though the report of Holder and Hallan (1986) is a study of cost-offsets in the general clinical population, enough of the findings bear on collateral cost-offsets that it has been reserved for this section. As in other reports by this group, the authors found access to an advantageous database, and were able to use it to conduct:

> ... a six-year longitudinal study to determine if the treatment of alcoholism as a primary diagnosis results in a reduction of total health care cost and/or utilization for the alcoholic as well as other nonalcoholic family members. (p. 1)

Altogether, the authors drew data on 90 families (245 persons), one member of which received treatment under a specific alcohol-related diagnosis in the mid-1970's, and contrasted their health and utilization behavior with that of a matched comparison group of 83 families (291 persons).

It should be borne in mind that these treatment cases are old, having received treatment for an alcohol problem in the 1970's prior to the many recent developments and refinements. This is an experimental group, as well, tiny in size when compared to the huge Aetna Study. Nevertheless, the analyses applied to the data and the findings on collateral cost-offsets are of interest, and the limitations may render the study one of the more conservative tests of the cost-offset phenomenon reviewed here.

All respondents were enrolled with Blue Cross / Blue Shield of California, through the California Public Employees Retirement System. With access to these data, Holder and Hallan (1986) were able to access most, perhaps nearly all, health care utilization data pertaining to these persons for a period of six years.

The results, once again, powerfully point up both the enormous medical costs of untreated alcohol problems, as well as the large cost-offsets to be expected from treatment. In terms of inpatient services, prior to treatment alcoholic enrollees averaged .118 inpatient admissions per month for a monthly cost of $86 (adjusted to the 1975 base); even their nonalcoholic family members averaged .044 inpatient admissions per month at a cost of $27, compared to the members of normal families who experienced .005 inpatient admission per month at $6.50. These striking distortions in the health care costs of members of alcoholic families - more than four times the rate of resource absorption of matched nonalcoholic families - is the most dramatic

demonstration of this effect in the literature.

Five years following the receipt of service for an alcohol-related condition, though, inpatient utilization for the alcoholic subjects declined by almost 80%, to only .023 hospitalizations per month at a cost of $10; this improvement generalized to family members, who experienced at five years post-treatment .012 hospitalizations per month at a cost of $8.70, even lower than the comparison group's use of .014 hospitalizations per month.

Ambulatory services showed impressive, if less substantial, decreases over time, and appear to have reflected appropriate service utilization by alcoholic claimants: Outpatient services initially rose for the alcoholics from .284 visits per month (at $9.30) prior to treatment to .440 visits per month in the first two years post-treatment, before dropping to .068 visits per month (at $3.40) by year five.

Nonalcoholic family members simply declined in outpatient utilization across the entire five-year followup, from .235 visits per month pre-treatment ($8.36) to .066 visits (at $3.40) in year five. The alcoholic patients, themselves, however, showed the greatest improvement, their total monthly health care costs falling from nearly $100 in the two-year pre-treatment for the alcoholics to a mere $13.34 in the fifth year post-treatment. The authors conclude:

> 1. At the end of the follow-up period the individual alcoholic family member experienced a substantial reduction in inpatient admissions per month as did others members of his/her family. In like manner the per-person monthly costs for inpatient care dropped by a factor of 8.
>
> 2. At the end of the study period the alcoholic family member utilization and costs of inpatient care converge to the experiences of matched comparison family members. ...
>
> Three prime conclusion can be drawn from this study. (1) ... the alcoholic and his/her family members use health care services and incur health care costs substantially greater (some 15 times greater) than the general population. (2) ... all forms of health care services and their costs would as a minimum continue at their observed rates prior to treatment ... (3) ... following initiation of alcoholism treatment, total health care costs for a family with an alcoholic member can be expected to decline significantly over time. This decline appears to be the direct result of treatment and not a result of natural changes ... the decline appears attributable to not only a reduction in the *use* of various health care services but also in the *mix* of service, i.e., more reliance on ambulatory as opposed to inpatient care. Further, we observe that declination of health care costs holds for all elements of the alcoholic family," (pp. 9-13).

In summary, collateral cost-offsets are an intriguing, though so far quite understudied and under-reported, benefit of addictions treatment. The potential savings here, though, is enormous, much larger than those accruing from cost-offsets from reduced health care utilization of treated alcoholics and addicts themselves, since the target group for these collateral cost-offsets - their families - is many times larger than the core group of substance-impaired individuals.

The additional effects of providing targeted treatment to the affected family members has not yet been tested in a collateral cost-offset study, but surely warrants attention in the future.

Conclusions

The socioeconomic literature on addictions treatment in general clinical populations is still emerging - in fact, the activity witnessed so far promises the appearance of ever more sophisticated analyses of large databases during the coming decade. However, a few firm conclusions can already be drawn, and others can be advanced tentatively.

First, though there are limitations to cost-benefit studies, there is evidence that the treatment of alcoholism, and perhaps other addictions as well, is cost-beneficial. Better rates of earning, lower out-of-pocket expenses for drinking and drug use, lower and more appropriate use of social welfare and other services, all combine to suggest positive cost-benefit ratios. When reductions in criminal (typically vehicular) offenses, and resultant legal and court costs, are factored in, cost-benefit ratios become more attractive still.

There is some indication that the local community or state government unit bears most of these costs by alcohol and drug users in the general clinical population, and so stands to benefit most from their control. When reductions in still other costs, such as to family members, are entered into the cost-benefit equation, it is clear that addictions treatment shows positive results in cost-benefit terms, and probably *very positive* results.

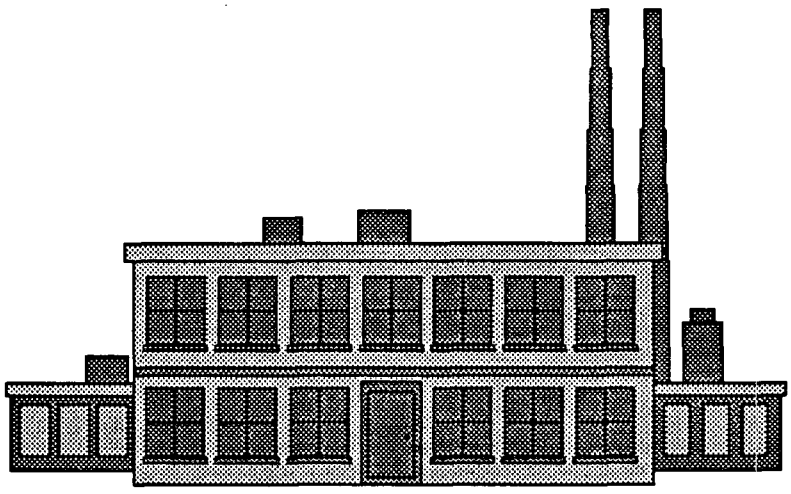
This notion is underscored by the strong findings on cost-offsets that are coming out of a research tradition that has produced in the last decade and is still producing evidence that alcohol treatment causes sharp reductions in medical care utilization and encourages more appropriate utilization when services are delivered. These cost-offsets are a stable, long-term effect of treatment from which society will reap benefits for a

period longer than any research team has been so far able to follow.

The concentration of this effect in younger patients suggests that cost-offsets can be expected when problems with drugs other than alcohol are treated. The research reported out so far fails to find much justification, from the cost-offset point of view, for the treatment of alcohol problems in older patients, but few treatments applied to the aged can, or should be, justified on economic grounds alone. In addition, treatment of addictions in female and male patients appears to perform similarly in socioeconomic terms, showing good cost-offset properties that are pronounced and durable in both sexes.

Overall, cost-offset studies are the best, and most persuasive, socioeconomic arguments for support of the treatment of alcohol and other drug addictions in the general clinical population. Such treatment, the data say, will not be an expensive "add-on" to an already strained system, but an important and clinically smart component under health care reform that will save enormous sums in the long run. The intriguing findings on collateral cost-offsets, if they can be replicated and extended in future research, may be an even more sizable cost-offset vector than that obtained from reductions in health care demand on the part of the treated alcoholic or addict alone. Future research should study this "systemic" effect of addictions treatment, so as to comprehend more fully the entire terrain of treatment costs and benefits.

Even the most optimistic of such pictures does not, however, distract from the clear imperative to contain costs in the health care system, even costs that are later repaid handsomely. Cost-effectiveness of addictions treatment in the general clinical population is a question just recently gaining currency. Despite institutional inertia and clear financial interests on many sides, the treatment community that provides service to the general clinical population may, with the assistance of assessment criteria and early intervention techniques, find ways to do more with less. This will necessarily be through provision of a comprehensive continuum of services of varying intensities, early detection and intervention and appropriate patient assessment and treatment matching. This approach will offer even smaller cost profiles for cost-benefit, cost-effectiveness and cost-offset analyses. It may be only in this way that sufficient resources can be husbanded for the much costlier and long-term treatment of severely alcohol- and drug-dependent patients in the general clinical and other populations.



ADDICTIONS TREATMENT IN WORKFORCE POPULATIONS

TREATMENT OF MEMBERS OF THE AMERICAN WORKFORCE has historically been one of the strongest motives for the development of addiction treatment services. Specific programs directed to particular employee groups have been a presence in some American industries for nearly a half-century, with a tradition of evaluation work stretching back nearly as far, to a study of the role of a "human relations program" in reducing absenteeism in a Northeastern electric utility company, reported by Mann in 1952.

One of the first contributions of the Center of Alcohol Studies, then at Yale, to the addictions treatment community in the mid to late 1940's was the development and pioneering of the occupational alcoholism program concept, later expanded to include service for a variety of emotional and addictions problems under the employee assistance program (EAP) title. This was an attempt to meet at the worksite the increased alcohol and serious mental health problems that had been inadvertently drawn into industry with the vast workforce expansion occasioned by the wartime buildup. Though EAP has a meaning more generic than a program to provide service to only the alcohol and other drug-addicted worker, it is the term favored throughout industry and so is used in this chapter to refer to worksite based referral and brief-treatment of alcohol and other drug addiction in American industry, frequently with referral to off-site rehabilitation services.

Intervention in addiction in the American workforce is an area of clinical endeavor that, socioeconomically, should show good promise. Employers pay in some instances nearly half of the health care costs in their community (NIAAA, 1986), and the perennial interest of industry leaders in reducing these costs, combined with findings like those reviewed in Chapter 4, *Addictions Treatment in General Clinical Populations*, showing strong medical care cost-offset effects of addictions treatment, especially when treatment is applied to persons of working age, make continued support of worksite-based addictions treatment and referral services likely.

A historical argument, and a socioeconomic one, can be strengthened by a straightforward clinical rationale: There is simply reason to expect improved clinical results when treatment is made available to active and purposeful persons who have powerful incentives to participate in treatment, such as saving jobs put in jeopardy by alcohol and other drug abuse. The voices of clinicians and of industry in this matter have been joined for decades by a strong message at the state and federal level encouraging the use of workforce interventions. In fact, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) has for its entire history set policy indicating that alcohol and now other drug abuse is the single most important employee health problem, and that the worksite is an ideal place to detect, confront and refer cases in need of treatment (Engelhart, Robinson & Carpenter, 1992).

Research seems to support the concern about alcohol and drug abuse voiced by NIAAA. Data from another federal source, the National Institute on Drug Abuse (NIDA) 1988 Household Survey, show that 70% of those in the general population who report current illicit drug use are employed, most of them full-time. These data show that about 8.2% of wage-earners will admit to current illicit drug use. The figure climbs to

almost one in four (24%) when the group at highest risk - young males - is considered alone. These are estimates based on self-reports and must be viewed as conservative figures for the true point-prevalence of addictions among the employed. Most of these workers also abuse alcohol, and an additional 6.3% of the workforce report heavy drinking without the complication of other drug abuse.

In summary, nearly 15% of workers report use of illicit drugs, a current problem with alcohol, or both. Other data (NIAAA, 1986) show the presence of serious personal problems in 10% of the workforce, a factor that greatly undermines productivity and job satisfaction. At least half of these problems are alcohol- or drug-related, and this mixed personal and substance abuse problem appears especially concentrated in what would otherwise be the most productive work years, when experience is ripened and vigor is at its peak, from age 30 to 49.

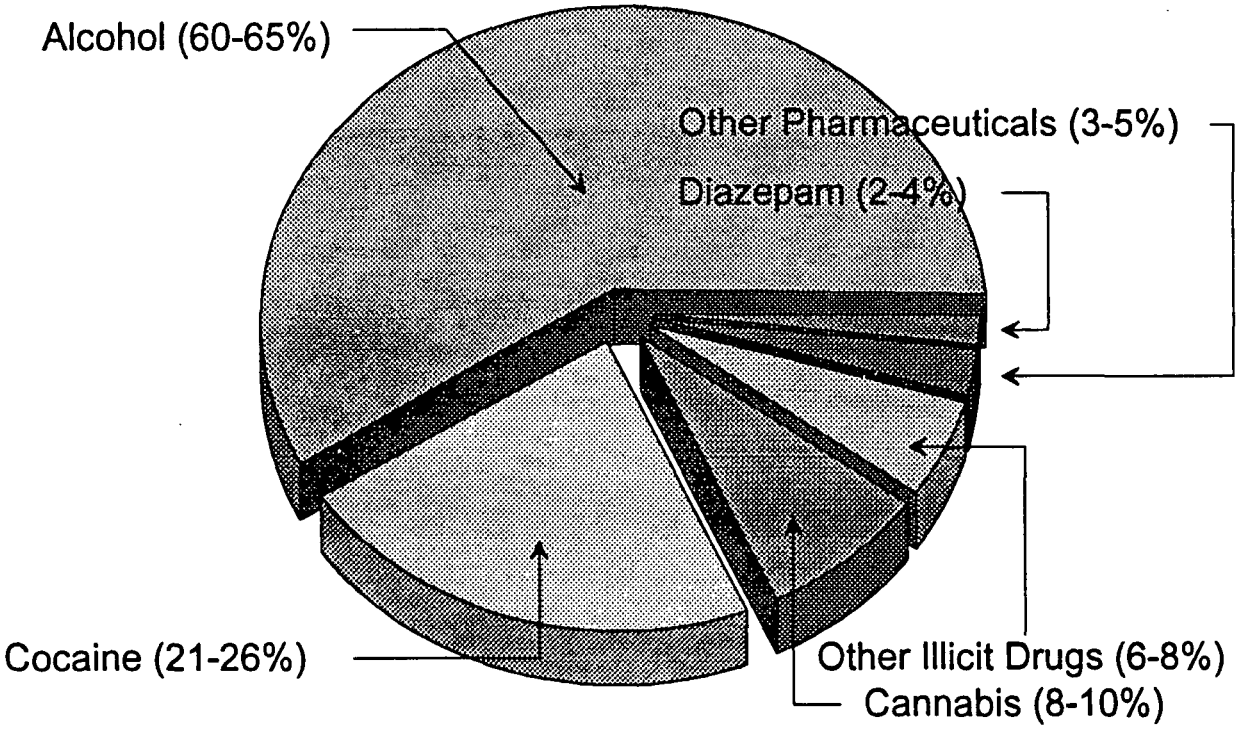
The types of substance abuse encountered by workplace programs have changed dramatically over the past decade (Figure 5-1). Some reports indicate an approximate doubling of nonalcohol drug-involved EAP cases during the 1980s, a problem that is especially acute in organizations with a high representation of skilled, unionized males among their workers. Unfortunately, while EAPs blossomed in the 1970s and 1980s, awareness of employee drug problems, and management willingness to intervene in them beyond the provision of a drug-screening program, was not well developed until relatively recently.

> Attention to employee drug abuse was briefly prominent during the early 1970s, although the concerns were diffuse and not well-defined. ... The issue of employee drug abuse was not ignored by employers concerned with job performance and safety issues, and was considered within both fitness-for-duty and assistance-oriented policies. However, as an issue "in its own right," it was relatively dormant during most of the decade of the 1970s and into the early 1980s, the period during which EAPs diffused rapidly and the number of EAP workers expanded geometrically. (Roman, 1989)

It can therefore be expected that much of the research reviewed in this chapter will suffer from the same

Figure 5-1

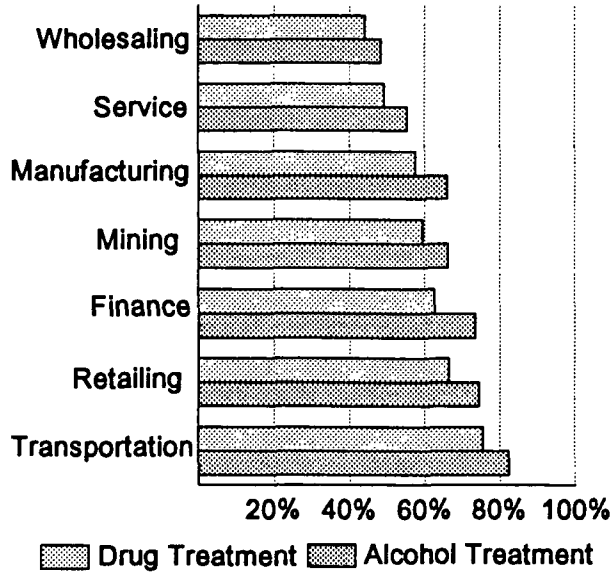
Primary Types of Substance Abuse Encountered by Employee Assistance Programs



Source: Roman, 1989

Figure 5-2

Employee Coverage for Addictions Treatment, by Industrial Sector



Source: Morrisey & Jensen, 1988

problem with focus as that reviewed in Chapter 4, namely an emphasis on alcoholism to the near exclusion of other drug involvement in the workers being studied. This despite the fact that Roman's (1989) data show that nearly a quarter of patients referred to EAPs report primary problems with cocaine, and almost an equivalent number report problems with cannabis, diverted pharmaceuticals, and other addictive agents.

An attempt at reclamation of these valuable workers appears warranted on the basis of organizational research. When addicted workers are identified, referred and successfully treated, most studies find few differences between them and their normal coworkers in terms of performance, on-time attendance, job retention, error rates and wastage, job satisfaction, and other important performance markers (Graham & Gottcent, 1978; Wijting, 1979). In fact, some studies show that workers referred to treatment through worksite programs show extremely high success rates and a return to optimum functioning. Prognosis is particularly favorable when the worker occupies a position of prestige and has long periods of training and credentialing invested in his or her career (Korcok, 1983). This is a finding that has given much momentum to the development of "impaired professional" programs of all sorts, making them increasingly prominent on the professional landscape.

Even when direct services are not offered, but health insurance coverage for addictive illnesses is, the outlook and attitude of American employers continue to improve. Coverage for alcohol and other drug abuse treatment, once extremely rare in most benefit packages, is now quite commonplace, as Figure 5-2 indicates. In fact, the majority of the workforce in most industries has some health insurance coverage for addictions treatment, and in some industries, such as transportation, a fairly generous level of benefits is the standard appealed to when labor/management contracts are renegotiated. Drug abuse coverage, once practically ignored as a benefit, is now very nearly on a par with coverage for the more traditional concern of employers, alcoholism. This positive response of industry in the form of benefit packages is supported by the many advantages of the worksite program to workers, their employers, the employer's health insurance underwriter, and treatment programmers, some of which are summarized in Table 5-1.

In the single decade of the 1980s, the number of EAPs in the United states increased by a factor of 4, from 5,000 to 20,000, now serving more than a third of the entire work force (Englehart et al, 1992). These programs are especially common in the largest industries, where 70% of management see their EAP as a standard employee benefit, 50% see it as an aid to supervisory work, 40% see it as a form of health care cost containment, and 30% see it as way to avoid litigation (Kingman, 1990).

Now, though, even small employers are able to combine with others in consortia to purchase EAP services from any of the more than 600 private consulting firms now offering these contracts.

Table 5-1

Some Advantages of Worksite Interventions

TECHNICAL ADVANTAGES
Convenience to employees
Presumed high quality if company sponsored
Services viewed as part of compensation
High degree of voluntary participation
Potential for social support of lifestyle changes
Potential for long-term interventions
HEALTH PROMOTION BENEFITS TO COMPANY
Reduced health care costs
Reduced turnover and absenteeism
Increased productivity and worker fitness
Increased worker coping ability

Source: NIAAA, 1985

EAPs have developed around a "core technology" of six elements. First is the use of job performance measures to identify, confront, and evaluate the post-treatment fitness for duty of impaired employees. Second is the provision of consultation and personnel-management training to supervisors and shop stewards, particularly training in the identification and "constructive confrontation" of impaired employees. Third is the constructive confrontation of the employee him/herself, who is usually informed that his/her job is in jeopardy, performance-based improvement is expected, and referral to treatment may be a helpful step in affecting that change. Fourth is the referral process, by which workers are briefly evaluated and, typically, referred on to in-house or off-site substance abuse treatment. Fifth is the maintenance of working alliances between the organization, the supervisor and the addictions treatment service provider, and sixth is the development of an organizational structure that is intolerant of drug abuse but friendly to its treatment.

No solution, however, whether EAP, employee wellness program, or alcohol and drug abuse treatment coverage as part of an employee's benefit package, is without cost. Problems with addicted employees are exceedingly expensive for industry to ignore. But with addictions treatment accounting for a relatively small proportion of the total health care cost to industry (between 1-4%) and with a demonstrated health care cost-offset following treatment of addicted employees, this outlay continues to be an excellent investment. When treatment costs of alcoholism and other drug dependencies are broken out from other health care expenditures, substantial cost-benefits ratios quickly emerge.

Currently, a movement toward cost-containment is beginning to take root, both within the EAP industry and in public advisory councils (e.g., Office of Technology Assessment, 1983). This is in response to the growth in overall health care costs, a growth that has caused the re-emergence of concerns for the utility, on strictly socioeconomic terms, of addictions treatment and other health care as benefits offered to the workforce population.

These are concerns that were raised before, and answered affirmatively, in a tradition of research going back now nearly 40 years. In fact, just as industry was among the first elements of society to install addictions services, it was also one of the first to evaluate its outcome from both clinical and socioeconomic perspectives. Nonetheless, "The growth of professionalization and the concomitant increase in demand for third-party payments ... call for reliable evidence that the escalating demand for resources is justified by program results," (Kurtz et al, 1984, p. 43). A national survey conducted in the late 1980's (Backer, 1989) of 1238 EAPs nationally indicated that concern about the ability of workplace programs to effectively confront the issue of drug abuse was the single most important issue likely to emerge in worksite programming in the 1990s. In the discussion which follows, much of this research will be reviewed.

With a few exceptions, socioeconomic analyses of addictions treatment in workforce populations are the most unsatisfying, occasionally even misleading, of any in the broader literature examined in this Technical Appraisal. Like the literature examined in Chapter 6, *Addictions Treatment in CJS Populations and Narcotics Users*, most studies with workforce grous focus on cost-benefit analysis. Cost-effectiveness research is rare, and cost-offset research, though the worksite would be as conducive to this kind of work as were the HMOs and group health practices reviewed in the last chapter, is represented by only a single study so far.

The forces behind these problems with the literature are understandable. First, most early workforce interventions were an additional capital and above-the-line expense for employers, who demanded hard arguments justifying their cash outlays if worksite addictions programming were to survive in the business environment. The prime interest of these managers and corporate decision makers was in the potential for worksite addictions programs to benefit their employee groups and therefore their managers, so that outcomes expressed in the financial and industrial terms of cost-benefit analysis - reduced sick time, fewer disciplinary actions, etc. - were to dominate the socioeconomic research in this area.

At the same time, there were few treatments in apparent competition for resources in this early era. Thus, there was little motivation to conduct high quality cost-effectiveness research except in systems such as the United States Air Force, which had developed a system of competing treatment approaches susceptible to cost-effectiveness research. Similarly, medical care was less prominent a feature of the balance-sheet when most of the collected literature was developed, and thus the impetus for cost-offset research was delayed nearly until the present.

If some of these features explain the focus of the literature as a whole on cost-benefit analysis, others explain the generally poor quality of the data. Most obviously, much of the research reported on workforce populations was developed before clinical outcome research in mental health - certainly before controlled outcome

research on addictions treatment - was at a more than rudimentary level, methodologically.

Second, those awarded the research mission - consultants called in from the local office of the National Council on Alcoholism, an occasional academic venturing into the field, and most frequently the treatment programmers themselves - typically had neither the research background nor the material resources needed to improve the quality of their research.

Third, the zeitgeist for much of the addictions research community at that time leaned more to program evaluation than to controlled research. As one of the leaders of the occupational alcoholism movement remarked:

> There is yet no effort to stimulate or recruit research skills into the field; rather there seems to be a general assumption that if research is done it will be carried out by occasional efforts of outsiders or by the hasty, but enthusiastic, efforts of energetic amateurs. (Trice, 1980, p. 4)

This had also been the case for the treatment of drug abuse (as discussed in the next chapter), but this sector of the addictions treatment community was, paradoxically, "saved" by the presence of serious narcotic and other drug addicts with criminal justice involvement, who caused federal service and research institutes along with their highly competent researchers to focus substantial resources on the development of the kinds of longitudinal prospective cohort evaluations reviewed in the next chapter. Neither this kind of anxiety nor funding levels were available to those conducting evaluations of addictions treatment in workforce populations.

For all of these reasons, most of the studies reviewed in this chapter are examples of program evaluations rather than methodologically sound outcome studies.

Cost-Benefit Studies

As should already be clear, cost-benefit studies dominate this literature. As already noted, most of the literature lacks evidentiary standing, making its introduction into informed debate a mixed blessing, though a number of poor quality reports are regularly introduced in reviews such as the present one without regard to their quality. This is not necessary, and it will be shown that, even with appeal only to studies with good scientific quality, strong cost-benefit arguments can be made for worksite addictions programs.

Kurtz, Googins & Howard (1984)

The most appropriate place to begin the discussion of cost-benefit analysis of addictions treatment with workforce populations is with the most incisive methodological review of the area yet published, the piece by Kurtz et al (1984). In their review, these scholars at the Florence Heller School at Brandeis analyzed 25 studies purporting to measure the "success" of occupational alcoholism programs.

Kurtz et al (1984) noted three principal difficulties facing reviewers of this area. They are (1) lack of agreement across studies on how success of occupational programs should be *defined*, (2) lack of rigor in how success is *measured* or evaluated, and (3) maintenance of strong *barriers to improving the state of the literature*, both from within the corps of program analysts, but more importantly from the organizations in which the programs are deployed and where success is gauged.

In regard to the first point, the authors noted four outcome markers with which the field has historically been interested. These are (1) change in drinking (or drug use), (2) improvement in work performance, (3) reduction of production and management costs, and (4) penetration rate. They found little quality of measurement for any of these domains in most of the literature, nor in many cases even general agreement on the proper criteria by which to judge program performance. For example, changes in drinking or drug use behavior have been variously operationalized as (1) abstinence or sobriety as in the Illinois Bell study, (2) reduction in consumption as in the GHAA study, (3) "recovery," as in a report from Boeing Corporation, or as "social recovery," "rehabilitation," and so forth.

Similarly, improvement in work performance, though theoretically and even practically susceptible to fine scaling techniques, has not been well documented in many of the studies reviewed. "Clearly, the majority of these measures lack operational specificity. This confounds attempts to make an overall assessment of program outcomes," (Kurtz et al, 1984, p. 35). Different studies have used different measures of work performance, including absenteeism, disciplinary actions, illness, accidents, turnover, and work efficiency, making the accumulated results very difficult to compare and synthesize.

Cost reductions have also been approached from a confusing array of directions, with savings from less worker replacement, disciplinary actions, number of accidents, or instances of early retirement being emphasized by some program evaluators, while others looked at increases in production, and still others focused on positive changes in morale, job satisfaction, relations with other employees, and so on.

Finally, *penetration rate* is a specialized concept in occupational addictions program that

> ... is based on the extent to which a program reaches the target population. The concept of penetration is derived from the public health model for intervention and is based on the assumption that there is a group at risk within the general population and that intervention programs are successful to the extent that they penetrate the risk group. (p. 36)

Penetration rates vary among EAPs as a perceived function of the program's effectiveness. Penetration rates are typically on the order of 1.5% of the work force during a 12-month period (Blum, 1989). The penetration rate is one of the most common and most highly touted measures of occupational addiction program success, frequently being the only measure mentioned in a report. But penetration says nothing about treatment success, much less the socioeconomic worth of treatment, and its emphasis in much of the evaluation research has not been helpful to the growth of occupational programs.

In regard to the second point, Kurtz and his colleagues noted serious, nearly universal flaws in the conduct of program evaluations in worksite settings. "In our review of the literature, we were unable to find any evaluation of [EAP]s that represented a reasonable approximation of the minimal research design," (p. 37). They noted significant flaws in assignment of subjects to treatment groups, in provision for adequate follow-ups, and in the documentation of outcome measures, particularly measures bearing on changes in drinking or drug use as the criterion of program success.

The final and most troubling point raised by the authors concerns the barriers to improvement of the research designs that may well be part of the "culture" of the worksite and of the occupational addictions programmers who conduct and evaluate their services there.

> The lack of evaluations is due in part to the recency of the activity but also to the real obstacles that make such evaluations difficult: the orientation of corporations, the orientation of program staff, the orientation of patients, problems of record-keeping, access to programs and perception of the value of research. ... The absence of professional researchers is perhaps more prominent in OAPs than in any other treatment context. Academic researchers who have actually conducted research in such settings number less than a dozen. In part, this is a function of the lack of interest on the part of researchers for who OAPs are unknown research environments. Moreover, those who venture to conduct research in occupational contexts are often put off by the relatively complex relationships that must be negotiated. (pp. 43-44)

Nevertheless, "As the novelty and excitement of the initial growth of the EAP movement subside, there will be an increasing demand for documentation of the benefits of the programs," (p. 42). The review of studies which follows is an attempt to satisfy this demand for documentation, though with an eye to the kinds of difficulties already noted by Kurtz and colleagues. In their review of 25 studies, only a few were in their view and are in ours worth a studious look here. Unaccountably, one very high quality study, the RAND Air Force Study (Orvis et al, 1981) was overlooked by Kurtz, and of course several other studies have appeared since the earlier review and are presented here.

Another review of 25 studies, many of them with a workforce focus, was examined in Chapter 4. This is the detailed review of Jones and Vischi (1979), who looked at 13 studies of the socioeconomics of mental health care, and at 12 studies of the socioeconomic outcomes of occupational addictions programs. Of these, most - such as the Illinois Bell Telephone Study (Hilker, 1974) or the Oldsmobile Study (Alander & Campbell, 1975) - are seriously flawed, while the best studies - the JWK Study (NIAAA, 1976), the GHAA Study (Brock & Boyajy, 1978) or the Kaiser-Permanente Study (Sherman et al, 1979) - were evaluations of addictions treatment with general clinical populations rather than workforce groups, and so are reviewed in Chapter 4.

However, one of the most frequently cited studies featured in the Jones and Vischi review is presented below. It featured health-oriented outcome measures, and is given in enough detail that the findings, as well as the shortcomings, can be usefully evaluated. The work also includes enough information about program costs that it can be presented for more than the mere purpose of illustrating the underdeveloped state of the workforce literature, but rather for defining as well the socioeconomic results of addictions treatment in workforce populations.

Philadelphia Police and Fire Studies (1975)

The study referred to is an evaluations of an occupational alcoholism program for municipal employees of the Philadelphia Police Department and Fire Department. It is particularly useful in that it includes reports of comparative costs to the sponsoring organization for Occupational Alcoholism Program (OAP) program referrals utilizing inpatient vs. outpatient treatment services, and of estimated dollar benefits accruing to the municipality as a result of the OAP program. These kinds of detailed cost and cost-benefit figures are rare: Houts (1991) reports that while 79% of EAP administrators agree with the need for cost-justification, only 40% of them claim to do any kind of socioeconomic evaluation of their services, only 10% claim to be able to report dollar figures, and an even smaller number can actually do so. The Philadelphia report,

particularly that larger and more detailed report of the program developed for the Philadelphia Police Department, must therefore be viewed as remarkable for its time.

At the time of the study, the Department included 8,000 uniformed officers and an additional 2,000 civilians who were eligible for program services. After the appropriate startup period in which supervisory detection and referral training was provided to 915 senior officers, the program achieved a referral rate of 150-170 new cases a year, a very respectable penetration rate of 15 to 20% of the service-eligible group.

An evaluation was then conducted by specialists from the National Council on Alcoholism, who used OAP counselor salaries and overhead along with sick leave pay of the referred officers while in inpatient treatment as their cost vectors. Reduction in sick leave was the primary outcome variable. While this focus on sick leave may seem to narrow to some reviewers, the emphasis is in fact well placed: Schramm (1977) reports that lengthy absence is by far the dominating cost of workforce alcoholism, with workers who are eventually referred through their EAP accounting for up to eight times the sick leave benefits and temporary replacement costs of normal workers in the year prior to their referral.

In the Philadelphia Police study, results were reported for the first 170 cases seen by the program. Of these cases, only about 65% came through the "normal" channel of supervisor confrontation and coerced referral. Rather, the Philadelphia program showed a good proportion (15%) of self-referrals, with another 20% of referrals split between family/friend pressure and the advice of the departmental medical office.

The researchers were careful to calculate a cost vector consisting of both direct costs (the resources necessary to operate the Police Department program) as well as the kinds of indirect costs that Schramm (1977) later emphasized but that are rarely included in reports of this type, such as sick leave time and benefits necessary for patients to participate in treatment. Cost figures did not, however, include the direct cost of inpatient treatment for the undetermined number of policemen who received this higher level of care, under the theory that inpatient treatment costs were borne by the Police Department's insurance underwriter and were not a direct cost to the City of Philadelphia. Benefits were easily evaluated, consisting principally of savings from reduced sick pay and leave payments, as well as of other performance parameters such as injuries and suspensions. The authors also had access to departmental norm figures for three of the outcome indicators - annual sick leave, injured days, and suspensions - and include these in the report.

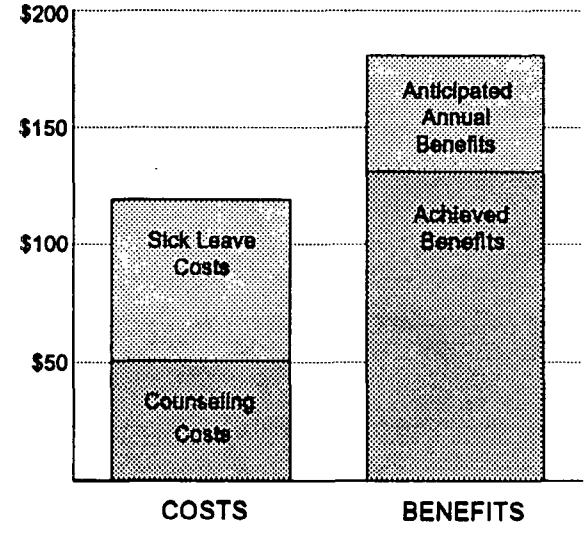
Their contrast of the outcomes of inpatient treatment vs. outpatient counseling is contaminated, though, by an unfortunate limitation of the data on outpatient treatment: "[T]hree groups had to be included in this category - those who actually accepted and received outpatient counseling, those who refused treatment and improved through their own efforts, and those who refused treatment and grew worse. Unfortunately there was no adequate way to separate these groups ..." (p. 12). Only the inpatient treatment group did not contain treatment refusers or dropouts, so that the inpatient/outpatient contrasts are at best misleading, and are not presented here. It should be borne in mind, though, that even the data in which the inpatient and outpatient results are collapsed includes some proportion of cases "who refused treatment and grew worse," so that the test of program cost-benefit must certainly be a more conservative test than some others.

Results for the principal test of cost-benefit during the combined first two years of program operation are given in Figure 5-3. As shown there, benefits for a two-year period exceeded costs by more than 10%, and an additional benefit equal to 42% of program costs was anticipated for succeeding years, based on the improvement of policemen already treated and without the investment of additional treatment or OAP resources.

Thus, based merely on benefits recouped during the period of service delivery without any assumption of the durability of treatment effect, the Police Department program shows a CBA ratio of 1.1:1, a ratio that rises

Figure 5-3

Costs vs. Benefits ($ thousands) in Philadelphia Police Department OAP



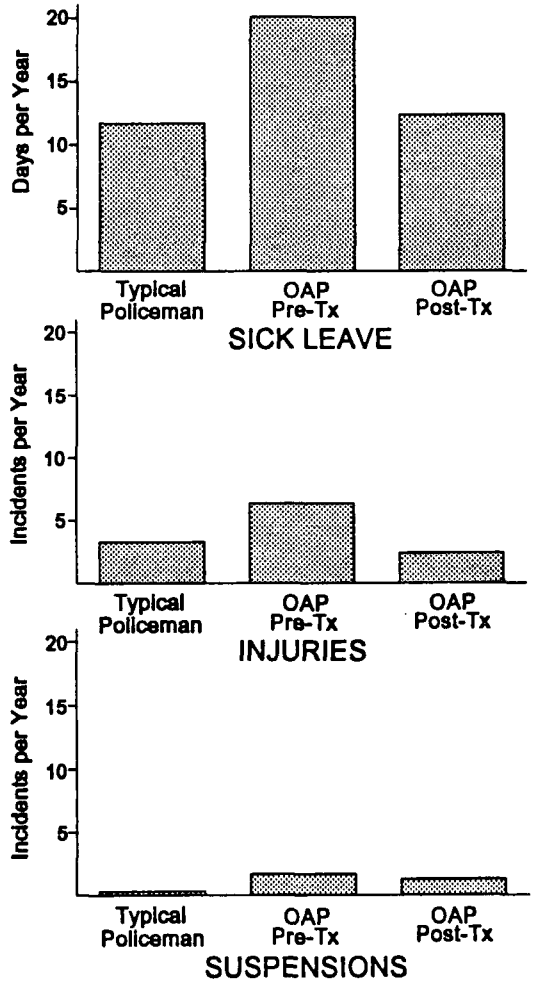
Source: City of Philadelphia, 1975

to 1.52:1 if treatment effects are believed to be sustained in total for an additional year, 1.94:1 if effects persist still another year, and so on. In terms of costs to the Police Department its occupational addiction program appears justified in cost-benefit terms on the basis of immediately tangible treatment effects only.

Additional non-dollar-based benefits were observed in injuries (62% decline) and suspensions (24% decline), and program participants compared favorably, post-treatment, to the figures for the "typical policeman" developed by the authors (Figure 5-4). Similarly positive results were obtained with an program developed subsequently in the Philadelphia Fire Department and reported in the same source.

Figure 5-4

Other Outcome Indices in Philadelphia Police Department OAP



Source: City of Philadelphia, 1975

Franco (1960)

An even earlier study to appear was a five-year follow-up evaluation of the occupational alcoholism program of ConEd of New York, which had been put in place in the late 1940's as one of the original OAPs in American industry. Kurtz found the study to have a too-brief follow-up period of only one-year in some cases, and the treatment refusers who constituted the comparison group must be suspected to differ in many important respects from those who accepted referral and completed treatment, but the study is otherwise superior in many respects to its peers, even those reported much later.

Altogether, Franco followed the outcome of 253 cases who were referred to the Consultation Clinic for Alcoholism that was set up at Bellevue Hospital in New York to handle referrals from ConEd and other local companies. Cases were admitted to the clinic between 1952 and 1957, and were reevaluated at about a year posttreatment. Treatment processes themselves were not specified, nor was one of the indices of outcome - social recovery - but job retention was the principal object of interest due to the high cost of replacing skilled electrical workers, and is featured in the report. Results are shown in Table 5-2.

As is shown there, the supervisory confrontation and referral components of the OAP may have had some effect. About three-fifths of ConEd workers who were confronted and referred, whether they accepted the referral to the OAP or instead viewed the confrontation as a "warning shot" and modified their behavior without help, retained their jobs. Franco remarked that most of those who would lose their jobs would do so within a year of referral to the OAP, so that the high percentage of workers who were retained at one year were likely to be secure thereafter.

He also notes, though, that while those who accepted or refused a referral to the OAP differed little in terms of job retention outcome, they differed markedly in terms of continued drinking symptoms. In the group that accepted referral and continued treatment, "... more than 60% are considered socially recovered and 30% are much improved. By contrast, among the 57% [of refusers] who maintained their jobs ... only 25% have made real progress toward social recovery," (p. 161). Franco concluded:

> The long-term experience with the Consolidated Edison Company Procedure on Alcoholism in the 10 years from 1948 to 1957 indicates ... that nearly 60% [of employees with a drinking problem] were successfully rehabilitated when reviewed over a follow-up period of more than five years. There has also been a reduction in absenteeism in the rehabilitated cases. These facts would indicate that a company program is a positive step toward the prevention of disability from chronic problem drinking. (p. 162).

Franco's findings are by no means definitive, and are

Table 5-2

Job Retention Effects of ConEd OAP at One-Year Follow-up

TREATMENT STATUS	NUMBER AND OUTCOME TOTAL NUMBER	RETAINED JOB	TERMINATED FROM JOB
Referred to OAP	190		
Continued Treatment	128	60%	40%
Discontinued Treatment	62	43%	57%
Refused Referral to OAP	47	57%	43%
Not Referred to OAP	18	31%	69%

Source: Franco, 1960

troubled by the lack of detail and inappropriateness of the comparison group, as Kurtz had already noted. However, the unambiguity of job retention as opposed to the softer measure of "rehabilitation" used in so many other studies is a strong point. Also intriguing is the finding that even persons who refuse referral for treatment can be sufficiently affected by a supervisor's confrontation that they control their drinking behavior and salvage their jobs.

The Detroit Study (1978)

One of the most detailed and valuable cost-benefit analyses to emerge from the occupational literature is *Cost-Effectiveness of Occupational Employee Assistance Programs: Test of an Evaluation Method*, often referred to as the Detroit Study. Prepared by faculty of the joint Institute of Labor and Industrial Relations of the University of Michigan and Wayne State University, the research report of Foote, Erfurt, Strauch and Guzzardo (1978) is the result of one of those rare intrusions of academically trained program evaluation researchers into the occupational arena.

Published under one cover as a thick monograph, the Detroit Study discloses findings on occupational program effectiveness and cost-effectiveness with a complexity rarely attempted elsewhere. It has a number of strengths as a cost-benefit study in the workforce area, including (1) a large sample size ($n \cong 549$, depending on the specific analysis), (2) its use of multiple cost and benefit measures, (3) its use of multiple research sites, the only study in this literature to do so, (4) the generous detail provided in the report, and others that will be developed in the discussion to follow. It has, as well, a number of weaknesses, some of them springing from limitations in the databases at particular sites, and others proceeding from general limitations of the kind of data accessed.

For example, the authors were able to assign dollar values to a variety of pre-/postintervention worker performance indicators, in true cost-benefit fashion. They were not able, though, to access authoritative information on program costs for the worksite programs they evaluated, so that explicit cost-benefit ratios could not be reported. The authors had to rely on figures of post-intervention cost-savings, a less definitive approach to the cost-benefit question.

The research developed out of an inter-institutional dialogue in Detroit in the mid-1970's.

> The research reported in this book is a product of the concerns of employee assistance program staff members regarding methods for evaluating program impact. These concerns became a major agenda item for the Research Committee of the Greater Detroit Area Chapter of ALMACA ... and in early 1976 that committee began to develop a research design that it hoped could be implemented individually by interested programs in the greater Detroit area. (p. v).

Funds for a demonstration project were made available from the Office of Substance Abuse Services of the Michigan Department of Public Health, and the researchers set out to address two major questions.

> (1) Is it feasible to gather evaluative data at a reasonable cost, across a group of heterogeneous occupational programs?
>
> (2) Can the data so gathered be used to estimate a program's cost-benefit? (p. 1).

Occupational programs at eight industrial sites in the Detroit area at first expressed an interest in participating, but four were dropped from the design because of management interference or limitations of their personnel databases. Finally, four programs - two at durable goods manufacturing companies, and one each in a nondurable goods and service industry, and all serving corporations with workforces of between 600 and 10,000 - joined the research consortium, with samples of 311, 22, 57 and 159. They are very well described in the report, but are referred to there anonymously.

The authors sought cost-benefit data in seven domains, and were able to obtain it in most instances from most of their sites, though peculiar limitations of certain data at certain sites are candidly discussed in the report. Questionnaires and data collection instruments are given in the report's appendix, and major variables are given here in Table 5-3. At each of the four participating sites,

> The study gathered information for each client on these seven work performance variables for a period of 24 months - 12 months prior to the month of initial entry into the program ... and 12 months after the month of entry. Therefore, in order to be included in the study, clients must have been employed full time for at least one year prior to program entry and one year after. The target group of clients were those clients entering the program during one or more of the years 1973 through 1975. (p. 4).

All data were gathered either by program staff, or by research assistants from the University of Michigan.

Table 5-3

CBA and Program Performance Variables in the Detroit Study

VARIABLE TYPE	VARIABLE
Work Performance Measures	Absenteeism
	Number of disciplinary actions received
	Number of grievances filed
	Number of on-the-job accidents
	Number of visits to plant medical unit
	Amount of Worker's Compensation paid
	Amount of Sickness and Accident benefits paid
Client Data	Demographic characteristics
	Job classification, wage level, seniority
	Source of referral to OAP
	Type of work performance problem
	Type of behavioral/medical problem
	Type of treatment received and diagnosis
	Worker's acceptance of OAP intervention

Source: Foote et al, 1978

Though there was a good deal of variation in worker demographics across the four companies, in general most employees referred to the worksite intervention programs were male (64 to 99%), White (61 to 90%), of average age (36 to 49 years old) and seniority on the job (eight to 15 years) for their company peers.

Though one program had a 74% self-referral rate, most employees in the study as a whole were referred by their supervisors or their company medical unit. The kinds of problems experienced by these workers are shown in Table 5-4. In many cases, the behavioral or medical problem classified for each worker was derived from the client's own description, as well as the diagnosis offered by the treating agency if the worker was referred for service. The authors were required to make this adjustment because of the relative rarity with which workers construed their problems themselves in terms of alcohol or other drug use. The authors found a substantial number of drug problems, not specified further, in this multisite sample, typically concentrated among younger workers.

> At the time they entered the program, the clients were very reluctant to admit to the counselor, and perhaps to themselves, that they had a problem with alcohol or other drugs. The clients often described their difficulties as some type of family or marital problem, or as a medical problem or a problem with their job. (p. 16)

Once confronted and referred to the worksite program, most employees responded well. About 71% of workers accepted the attempt to intervene in their problems, and about 70% of these cases were found serious enough that they were referred on for treatment. Most often, alcoholism treatment was the service to which the employees were referred, on either an inpatient or outpatient basis. Unfortunately, the report gives little detail about the kind of treatment actually received by these employees, other than to note that their program counselors "... felt that the available treatment agencies in the community were better equipped to treat alcohol problems than other kinds of problems," (p. 22).

The authors next presented an extensive look at the raw clinical impact of the programs they studied. Data on several variables - average hours of absenteeism, average workmen's compensation claims, and sickness and accident benefits received, were analyzed on a quarterly basis.

Figure 5-5 shows these data, from which findings on absenteeism and claims for the month of intervention itself have been edited. In terms of absenteeism, the authors concluded that "... occupational programs *can* have a significant impact on clients' attendance. ... In addition, it appears that the impact may be gradual over the year after intervention, possibly due to a greater use of sick leave in the early months," (p. 28).

Workmen's compensation claims, as well, showed improvement, though the measure was clouded by "... the fact that claims for a single incident may be paid out over a period of several years," (p. 36). It may therefore take a longer follow-up period for gains in workmen's compensation to become fully manifest.

Sickness and accident benefits did not in general show increases, though they were heavily confounded by their use to cover time-in-treatment and other dimensions of employee functioning not attributable to poor treatment effects. "In any case, it seems clear that a one-year follow-up period after program intervention is not a long enough period of time in which to measure a

Table 5-4

Problems reported to OAPs in Detroit Study

COMPANY / PROBLEM	% COMP. A (n = 343)	% COMP. B (n = 22)	% COMP. C (n = 57)	% COMP. D (n = 159)
Performance Problem				
Attendance	56	41	40	72
Productivity	5	23	37	3
Interpersonal Relations	3	14	9	9
Job Safety	3	9	0	0
Other	5	13	7	4
None Reported.	28	0	7	12
Behavioral or Medical Problem				
Alcohol Problem	51	27	75	62
Other Drug Problem	7	0	7	13
Mental Health Problem	23	59	11	NA
Marital/Family Problem	12	5	2	NA
Medical Problem	2	4	0	0
Financial Problem	1	5	5	3
Legal Problem	< 1	0	0	5
Job Problem	1	0	0	8
None Reported.	3	0	0	0

Source: Foote et al, 1978

program's impact on the use of S&A benefits," (p. 41).

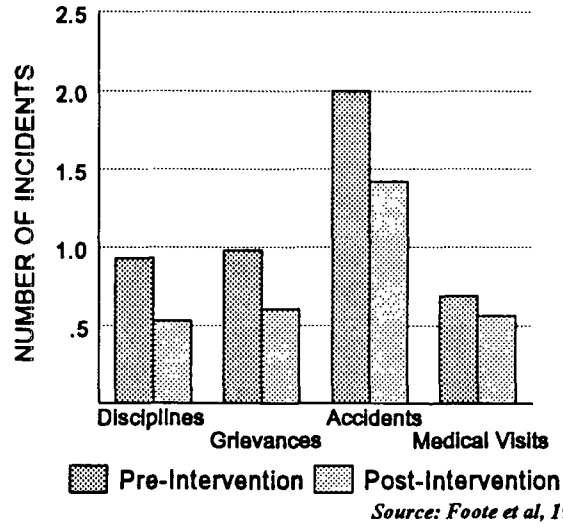
The four other principal outcome measures - number of disciplinary actions, grievances, on-the-job accidents, and visits to the medical unit - were not analyzed with the same longitudinal method, but merely at a more gross level of average number of incidents before and after treatment. Results are given in Figure 5-6. In terms of effects of the Detroit programs on indices of work performance, the authors were quite satisfied.

> In general, the four programs included in this study showed a similar impact on their clients' work performance, as indicated by the seven measures described above. Absenteeism declined for those groups that had excessive absenteeism prior to intervention, and was near normal levels by the second half-year after intervention. Grievances and disciplinary actions declined substantially ... and were near the company norm, for the one program that had company norms available.
>
> On-the-job accidents, visits to the company medical unit, and workers' compensation payments generally showed reductions after program intervention. (p. 41)

The authors drew additional points from their data. First, they caution that programs which deal with chronic illnesses such as alcoholism and drug addiction "... must expect slow recoveries," (p. 42). Second, "... it would appear that a longer time period is necessary to evaluate a program's impact," (p. 42), particularly when economic indicators that are closely tied to the recovery process and are slow to change, such as sickness and accident benefits, are the criterion measure. And third, they caution that company norms should be appealed to whenever possible, just as the socioeconomic researchers looking at cost-offsets in general clinical populations compare the health care

Figure 5-6

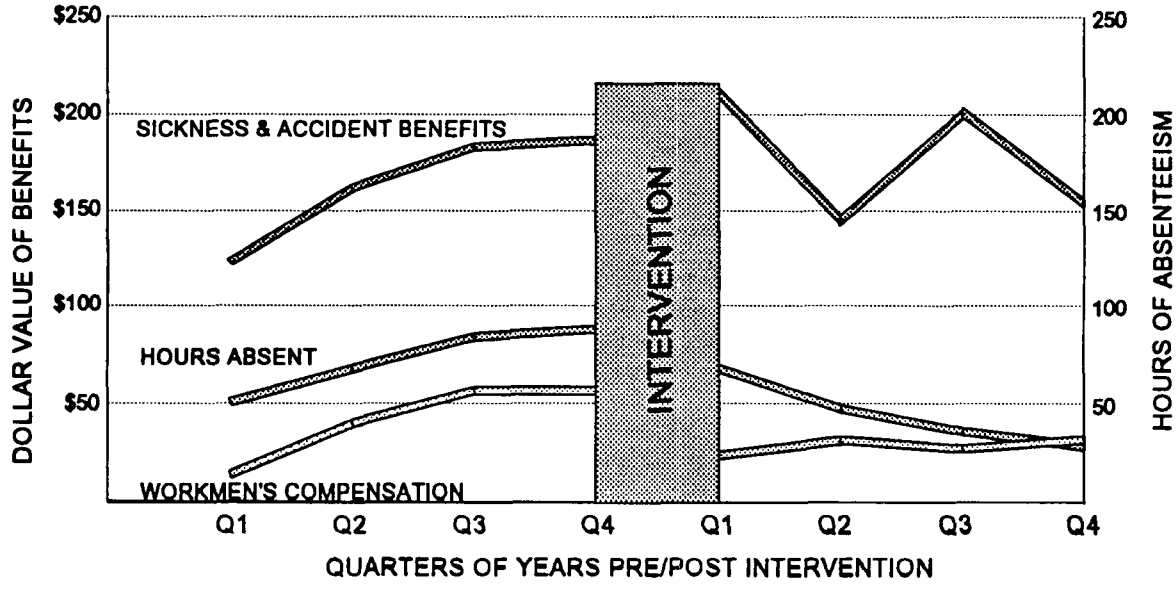
Job Performance Outcome Measures in the Detroit Study



Source: Foote et al, 1978

Figure 5-5

Three Outcome Measures in the Detroit Study



Source: Foote et al, 1978

utilization rates for alcohol-involved patients to uninvolved comparison subjects.

The authors went on to conduct a variety of contrasts between employees with different presenting medical and behavioral problems - e.g., alcoholism vs. other drug addiction vs. mental health problems. They found that, in general, employees identified with alcohol abuse had work performance difficulties no worse than other patients, but that drug abusers had more severe work impairment on a number of dimensions.

Having shown the general clinical effectiveness of the worksite programs participating in their study, the authors turned to a cost-benefit analysis of the Detroit results. As the authors noted,

> One of the objectives of this study was to determine whether cost-benefit analysis of occupational programs could be done using the types of work performance measures described ... This is an important question, because cost-benefit analyses are often used to assist in making judgments about where to allocate company resources. If an occupational program can demonstrate that, for a certain level of cost, an equivalent or larger monetary benefit can be produced, then it is in a good position to argue for increased resources, or at least a stable resource base. (p. 59)

The authors then went on to devise and report a series of decision rules for valuing changes in the seven performance parameters they studied. Absenteeism was valued straightforwardly at the hourly wage of the absent employee. On-the-job accidents were valued as the wages lost because of the accident, a visit to the medical unit was valued as one hour's lost time, a disciplinary action was valued as three hours lost wages, grievances as five lost hours, and both workmen's compensation and sickness and accident benefits could be translated directly into dollar terms.

Unfortunately, their cost-benefit analysis plan was frustrated by two problems. The first involved limitations of the data at two of the sites - the largest (Company A) and the smallest (Company B) - so that results could not be calculated. Company A did not have reliable data on changes in absenteeism, the largest benefit vector, forcing the authors to compute a negative cost-saving. The referred workers in Company B did not differ, pretreatment, from company norms on many important performance indicators, so that their improvement was capped by a "ceiling effect," also showing a negative cost-saving.

More importantly, however, the authors could report only cost-savings as a result of occupational program activity, not true cost-benefit ratios, since program costs themselves were difficult to determine. The authors indicate that "... the measured benefits were sufficiently large to suggest that both programs [Companies C and D] were cost-beneficial for their companies," (p. 82).

They found, for instance, that the average employee in Company C who accepted referral to the plant EAP experienced more than $2,700 in reduced costs to the company - mostly in reduced absenteeism and sickness and accident benefits - during the first post-referral year. The average employee in Company D experienced about $1,250 in first-year cost savings. These first-year cost-saving presumably exceed program costs themselves, rendering the programs cost-beneficial as the authors indicate.

They, however, did not point out, as they might have, that these cost-savings can be expected to persist over time, so that the benefits ultimately reaped longitudinally might be several times those observed during the first post-referral year. The next study reviewed explored just that issue, the persistence of program effects, among other matters.

The Canadian Rail Study (1985)

One of the strongest studies to emerge in the literature on socioeconomic analyses of addictions treatment in workforce populations was performed at the behest of the Canadian National Rail System - Great Lakes Region by Groeneveld, Shain, Brayshaw, Keaney and Laird (1985). It is often referred to as the Canadian Rail Study. It is one of the very few controlled studies in this literature, and is one of the most impressive cost-benefit studies of an occupational addictions program ever conducted. As was the Detroit Study, the Canadian Rail Study was conducted by academically trained researchers, from the Addiction Research Foundation in Toronto. Their presence clearly improved the quality of the research.

The study is methodologically superior to most others on a number of grounds. These include (1) the large size of its employee sample (total $n = 429$) including 131 occupational addictions program participants and a randomly selected comparison group of 298 similar workers, (2) its use of multiple outcome measures that were objective and open to independent verification, and (3) the analysis of its data, which resemble in many respects the cost-offset analyses in the Midwestern and Aetna Studies (see Chapter 4).

Even more remarkable, however, is the longitudinal design of the study: Groeneveld and colleagues tracked the work performance of alcohol impaired employees over no less than a nine-year period, from five years prior to contact with their occupational addictions program, through intervention, to three years after the contact year. No other study in workforce populations, and few elsewhere, have attempted to impose such a long observation window.

This methodological advance was made possible by the authors' access to an organization, Canadian Rail, with

a large and extremely stable workforce, so that only subjects with a continuous nine-year band of data could be selected, while still retaining the sample size necessary to the basic design. Also in place at Canadian Rail was an OAP with an excellent penetration rate, this also allowing the development of a large treated sample, and available too was an exceptionally orderly, thorough, and accessible array of personnel records, from which pre- and posttreatment levels of various criterion behaviors could be extracted. In this way, Groeneveld was able to conduct a large-scale retrospective controlled longitudinal study that is difficult to conceive of except under these unique circumstances.

The actual mechanism of the research was quite simple. To begin, Groeneveld identified those performance indices which were available on every Canadian Rail employee during the window of observation of the study. Five solid measures of worker performance were available. Two of them - sick-benefit claims to the Canadian workmen's compensation authority, and long-term disability payments - were readily digestible in financial terms. The three others - days absent, number of disciplinary actions, and days on worker disability - are also measures of primary importance to employers.

Groeneveld then selected all 131 Canadian Rail employees who had been treated through Canadian National Rail Company's occupational addictions program during the index years of 1977 through 1979. These patients had received any of an array of services that are not well specified in the report, but that included brief outpatient counseling through Canadian Rail's proprietary program, involvement in self-help groups, and occasional hospitalization and rehabilitation. Most were returned to their jobs, after which additional follow-up data were taken, for as long as three additional years in some cases. An additional 298 comparison subjects were selected from the personnel rolls of the Canadian Rail system, and their behavior on the five performance dimensions was used to calculate "company norm" averages against which the performance of the treated OAP clients could be compared.

Results from the longitudinal tracking of the treated group are drawn together in Figure 5-7. The resemblance of this figure to those in the health care cost-offset section of Chapter 4 is noteworthy.

Clearly, workers referred eventually to their occupational addictions program show, several years prior to referral, the kinds of performance problems that later prompted the referral. These include sick-benefit claims 120% the normal level, days absent 335% of normal, disciplinary actions 235% of normal, and so on.

Remarkably, all five performance criteria show a marked "ramping up" effect just prior to confrontation and referral to the program. This is also quite reminiscent of the health care cost ramping effect just prior to the index hospitalization of an alcoholic as shown in several of the figures in Chapter 4, and may occur for the same reason: prior to referral to the worksite program, as prior to hospitalization, the alcohol- and drug-impaired worker is approaching a crisis in which illnesses and physical dysfunction are experienced (thus the increase in absenteeism, sick days and disability payments) and to which the environment responds (e.g., through disciplinary actions) in brief and unsuccessful ways. Just as in the health care utilization spike around the time of index hospitalization, the negative performance indicators in the Canadian Rail data ramp up and spike around the time of referral.

Just as impressive, however, is the posttreatment decline in all outcome indicators. Ultimately, alcohol- and drug-involved railworkers referred to the occupational addictions program show a 56% reduction in disciplinary actions, a 55% reduction in absenteeism, a 53% reduction in days on disability, etc.. Curiously, the authors themselves voiced in the report some disappointment with the lack of "convergence" in these outcome measures with data derived from the normal comparison group, not shown.

> Since the inception of EAPs many working in the field have been making the implicit assumption that the adopting company will benefit financially by running these programs. ... This study was an attempt to put this assumption to the test.
>
> Research results involving 131 alcohol dependent employees indicated that the cost of managing program participants increased steadily during the pre-intervention period, reaching its highest level during the referral year which on some variables was 300% higher than the [initial] value. However, the predicted post-program improvement was only marginal. An exception to this was discipline which was normalized during the first follow-up year but increased again thereafter ... (p. 86)

This situation requires explanation; fortunately, an obvious one is suggested in Chapter 4. The insufficiently converging trend lines of referred alcoholics vs. normal comparison worker as shown in the Canadian Rail Study are reminiscent of the finding of Forsythe *et al* (1982) in Chapter 4, in which insufficient convergence in health care costs between treated alcoholics and normal comparison subjects was also shown. Just as was done in Forsythe's case, however, Groeneveld's disappointment should be corrected with the observation that true program benefits are not best measured by the degree of correspondence between a formerly very ill group's behavior and the behavior of a comparison group that was always well.

Rather, true program benefits are best measured as the likely difference between the ill group's behavior in treated and untreated conditions, the *caveat* that stands behind the sophisticated probabilistic modeling of untreated group effects in the cost-offset literature reviewed in Chapter 4. In the Canadian Rail data we have only a rather weak "own control" method, a lengthy pretreatment baseline, by which to judge improvement, the same limitation that beset Forsythe and to which the Holder team responded with Markov Chain and other models.

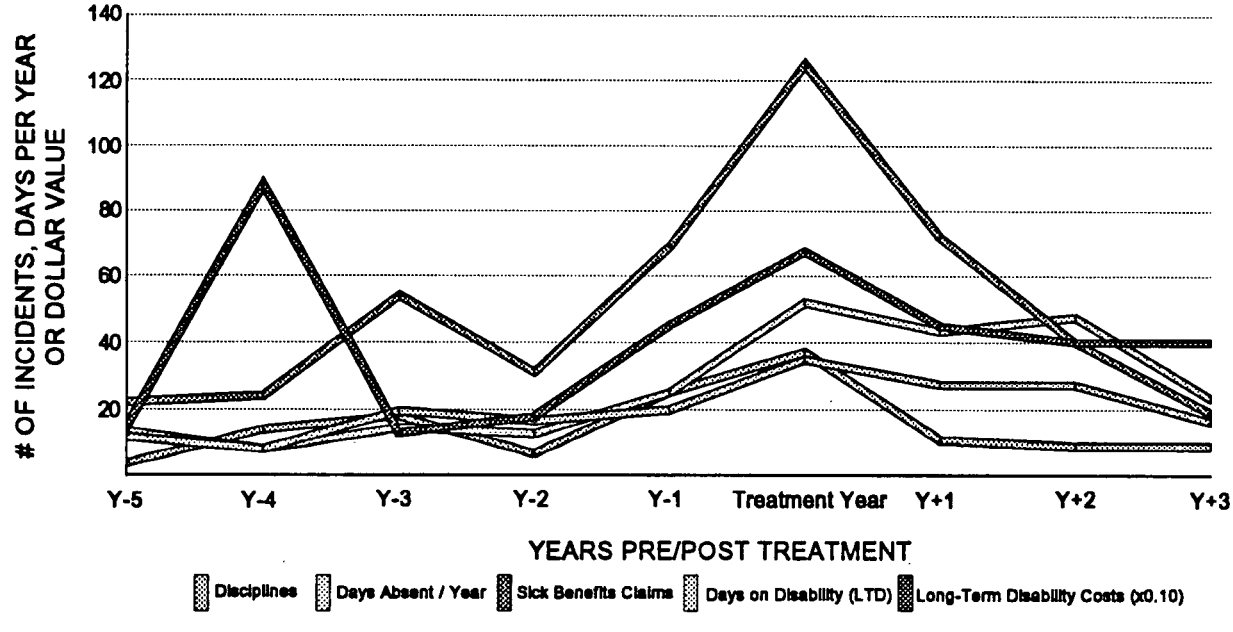
Whether future research in Groeneveld's tradition can import to the workforce literature the elegant methods of cost-offset research in general clinical populations - e.g., extremely long time-frames, statistical estimation (such as Markov Chain modeling) of worker performance under untreated conditions, etc. - remains to be seen.

Three other possibilities can be offered to explain this (relative) lack of convergence between the performance parameters of treated alcoholic workers and their normal peers. First, the authors note that many of the Canadian Rail employees were virtually tenured in their position, with limited contingencies in effect between improvement in performance and continuation on the job. Thus, the kinds of trend lines observed in Figure 5-7 include the behavior of a great many individuals who felt little or no compulsion to control their drinking or otherwise improve their performance. The trends shown in the figure are for the referred group *as whole*, regardless of the effectiveness of the treatment they received, even of whether they in fact received any treatment or not.

Two other explanations are suggested in the report: "The question of why alcohol abusing employees maintain their pre-treatment work behavior patterns following treatment is clearly a question for future research. Our speculation is that in most cases the identification takes place at a later stage in the development of alcoholism," (p. 86). The discussion in the last chapter concerning the relatively poor cost-offset response to treatment when patients are in the older age groups informs this discussion, too. As will be recalled from Chapter 4, older patients who are more advanced in their medical diseases as a result of lifelong excessive drinking frequently show little decrease in medical care utilization following treatment for their alcoholism. In fact, the GHAA study (Plotnick et al 1982) found a substantial group of patients, mostly older, who responded well to alcoholism treatment but continued to decline medically. If Groeneveld is correct in suspecting that "most cases" in the Canadian Rail system are identified late in their drinking careers, then the kind of limited convergence she observed would be expected.

Figure 5-7

Multiple Outcome Measures in the Canadian National Rail Study, Workers Receiving Services Through an OAP



Source: Groeneveld et al, 1985

Finally, one more possible explanation is given in the report:

> The poor post-program performance could also be the result of inadequate [clinical] follow-up procedures. Although CNR's employee assistance program is well designed and run, it lacks a follow-up component. Consequently, the reintegration and sustained close supervision of the program participants were not provided either by the supervisor or the program coordinator. It is possible that post-program performance is more satisfactory in work environments where aftercare has more emphasis. (p. 86)

This problem of missing follow-up and clinical continuity is another explanation for the more-modest-than-hoped findings of Groeneveld. Results reviewed in the next chapter, *Addictions Treatment in CJS Populations and Narcotics Users*, will underline the importance of continuity and follow-up.

For the moment, the broader overview of the literature afforded by the integrated approach of this Technical Appraisal allows us the unusual luxury of evaluating a research report in more generous and optimistic terms than its authors: Groeneveld showed, in fact, good clinical results from the Canadian Rail EAP, results that may have been diminished in absolute magnitude by the advanced disease states of many of the referred workers and the lack of clear contingencies for improvement. The results may have been diminished in durability by the lack of clinical continuity in the follow-up phase.

Probabilistic modeling like that generated in the more recent reports by Holder's team, is the most promising way to address the issue of true program benefits. These methods, though, were not within the competence of Groeneveld et al (1985), which nevertheless stands as the most sophisticated study of its type in the literature.

Summarizing the cost-benefit literature on addictions treatment in workforce populations, we find that much is lacking. As Kurtz and his colleagues noted almost 10 years ago, very little research of any quality has been published on occupational addictions programs.

The conclusion, though, that addictions treatment in workforce populations is not supported from the standpoint of cost-benefit analysis is not warranted, and flies in the face both of the logic presented in the introduction to this chapter and the evidence presented herein. As argued there, occupational programs are especially accessible to potential users of the program when they are available at the worksite. In addition, high levels of patient motivation can be expected when a life feature as important as one's job is on the line.

A subtle point from Groeneveld that should not be missed involves the assessment window across which "baseline" or pretreatment performance indicators are calculated. Groeneveld showed a strong ramping effect on negative performance indicators in the year prior to treatment, after which these indicators relaxed as the clinical benefits of treatment were absorbed and consolidated. Many of the occupational studies which used very brief pretreatment baselines against which the later clinical gains of EAP involvement were contrasted, must thus be suspected to have exploited the statistical anomaly of the pretreatment ramping effect. This artificial inflation of "treatment effects" is a problem with which cost-offset research in general clinical populations has been long aware, and which has also received the attention of researchers in criminal justice populations, as seen in the next chapter.

Groeneveld, however, produces a picture which is difficult to explain in terms other than those adduced to explain the cost-offsets of addictions treatment in Chapter 4: As health deteriorates in active alcoholics and drug addicts prior to a medical emergency, so does work performance deteriorate prior to a vocational emergency.

And just as long-term follow-ups of health care costs indicate that, over time, the previously swollen health care costs incurred by treated alcohol and drug addicts abate and converge toward normal levels, so do the problematic performance indicators of impaired employees abate and converge when an OAP referral is effected. As Franco showed, most such workers are able to retain their jobs, and as the Philadelphia Fire and Police Studies and the Detroit Study showed, the cost-savings to the sponsoring organization of improved performance can more than pay for the costs of providing OAP support.

The need for still more sophisticated research techniques including mathematical modeling of impaired employees in "untreated" conditions and of long-term follow-ups like those developed in cost-offset research and shown to some extent in Groeneveld would be assets that would further support the cost-beneficial nature of occupational addictions programs. The additional findings of Groeneveld, however - that supervisory referral be directed at impaired workers early in their alcohol and drug use careers, and that active follow-up be arranged in most cases - are warnings about the limitations of cost-benefit analyses that should not escape occupational program developers.

Cost-Effectiveness Studies

While a number of studies of addictions treatment in

workforce populations have focused on issues of cost-benefit, very few have approached differential cost-effectiveness for different treatments. Bechtel Corporation in 1984 released a brief report detailing its shift from inpatient to outpatient referrals for alcohol and drug-involved employees, resulting in a near-90% shrinkage in costs to the company without significant change in treatment outcome. Another study was developed by Masi and Boyle (1987) under a federal contract, showing the attractiveness from a cost-effectiveness point of view of a partial-hospital program developed for impaired employees of the U.S. Department of Health and Human Services. Neither study, though, is of a quality worth reviewing, and little other cost-effectiveness research other than that which will be reviewed in this section has been conducted.

The lack of good cost-effectiveness research may be due in part to the same influences that have driven the hesitancy of cost-effectiveness research in general clinical populations and among narcotics users: Namely, that cost-effectiveness research has numerous methodological difficulties, including the inconsistent use of standardized assessment, staging and treatment placement criteria, and the ethical issue of insuring that patients are not referred to a treatment that is insufficient for their level of severity. It is therefore even more pleasing to review the few attempts at cost-effectiveness analysis with occupational groups that have been done.

RAND Air Force Report (1981)

One of the most complex and compelling reports on cost-effectiveness of addictions treatment in any context was reported by Orvis, Armor, Williams, Barras and Schwarzbach of the RAND Corporation in 1981. *Effectiveness and Cost of Alcohol Rehabilitation in the United States Air Force*, often referred to as the Air Force Report, remains the most sophisticated and definitive assessment of the cost-effectiveness of different treatment modes ever conducted within a single workforce group - United States airmen - and is all the more remarkable for its relatively early date. It deserves careful analysis and is presented in detail here.

The Air Force Report was instigated by a General Accounting Office (GAO) survey in the mid-1970s that indicated that the armed services of the United States harbored a larger and more hidden problem with alcohol and other drugs than its chiefs realized, and that expenditures for treatment and research may have been insufficient at that time.

The Air Force had responded by developing a unique system of treatment services, in which inpatient treatment was de-emphasized and centralized in only 10 Air Force Alcohol Rehabilitation Centers worldwide, where about 15% of its referred personnel were treated. Most airmen instead were referred to one of two less intense treatment regimes at a local level. This system was in marked contrast to that of other services, especially the U.S. Navy, which had always emphasized inpatient rehabilitation. Little was known about either the costs or effectiveness of the Air Force's unique approach. GAO's interest in addictions problems in the military, and its clear call for program development and continuity, provided an opportunity to test the effectiveness of the Air Force approach.

As it developed, Air Force policy recognized two types of alcohol problems. These were (1) alcoholism, in which the criteria for a medical diagnosis of alcohol dependence were met, and (2) problem drinking, in which misuse of alcohol has resulted in social or family problems, health or psychiatric problems, or impaired fitness for duty, but in which more formal medical criteria are not met. This was a rather progressive conceptual system for the time, one that would be validated later in the DSM-III system of Alcohol Abuse vs. Alcohol Dependence. The Air Force's treatment system as it developed was similarly progressive, consisting of three levels of care to which cases of differing levels of severity or diagnostic certainty might be assigned.

As described in the report, all case-related activities for USAF personnel were the responsibility of the local Social Actions office, which formed a Rehabilitation Committee to monitor case assignment, treatment and follow-up for each patient in the system. At the lowest level of care was the Alcohol Awareness Seminar, consisting of two four-hour educational sessions held locally on-base. Most patients identified or self-referred were admitted first to the seminars, after which additional treatment recommendations might be made:

> The decision is made after the individual completes the seminar, receives further evaluation, and has his recent job performance reviewed. If these assessments indicate that the problem is serious, he is then formally entered into the rehabilitation program; otherwise, no further intervention is undertaken (p. 7).

At the next level was Social Actions Outpatient Counseling, consisting of two phases. In the first, Local Rehabilitation, the individual received one to three months of outpatient individual and group therapy, which might include conjoint treatment, occupational or recreational therapy, and referral to AA.

In the later Follow-on Support phase, for a period of two to 12 months the airman was additionally assisted by allowing him "... to demonstrate normal functioning in work and social situations, with a minimum of structured intervention. During this phase, individuals receive the same types of services as those received in [Local Rehabilitation], but with diminished frequency," (p. 7). In outpatient counseling, most treatment

was in a group format, with an average of 16.4 sessions of all types attended.

Of the more than 15,000 patients treated in the Air Force system during the years of the RAND study (1977-1978), more than 13,000 (84%) received only outpatient counseling or awareness seminar, without referral to inpatient treatment. Patients who proved unsuccessful at this lower level, or whose cases were immediately deemed sufficiently serious, were referred on to one of the Air Force's ARCs.

Of the ten ARCs, two initially used a 14-day design before switching to the 28-day schedule used by the eight other programs. Treatment in the ARCs was loosely of the Minnesota Model type, consisting of educational sessions, individual and group therapy, and so on. One-third of patients admitted to the ARCs were prescribed Antabuse, though compliance with that treatment regime after discharge was not studied.

The intention of the RAND researchers, in conformance to GAO's recommendations, was to evaluate the costs and outcomes of this program in its normal operational mode.

> It was our intention to evaluate the [program] as it actually operates in the field. We therefore relied on the normal treatment and assignment procedures used by program personnel ... Compared with a randomized experimental design, this approach has the advantage of providing information about the treatment assignment process and of ensuring that the rehabilitation modes compared operate as they would in everyday practice ...
>
> The field approach, however, places certain limitations on the conclusions that may be drawn from the study results. First, because persons with serious problems almost always receive rehabilitation services after identification, a no-treatment condition does not exist in the field. Hence the contribution of natural remission to improvement ... cannot be assessed. Second, because clients were assigned to treatment by normal rather than random procedures, the admission characteristics of clients assigned to different modes could vary in important ways that may affect post-treatment status. (p. 2)

Aware of these limitations, the researchers were careful throughout their analyses to employ statistical control and correction factors where possible, and to separately evaluate the impact of each treatment modality on patients of different severity levels. Moreover, the authors were confident of the generalizability of their results, remarking:

> [A]lthough this research takes place in a military environment, it does not stand in isolation. The alcohol problems we have assessed are the same as those found in the civilian population. Moreover, the rehabilitation services comprising the Air Force program ... are common elements in [civilian programs].
>
> Therefore, the results reported here should not be considered unique to the Air Force population, but should be viewed in the larger context of the growing body of literature concerning the effectiveness of various interventions ... (p. 3).

We would note, though, that patients treated in the Air Force's programs were mostly first-enlistment airmen. This means that the sample consisted principally of people with case characteristics - youth, less chronicity of drinking problems, relative vocational stability within the Air Force system, a well-developed support network - that most researchers find to be good prognostic signs. It may therefore be that the findings of the Air Force Report on cost-effectiveness apply more to clinically favorable situations than to circumstances in which more severely alcohol and drug dependent patients are treated. This does not detract from the quality of the study, but is merely to say that its strong findings on cost-effectiveness for various levels of care - educational seminar vs. outpatient counseling vs. inpatient rehabilitation - should be viewed with this possible sample bias in mind.

Though the research project's goals were themselves complex and in many instances beyond the limits of the present report, they included an interest

> ... in determining whether local rehabilitation is as effective as the inpatient mode, whether the awareness seminar is as effective as more intensive outpatient counseling, and whether the relative effectiveness of these treatment modes depends on the severity of impairment at admission to the program. (p. 13)

To address these questions, the researchers selected from the pool of 15,000 admissions a total of 1,033 patients to be administered an extensive baseline battery. Of these, 756 were selected for the follow-up study, in which each patient was personally interviewed on-base at up to 26 months after discharge from their treatment program.

In the findings, of immediate interest is the apparent accuracy of matching severity of alcohol problem to level of intervention achieved without much guidance in the Air Force program. Although the matching is not standardized or well spelled out in the report, this is one of the few studies that wed patient assessment and treatment matching. Table 5-5 shows the distribution of patient severity levels among the different programs. The observed small percentages of alcohol-dependent patients admitted to the awareness seminars only, and the low percentage of nondependent patients routed to the inpatient ARCs, along with the preference for outpatient counseling in both patient categories, speaks well to both the logic and the

Table 5-5

Patient-Treatment Matching in Air Force Study

ADMISSION STATUS	TREATMENT % ADMITTED TO INPATIENT	% ADMITTED TO OUTPATIENT	% ADMITTED TO SEMINAR
Alcoholic (Alcohol Dependent	42.4	46.1	7.3
Problem Drinker (Nondependent)	11.1	62.2	23.4

Source: Orvis et al, 1981

judicious use of treatment resources in the Air Force system.

More impressive, though, were the follow-up results, taken on more than 750 patients in face-to-face detailed interviews at least 12 months following completion of their treatment. The researchers compared improvement rates for patients in each of the treatment modes, after statistically adjusting the results of each cell to control for problem severity and admission characteristics.

Results for the first level of analysis - a direct comparison of the clinical effects at follow-up of inpatient treatment, outpatient treatment, and eight-hour seminar attendance - are given in Table 5-6. As shown there, "... the remission rates for the less intensive treatment modes compare very well with those reported for the more intensive interventions," (p. 23). All treatments were about equally effective, showing success rates (defined as an absence of serious signs of alcohol problems) of between 62 and 77%.

The authors next conducted a test of the differential effectiveness of different amounts of the same treatment, since outpatient counseling as delivered was of different lengths, and the existence of two 14-day inpatient programs in the Air Force system allowed comparison of their results with those of the more standard 28-day programs. These results are given in Table 5-7. As the authors conclude:

> The results ... conform to the pattern, described in the preceding section: The remission rates for the less intensive treatment modes are comparable to the rates reported for the more intensive interventions. This is true both for comparisons between the 28-day and 14-day inpatient programs and for comparisons between clients receiving large versus small numbers of outpatient counseling sessions at the local level. Neither of the two comparisons yields statistically significant results for either the dependent or nondependent group. (p. 24)

Table 5-6

Absence of Serious Alcohol Problems at Follow-up by Treatment Type

ADMISSION STATUS	TREATMENT INPATIENT MODE	OUTPATIENT MODE	AWARENESS SEMINAR
Alcoholic (Alcohol Dependent	72.3	76.6	Insufficient Cell Frequency
Problem Drinker (Nondependent)	61.9	72.2	66.1

Source: Orvis et al, 1981

Analyses of additional outcome measures, including time lost from work, days of alcohol-related hospitalization, warnings by physicians, and so forth were conducted, with generally the same result: Adjusted for severity, lower levels of care produced results equivalent to the higher levels of care. These findings were validated by record searches and other official logs of work performance of the treated personnel, confirming that "the less intensive treatments compare very well with the more intensive interventions," and leading directly to the cost-effectiveness analysis that forms a large part of the RAND report and is now discussed.

In their look at the cost-effectiveness data, the authors developed a rather sensitive look at both cost and benefit vectors, from which cost-effectiveness data could be derived. As shown in Table 5-8, they measured costs in five general domains - lost productivity, medical and health care resources, property damage, law enforcement activity and resources invested in the alcohol control program. Through a sophisticated procedure and examination of numerous information sources they were able to assign dollar values to the consequences of alcohol problems in the entire Air Force personnel pool.

They had access, as well, to previous work done by

Table 5-7

Absence of Serious Alcohol Problems at Follow-up by Treatment Intensity

ADMISSION STATUS	TREATMENT 28-DAY	14-DAY	> 10 VISITS	≤ 10 VISITS
Alcoholic (Alcohol Dependent	81.3	75.4	74.1	73.2
Problem Drinker (Nondependent)	76.3	73.8	70.6	79.9

Source: Orvis et al, 1981

Table 5-8

Cost Factors ($ millions) in Air Force Study and Total Costs in 1977

CATEGORY	COST FACTOR	COST
Lost Production	Lost work time Lost supervision time Attrition	$26.9
Medical and Health Care	Hospitalizations Outpatient visits Fatalities	$21.3
Property Damage	Damage to Air Force Property	$5.3
Law Enforcement	DWI/DUI arrests Alcohol-related fights and incidents Article 15s (Courts Martial)	$2.4
Alcohol Control Program	Social Action activities Alcohol Rehabilitation Centers	$6.5

Source: Orvis et al, 1981

RAND on the prevalence of alcohol problems in the Air Force, and so were able to provide data rarely seen in the literature, namely the costs, as described above, attributable to personnel with varying degrees of problem severity. Thus, of a total cost of $55.8 million in 1977 (excluding the cost of the alcohol control problem), almost half ($26.1 million) was contributed by the relatively small number of alcohol dependent personnel, or about $1,003 per case. The more numerous problem drinkers contributed an equal amount ($26.7 million) at $508 per case, and personnel without signs of alcohol problems contributed about $6 each.

> The average alcohol dependent person experienced impairment that cost the Air Force about $1000, whereas persons with nondependent problems incurred per capita costs of half this figure. More detailed analysis shows that this differential stems almost entirely from lost workdays and non-ARC hospitalization; dependent persons report twice as many occurrences of these problems as persons classified in the nondependent group. (p. 39).

Just as complex was their approach to the costs of treatment. The researchers combined data from three sources, including official budget figures and independent survey data, to calculate the cost of providing treatment at each of three levels. Data as shown in Figure 5-6 indicate that the full course (28 days) of inpatient treatment was, at $3,057 per patient, more than three times as expensive as the $929 average course of outpatient treatment, which was itself more than 15 times as costly as the $59 eight-hour awareness seminar.

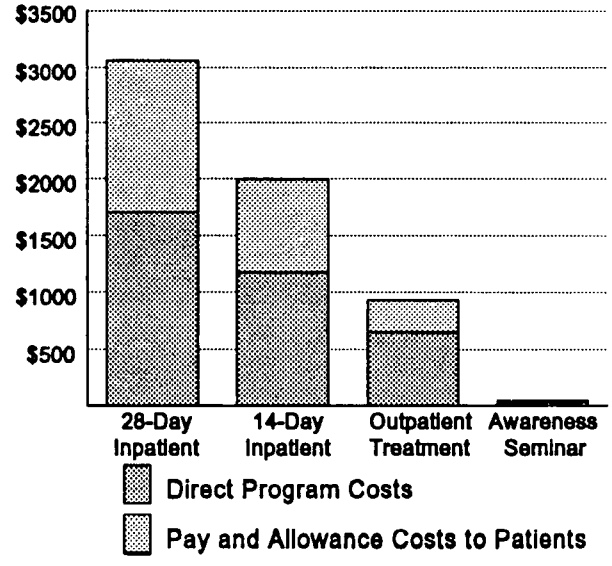
Then, with results bearing on (1) the average costs of treatments of varying intensities, (2) the expected costs due to untreated alcohol problems of varying levels of severity, and (3) the ability of three different treatments to divert patients from this untreated cost track by producing problem-free outcomes at extended follow-up, the authors were prepared for an evaluation of the cost-effectiveness of alcoholism treatment that has still not been equaled though, again, the relative youth and positive prognoses of many of the treated cases may have skewed the results, at least to some extent, to favor the lower levels of care. The authors worked from the following set of assumptions:

> [F]indings suggest that inpatient care and outpatient counseling are equally effective for persons who are alcohol dependent, and that the inpatient, outpatient and awareness seminar modes yield comparable outcomes for persons with nondependent problems. Therefore, minimum per capita cost for a given level of effectiveness is attained by selecting the least expensive treatment intervention for the two types of alcohol problems. ... Accordingly, efficiency would be increased to the extent that dependent persons are assigned to outpatient counseling and nondependent persons to the awareness seminar. (pp. 44-45).

The researchers were thus able to contrast potential cost savings due to treatment of various levels of intensity, given the costs to the Air Force associated with problems of differing intensities, and also given the likelihood that each treatment would produce a nonproblem outcome for a given level of severity at the cost of treatment already as calculated.

Figure 5-6

Costs Per Capita of Treatment in Air Force Study



Source: Orvis et al, 1981

Table 5-9

Expected Savings (Treatment Cost minus Cost Savings) for Different Levels of Care

TREATMENT AND COST	NET SAVINGS (TREATMENT COST MINUS COST SAVING)			
	28-DAY REHAB	14-DAY REHAB	OUT-PATIENT	SEMINAR
COST SAVINGS	$3,057	$1,996	$929	$59
Cost-Savings Over Time from Successful Treatment of Alcoholic Airman				
Year One - $330	(-$2,727)	(-$1,666)	(-$599)	$271
Year Two - $1,156	(-$1,901)	(-$840)	$227	$1,097
Year Three - $1,982	(-$1,075)	(-$14)	$1053	$1,923
Year Four - $2,808	(-$249)	$812	$1,879	$2,749
Cost-Savings from Successful Treatment of Problem-Drinking Airman				
Year One - (-$30)	(-$3,087)	(-$2,026)	(-$959)	(-$89)
Year Two - $243	(-$2,814)	(-$1,753)	(-$686)	$184
Year Three - $516	(-$2,541)	(-$1,480)	(-$413)	$457
Year Four - $789	(-$2,268)	(-$1,207)	(-$140)	$730

Source: Orvis et al, 1981

Since the researchers had indications from other pre valence data that most patients in the alcohol control program were first-term enlisted personnel, a force that replaces itself by attrition every three to four years, potential cost savings resulting from treatment were projected out over a four-year period. Results are given in Table 5-9.

They found for instance that, for persons with severe (dependent) alcohol problems, inpatient treatment lasting 28 days at a cost of over $3000 would break even only if the patient were to remain free of symptoms (or at least free of symptoms with any associated costs) for at least four years. Also in the case of the 28-day programs, the relatively modest cost recovery seen when a less costly and less dangerous problem drinker is treated makes it extremely unlikely that the expensive full course of inpatient treatment will ever be fully recouped unless the patient experiences a full remission and remains in the service for repeated periods of enlistment. The less expensive 14-day program can also not be cost-justified for problem drinkers, nor can even the modestly priced outpatient counseling unless all treatment gains are maintained for at least four years.

These findings forced the RAND researchers ultimately to recommend that Air Force inpatient resources be reserved only for the most severe patients; more importantly, even a more advantageous cost-effectiveness position could be achieved by more carefully monitoring the flow of the much more numerous problem drinkers, who could actually be treated economically only through the awareness seminar mode. These changes together could allow a system with finite resources to ultimately identify and intervene with a larger number of addicted individuals.

> In short, ... the cost-benefit balance of rehabilitation could be improved by making greater use of the outpatient counseling mode for dependent persons and of the awareness seminar for nondependent persons. The inpatient mode can be cost-effective, but only for dependent persons and, even then, only by assuming that remissions ... persists at least three or four years. Likewise, outpatient counseling requires a minimum of four years of remission to be cost-effective for nondependent persons. (p. 46)

WALSH ET AL (1991)

Another intriguing study was published recently by a large team of researchers at Harvard University's School of Public Health. The rationale and method of *A Randomized Trial of Treatment Options for Alcohol-Abusing Workers* (Walsh, Hingson, Merrigan, Levenson, Cupples, Heeren, Coffman, Becker, Barker, Hamilton, McGuire & Kelly, 1991) was captured succinctly by Walsh at the outset:

> Employee assistance programs ... identify workers who abuse alcohol and refer them for care, often to inpatient rehabilitation programs. Yet the effectiveness of inpatient treatment, as compared with a variety of less intensive alternatives, has repeatedly been called into question. In this study, anchored in the work site, we compared the effectiveness of mandatory in-hospital treatment with that of required attendance at the meetings of a self-help group and a choice of treatment options. (p. 775)

Most importantly, Walsh et al (1991) is the only randomized trial of its kind ever conducted, and the only study in which three treatments of the sort tested here - (1) inpatient rehabilitation, (2) Alcoholics Anonymous attendance, the least expensive helping activity available to most alcohol and drug users, and (3) a choice of any combination of inpatient rehabilitation, AA attendance, or outpatient counseling - were directly compared.

The authors clearly operated from a position in favor of intervention with alcohol and drug abuse through worksite programs. Their question was not "Does treatment for alcoholism instigated by the worksite produce a satisfactory benefit," but rather "How much

Table 5-10

Objective and Subjective Outcome Measures in Walsh et al (1991)

VARIABLE TYPE	VARIABLE AND SOURCE
Measures of Job Performance	Objective Data from Company Records
	Involuntary termination
	Self-Reported Data from Subject Interviews
	Problems with supervisors
	Warning notices
	Drinking on the job
	Accidents on the job
	Any accidents after drinking
	Absenteeism because of drinking
	Supervisors' Assessments from Interviews
	Quality of job performance
	Job performance score
	Drinking on the job
	Intoxication at work
	From Company Payroll Files
	Hours of work missed
Measures of Drinking and Drug Use	Objective Data from Company Records
	Referral for supplementary inpatient Tx.
	Self-Reported Data from Subject Interviews
	Any drinking
	Number of drinking days past month
	Average daily drinking
	Intoxication episodes
	Binges
	Blackouts
	Score on the Iowa Stages Index
	Overall impairment
	Serious symptoms
	Definite alcoholism
	Cocaine use past six months

Source: Walsh et al, 1991

treatment is enough treatment?" Subjects were recruited among EAP referrals at a large New England industrial site, and were selected for the study if they (1) had an active alcohol problem that was interfering with job performance, (2) were new to the EAP system, and (3) were not determined to require immediate hospitalization for medical or psychiatric reasons. This then, too, is a limited sample like the one used in the Air Force Study, in that Walsh conducted her trial only on patients who were less severe than those requiring immediate hospitalization.

EAP referrals coming into the system between 1982 and 1987 were screened according to these criteria; 243 referrals were found to meet the requirements of the study, and of these 227 (93%) consented to participate. The final sample was 96% male, 90% White, typically employed in blue-collar or semiskilled positions in the company. Many of the workers reported recent use of cannabis (59%), cocaine (39%) or both, and nearly a third of the subjects reported a prior history of a "drug problem." Thus, though the gender and ethnic distribution of this sample is not without its limitations, the substance use histories of these subjects render the Walsh group the most representative of the research samples yet presented in the workforce literature.

Subjects were evaluated via a complex interview and self-report battery measuring alcohol and drug use and a variety of psychiatric symptoms, and both spouses and job supervisors were also interviewed, at intake, 12 months and 24 months, in order to gather more data "... on the subjects' level of functioning and drinking at work and at home," (p. 777). All cases were evaluated at intake and at one, three, six, 12, 18 and 24 months.

The scaling procedures in Walsh et al (1991) are the most thorough ever reported in the workforce literature, and seem to express the influence of experienced clinical outcome researchers on the study design. The types of measures taken, and their sources, are given in Table 5-10.

After assessment, subjects were randomly assigned to one of three conditions. In the first, 73 subjects were assigned to compulsory hospitalization (CH), which typically lasted about 23 days. Nine refused this assignment but were retained in the CH sample and followed. The inpatient treatment was followed by a year of employment probation, during which thrice weekly AA attendance, sobriety at work, and weekly check-ins with the EAP staff were required.

In the second treatment condition, 83 subjects were assigned to compulsory AA attendance (AA). This condition required patients to attend at least three AA meetings per week, daily meetings if possible, for at least a year, with sobriety at work and EAP check-ins also being required.

In the third treatment, 71 subjects were allowed a choice of treatment options (CT), including hospitalization, AA attendance, or outpatient counseling.

> The subjects randomly assigned to a choice of treatments were not required to join AA or enter a hospital, although the staff of the employee assistance program sometimes encouraged them to do one or the other, and were free to elect no treatment, as long as they remained sober on the job, performed acceptably, and checked in weekly with the employee assistance program. (p. 776).

The final choice of treatment by this group was varied. Of the 71 patients randomly assigned to this group, 29 elected inpatient rehabilitation, 33 joined AA, three chose some type of outpatient service, and six declined any type of help. Across all three treatment conditions, clear rules were specified for the provision of additional treatment when it was warranted, As will be seen, nearly a quarter of CH patients were rehospitalized at some point during the two-year follow-up, as were 63% and 45% of the AA and nonhospital CT groups, making it difficult to evaluate some of the outcomes

reported.

In terms of job performance outcomes, there were few differences between groups, despite the large apparent differences in level of care among the three treatment conditions.

> The subjects in all three groups showed substantial and sustained improvement in all aspects of job functioning. ... Less than 15 percent reported job problems at the 24-month follow-up, and 76 percent of the supervisors interviewed at that time rated the subjects' job performance "good" (42 percent) or "excellent" (34 percent). The proportions with warning notices dropped from 33 percent at intake to under 2 percent ... The number of hours ... missed from work dropped by more than a third in all groups ... On none of our 12 job outcomes did we find any significant differences among the groups, nor did we find any in pairwise group comparison, at any follow-up point. Logistic regression analyses on a composite index of job problems yielded no significant effects of group assignment. (p. 778).

Overall, these results were evaluated very favorably for all groups. "Job problems diminished markedly and ... never returned to the levels before intervention. Supervisors' evaluations and formal payroll records substantiated [this] pattern ..," (p. 780). Apparently, "[a]ll three groups brought their drinking problems under sufficient control at work for group differences in job performance to be rendered statistically insignificant," (p. 780). Nevertheless, as the researchers pointed out, almost twice as many AA and outpatient only referrals were hospitalized during the follow-up period. This result may advance the argument for patient assessment and matching, as discussed previously, to avoid the mismatching and misplacement of patients. In addition, the cost of inpatient treatment is high because of the exclusive use of hospital based treatment. In terms of payoff to the organization in improved job performance and lowered collateral costs, there was no advantage gained when patients were referred to inpatient treatment as opposed to AA or a combination of non-hospital treatment options. Cost data are given in Table 5-11.

From a pure cost-of-treatment point of view, though, Walsh found little difference between compelling alcohol and drug impaired workers to enter an inpatient rehabilitation, on the one hand, or to attend AA frequently, on the other. This is because nearly two-thirds of those who would be ordered only to AA will experience sufficient failure to control their drinking that they will eventually be referred to hospital anyway, at a cost only about 10% below what would have been absorbed had the worker been referred to hospital immediately.

Even when patients are given a choice of treatment options, Walsh found little ultimate advantage from a cost point of view of providing a choice of treatment options vs. referring the patients directly to a hospital. This is because almost half of workers given a choice will opt immediately for inpatient rehabilitation and will require another 11 days of treatment beyond their first stay. Even of those given a choice who initially choose AA or outpatient treatment, nearly half will fail to improve and will be eventually hospitalized. It should also be noted that many of the patients given a choice of "treatment" in fact elected at first nothing more formal than AA attendance. Walsh's design did not provide a good test of inpatient vs. outpatient vs. self-help levels of care, and should not be read in that way.

The need for additional services by some patients, though, is suggested by the outcome data bearing directly on alcohol and drug use. On four of these measures - average daily drinking, number of days drinking per month, binges, and serious symptoms - there were no between-group differences. On six of the remaining eight, though, the compulsory hospitalization group showed a better outcome at one or more of the follow-up intervals, especially on measures of continuous abstinence, never becoming intoxicated, and requiring no further treatment. The authors suggested that "... compulsory hospitalization with AA follow-up addressed drinking problems significantly more effectively than did compulsory AA alone. The result of [a choice of treatment] were [sic] intermediate between the two," (p. 780)

Table 5-11

Costs and Duration of Initial and Additional Treatment

TREATMENT CONDITION / EVENTS	AA n = 83	OUTPT CT n = 42	INPT CT n = 29	ALL CT n = 71	CH n = 73
Probability of Initial Hospitalization	0.00	0.00	1.00	0.41	0.88
Length of Initial Hospital Stay (days)	0	0	24.5	10.0	19.6
Probability of 1 Add'l Hospitalization	0.63	0.45	0.28	0.38	0.23
Probability of ≥ 2 Add'l Hospitalization	0.24	0.05	0.14	0.08	0.04
Hospital Days Add'l to Initial Plan	22.1	13.2	10.7	12.2	5.5
Total Hospital Days, Initial + Add'l Stays	22.1	13.2	35.2	22.2	25.1
Cost	$8,840	$5,280	$14,080	$8,800	$10,040
Savings Over Compulsory Hospitalization	$1,200	$4,760	(-$4,040)	$1,190	-

Source: Walsh et al, 1991

It seems clear from the data that patients given a choice who choose an outpatient solution and are able to be successful at that level - AA, counseling, or informal self-help of some kind - experience the most cost-effective treatment for their alcoholism, eventually using little more than half the health care resources of their compulsorily hospitalized peers, and little more than a third of the resources used by their peers who elect hospitalization voluntarily. However, the real need of some patients for residential services - particularly patients who themselves sense a need for the structure and safety of an inpatient unit and so elect to admit themselves there at the beginning of their treatment course - should not be minimized. Ultimately, the results of Walsh et al were less a recommendation of inpatient rehabilitation or outpatient counseling than a warning for OAP personnel to not be satisfied with mere compulsory referral to AA.

> Alternatives to the hospital other than AA need to be evaluated systematically. Structured outpatient programs, case management, and matching strategies might make it safer to use inpatient treatment as a last resort, but these possibilities remain to be tested. (p. 781)

Summarizing the results of cost-effectiveness analyses of addictions treatment in workforce populations, our conclusions must be considerably more guarded and tentative than they were when we considered the literature on general clinical populations in Chapter 4, or than they will be when we look at the literature on narcotics users in Chapter 6.

Only two studies of any quality - the Air Force Study and Walsh et al (1991) - have been reported, and though their main findings cohere well, both used samples that may have been biased subtly in favor of less severe, less chronic, younger and more prognostically favorable patients. Also, Walsh adds a dimension concerning the wisdom of making the right referral decision straight away when planning the treatment of mild vs. severe cases.

Overall, it seems reasonable to concur with the growing chorus of voices in the occupational community that are calling for better patient-assessment and treatment-placement criteria. Fortunately, a number of efforts are encouraging in this important area. As a more general principle, referral decisions should be guided by the case, not the market, and whenever possible serious attempts to match patients from the start with the appropriate level of care will make for the best use of resources.

As a rule, patients electing to begin a treatment cycle by choosing a low level of care should be accommodated. Such a low level of care might include outpatient counseling or an educational or "early recovery" group treatment. Both the Air Force Study and Walsh indicate that most such patients will succeed, and at a very reasonable cost.

On the other hand, in the case of those patients who are severely alcoholic or drug-addicted, provision should be available to hospitalize them without more ado. The costs of their treatment will be high and harder to recoup, but most of these individuals too will be able to reconstitute their lives and careers, and may in fact save their employer money. There seems little to be gained, though, from denying these severe cases access to more structured care settings. Many will deteriorate over time, at uninterrupted cost to their employer's productivity, and with an eventual inpatient care cost that was only delayed, not averted.

Overall, the only strategy that seems completely unsupported by the data examined in this section is a dogmatic approach to referral, either the line that would refer all impaired workers immediately to an inpatient rehabilitation program, or the other position coming into vogue that would refuse to countenance any inpatient clinical solution until all less expensive ones have been tried and exhausted. Walsh shows that workers exposed to that kind of policy may in the end require nearly as much treatment as if they'd been hospitalized immediately.

Cost-Offset Studies

If cost-effectiveness studies of addictions treatment in workforce populations are infrequent, cost-offset research from an obviously occupational perspective is almost wholly unknown. This is not to say that nothing is known about the effects on health care utilization of offering treatment to employed persons. In fact, most of the research reviewed under this heading in Chapter 4, *Addictions Treatment in General Clinical Populations*, was done with the aid of large insurance company databases that were built around the health care histories of persons who had their insurance policies as a result of their employment. In many respects, general clinical populations are workforce populations. Thus, much of what was discovered in reference to health care cost-offsets in Chapter 4 could be as easily reviewed here.

However, one study which looked at reduced health care costs rather than improvements in worker performance measures, or reductions in drinking or drug use, as a result of EAP involvement has been reported in the occupational literature. It is not particularly strong, and certainly doesn't aspire to the breadth and quality of the Aetna, Midwestern or other studies reviewed in the last chapter, but does provide some relevant data

Table 5-12

Medical Care Costs Before, During and After Addictions Treatment

TREATMENT GROUP STATUS AND COSTS	GROUP I n = 73	GROUP II n = 18	GROUP III n = 32
Treatment in 1987	≥ $300	≥ $300	≤ $300
Treatment After 1987	No	Yes	No
Average Cost of Total Treatment	$6,497	$8,243	$1,018
Average Medical Costs for 2 Years Prior to Treatment	$1,793	$1,584	$917
Average Medical Costs for 2 Years Following Treatment	$917	$3,064	$1,981
Average Difference	(-$866)	$1,480	$1,064
% Change	(-48)	+ 93	+ 116

Source: Yu et al, 1991

Yu, Chen, Harshman & McCarthy (1991)

An Analysis of Substance Abuse Patterns, Medical Expenses and Effectiveness of Treatment in the Workplace (Yu et al, 1991) is one of the few studies in the workforce literature to emanate from a union-managed, rather than employer-owned or contracted, EAP, and is the only study yet to enter the literature with an explicit focus on medical care cost-offsets. The study is the product of four administrators of the Building Service 32B-J Health Fund, "... a self-insured union welfare fund [which] insures union members working in such occupations as doormen, cleaners, elevator operators, maintenance workers, superintendents, security guards and porters," (p. 26) with 64,000 members in the Northeast.

The Building Service Union Local had in 1978 commenced funding its own Members Assistance Program, an EAP which was available to union members and their families and which typically referred alcoholic workers to detoxification, inpatient rehabilitation, or outpatient services. During the life of the EAP, services had gradually expanded until $1.77 million was spent on addictions treatment services for members in 1987, raising for the authors a pressing question concerning payback for this large outlay, especially payback in the form of reductions in the burgeoning medical coverage costs with the union had been saddled by a variety of forces.

The logic is consistent with cost-offset research, and reads much like the rationale for a cost-offset study conducted in the general clinical population in the early 1980's.

> In this study, we concentrate on medical expenditures. ... We selected participants from the records of paid insurance claims who were covered for at least two years before their first substance abuse claims and for at least two years after the last substance abuse claims.
>
> Then we compared the medical expenses two years before the treatment and two years after the treatment. We hypothesized that after the substance abuse treatment, medical costs should drop dramatically. (p. 26)

Data were collected from the Building Service Local 32B-J health insurance claims, with the authors seeking "... a sample of patients that could be studied longitudinally and data recent enough to be of current value," (p. 26). Ultimately, all union members filing a claim for substance abuse treatment in 1987, who had maintained active membership in the insurance plan for two years prior to and two years following their 1987 claim, were selected. The authors reported some analyses on a larger group submitting a claim for an addictions treatment service in 1987 but no longer maintained by the plan at two year follow-up, but those data are omitted in the discussion here.

Because of differences in use patterns and the availability of four years of records, the authors were able to break their sample down into three groups. Group I consisted of active, one-time users of addictions treatment who submitted claims for at least $300 worth of treatment in 1987 but in neither of the following two years. Group II consisted of active, repeat users of

Table 5-13

Medical Care Costs by Substance Abuse Problem Type - Group I Patients

TREATMENT GROUP STATUS AND COSTS	ALCOHOL ONLY n = 32	OTHER DRUGS ONLY n = 17	ALCOHOL AND DRUGS n = 24
Average Cost of Total Treatment	$8,212	$4,873	$8,028
Average Medical Costs for 2 Years Prior to Treatment	$2,269	$1,709	$1,217
Average Medical Costs for 2 Years Following Treatment	$944	$612	$1,122
Average Difference	(-$1,325)	(-$1,097)	(-$95)
% Change	(- 58)[1]	(- 64)[2]	(- 8)[3]

[1] $p = 0.0432$
[2] $p = 0.1167$
[3] $p = 0.6580$

Source: Yu et al, 1991

Table 5-14

Medical Care Costs by Age Group - Group I Patients

	AGE GROUP		
STATUS AND COSTS	21-30 n = 15	31-50 n = 39	≥ 51 n = 18
Average Cost of Total Treatment	$8,151	$5,905	$6,407
Average Medical Costs for 2 Years Prior to Treatment	$1,471	$1,512	$2,623
Average Medical Costs for 2 Years Following Treatment	$1,635	$529	$1,185
Average Difference	$164	(-$983)	(-$1,438)
% Change	+ 11	- 65	- 55

Source: Yu et al, 1991

addictions services who submitted at least $300 worth of claims in 1987 and again in either or both of the two follow-up years. Group III consisted of alcohol or drug abusers who contacted the union EAP for help in 1987 but who then either refused services or used less than $300 worth. These are essentially a self-selected no-treatment group. Additional breakdowns of the sample were made on the basis of gender, age, and primary substance of abuse, with results that in certain respects complement, in others confound, some of the findings presented elsewhere in this report.

Some of the main results are presented in Table 5-12. As can be seen there, successful treatment for substance abuse results in significantly lower subsequent medical care costs in a workforce population, particularly when a treated group (48% decline in medical care averaged over two years posttreatment) is compared to an identified group that refuses treatment (116% increase in health care over two years). An array of significance tests performed on these utilization change data by the authors showed that the 48% decline in Group I's health care utilization was significant at the $p < .02$ level.

Looking further at Group I's results, however, the authors showed a clear difference in cost-offset potential depending on the type of drug use problem that receives treatment (Table 5-13). When the data are broken down by substance use group, significant cost-offsets are experienced by the "alcohol only" group alone. The health care expenses of the "other drugs" groups decline following treatment, but not to the extent observed in the alcohol only group:

> Although the medical expense for the "other drugs only" group drops (64%) more than that for the "alcohol only" group (58%), larger variance makes it not quite statistically significant. The treatment is relatively less effective for the "alcohol and other drugs" group than for the "alcohol only" group at decreasing the medical expense. (p. 29)

This negative bias of drug use on medical care cost-offsets was strong enough in Yu et al's data to reverse the trend noted in Chapter 4, concerning the greater medical care cost-offsets expected with younger patients, while older patients show little if any relief from medical care utilization when offered alcoholism treatment. Table 5-14 clearly shows that not older, but rather younger patients fail to show a significant cost-offset effect. Further analyses, however, showed that this was less an age cohort effect than an effect for type of drug use problem treated. Of the younger patients, only 10% had a problem with alcohol only, apparently the kind of problem that the cost-effectiveness data in Chapter 4 showed can be treated successfully, at fairly low cost in many cases, and with good cost-offsets in future medical care.

By contrast, the oldest group of Yu's patients contained 88% "alcohol only" problems. This group had only 12% of members with what Chapter 6 shows to be the harder and more costly to treat problems with other drugs, while 90% of Yu's youngest patients were in this harder to treat, drug using group.

These are findings that may be important, since Yu is reporting out cost-offset data that, while based on a sample size that is tiny in comparison to the large cost-offset studies reviewed in Chapter 4, are nonetheless based on more recent data from the kind of polydrug-involved younger treatment-eligible population of the current era.

Table 5-15

Medical Care Costs by Gender - Group I Patients

	GENDER	
STATUS AND COSTS	MALE n = 59	FEMALE n = 14
Average Cost of Total Treatment	$6,713	$5,590
Average Medical Costs for 2 Years Prior to Treatment	$1,288	$3,919
Average Medical Costs for 2 Years Following Treatment	$906	$1,016
Average Difference	(-$382)	(-$2,903)
% Change	- 30	- 74

Source: Yu et al, 1991

Another important finding of Yu, however, is perfectly consistent with the data from Chapter 4 showing no gender effect for treatment or cost-offsets. As will be recalled, prior bodies of medical research had hinted that, because women are higher cost users of medical care and because women substance abusers may be more seriously ill than their male counterparts, then addictions treatment may not be as cost-effective for females as it is for males. Data from the Midwestern Study strongly challenged that notion.

Here, Yu's data take the argument even further. Table 5-15 shows that, though women tended to be higher cost users of medical care prior to treatment, their treatment was less expensive and their cost-offset was more than twice as great. These data, too, may be influenced by a gender bias in type of substance abuse problem treated (a factor not examined by the authors), with women showing more "alcohol only" problems than their male counterparts, and the sample size of 14 women is far too small from which to generalize.

However, two studies, the Midwestern Study (Blose & Holder, 1991) and Yu et al (1991), have now shown that women substance abusers can be treated as inexpensively, with as good effect, and with as good an outcome in terms of health care cost-offsets, as can men. Overall, the authors concluded:

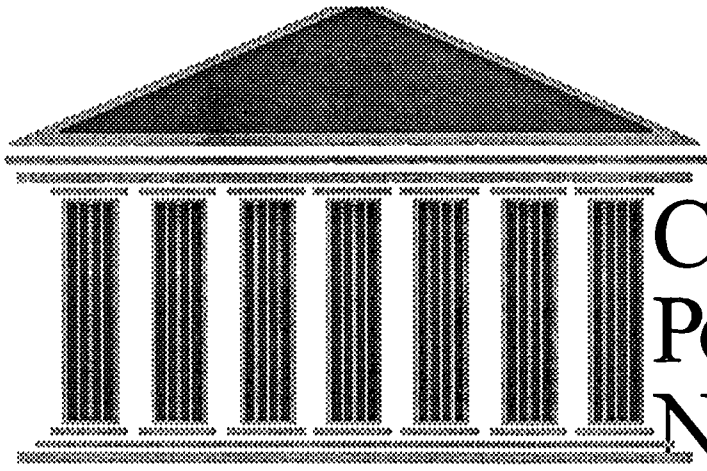
> Group I participants were under treatment for one year. Their medical costs decreased 48%. Group II participants had various durations of treatment between the years 1987 and 1990; their medical costs increased 93%. Group III participants attended the [union OAP] only once. Their medical costs increased 116%.
>
> ... Group I patients, generally between 20 and 30 years of age, who abused both alcohol and one or more other drugs showed an increase in their medical cost instead of a decrease, suggesting no success among those patients. ... [The data] might indicate that women have greater success following appropriate treatment... This suggests that women seeking treatment achieve greater rates of recovery than men. Another explanation for the greater decrease ... is that substance abusing women may seek personal care and treatment more than their male counterparts. (p. 30).

Conclusions

As is true of both the general clinical population examined in Chapter 4 and the narcotics users looked at in the next chapter, the socioeconomic literature on addictions treatment in workforce populations is still emerging. Much of the material in this literature particularly is flawed, because of the relative absence until recently of well trained clinical outcome and socioeconomic researchers working in occupational settings.

Despite these caveats, there is in general reason to suspect that addictions treatment, if properly conducted, is cost-beneficial to industry in the form of improved productivity, and cost-beneficial to the nation's health care system in terms of realized and substantial cost-offset effects. Many of the data looked at in Chapter 5 - including the ramping up of negative job performance indicators in alcohol and drug addicts prior to treatment, the gradual convergence over time of these indicators with those measured in a comparison group of employees, the accrual of good health care cost-offsets and the absence of a penalty when women rather than men are the recipients of treatment, and the suggestion of superior cost-effectiveness when intervention occurs early in the progression of the illness when less intensive levels of care may be utilized - all of these are reminiscent of findings reviewed in Chapter 4, *Addictions Treatment in General Clinical Populations.* They seem clearly to indicate that addictions treatment in workforce populations is a good investment which will be repaid handsomely over time in the form of increased productivity and morale, reduced management problems, and decreased utilization of the health care resources that produce such a bite on American industry.

Also indicated in much of the research are calls for policy adjustments made elsewhere with more force than here, namely the necessity (and financial wisdom) of intervening early, and of providing follow-up services to cement the gains made in intensive treatment. Above all, flexibility of approach, and a willingness to look beyond mere financial motives when some treatment factors - polydrug use, subjective awareness of severe addiction, etc. - are present, are suggested by these data. Still other reports, and conclusions with a somewhat different tone, are suggested by research on addictions treatment with narcotics addicts, to follow.



6 ADDICTIONS TREATMENT IN CRIMINAL JUSTICE POPULATIONS AND NARCOTICS USERS

PRIOR TO THE AVAILABILITY OF HIGH QUALITY DATA, addictions treatment with narcotics users was viewed with pessimism and even disdain by large segments of the treatment community. Even as early data began to emerge on the ability of innovative and sustained drug abuse treatment to reduce costs to society and to law-abiding citizens, these data were viewed suspiciously in many quarters, and regarded with the pessimism that supposedly intractable problems with high social costs tend to generate (Anglin, Hser & Booth, 1987). Even more skeptical, though, than the treatment community has been the attitude of policymakers and the public. Perhaps more pronounced than their skepticism has been the stridency of their call for economic justifications of treatment: "There is no escaping the demand for [socioeconomic] findings; however, recognizing the moral dimensions behind the questions helps to explain why they are so insistent and why the answers are so often overlooked or brushed aside," (Gerstein, 1991, p. 138).

As Goldstein et al (1989) note, "In general, drug abuse studies employ the least adequate methodologies," (p. 479). Early studies, for instance, were criticized for too frequently ignoring maturational changes ("maturing out") in their typically very youthful study groups, and of thereby falsely attributing to treatment the improvements in drug use, criminal activity and so on that may have been brought about merely by the passage of time in the young drug abuser's life. It was also observed, quite accurately, that much of the early research used very short pre-treatment baselines, a common practice but one that, in this instance, could have a profound impact on policy: Drug-related criminal and antisocial behavior naturally waxes and wanes across time during an individual's life, but can be expected to be at its peak in the period leading up to detection and referral. Therefore, the use of a short pre-treatment assessment window capitalizes on a statistical chance effect, showing pre- to post-treatment changes in clinically targeted behavior that would not be so impressive were larger pre-treatment windows, with less symptomatic eras in the patient's life, factored into the baseline data.

Studies, then, which used the slender pre-treatment comparison windows of the early research era were bound to overestimate both the effects of treatment as well as the social severity of the problems to which the treatment was applied. These skewed results probably overdramatized the perils of drug problems that were left untreated, and may have promoted unrealistic expectations about treatment effectiveness among program planners:

> [E]conomic arguments without rigorous analytic data have been used to justify the existence and funding of drug strategies. These arguments have focused more on the putative economic consequences imposed by untreated drug abusers than on the measured effectiveness of enforcement, prevention and treatment in producing reductions of those consequences and their costs. (Harwood, 1991, p. 48).

In addition, many of these early studies used only a few, sometime only one, measures, typically of doubtful reliability and validity. Far too frequently, patient self-report was accorded full weight as a measure of outcome, regardless of the motives for patients with serious narcotics addiction, often involved with the criminal justice system, to minimize and deceive. Much research, and even a portion of actual service deliver programming, may have been sloppier than investigators and policymakers realized: An audit of 15

methadone maintenance programs in five states performed for the federal General Accounting Office, sometimes called the "GAO study," found that most programs (1) failed to eliminate the use of narcotics and intravenous drug injection practices, (2) tolerated increased alcohol and cannabis use by attendees, (3) failed to offer more than basic dispensing services, and (4) failed to follow up on client attendance at ancillary services to which they were referred (Shikles, 1989).

The literature on narcotics addiction and criminal justice populations has been difficult to integrate with the other literature reviewed in this Technical Appraisal for many reasons. First, the target population consists of an unusually physically and socially resilient, youthful cohort with important outcome-relevant characteristics (high levels of coercion and patient accountability) that set them apart from general clinical populations and workforce populations.

To further complicate matters, the literature is typically classified according to problem type (e.g., opiate addiction) or treatment received (e.g., methadone maintenance vs. therapeutic community), without adequate attention to the criminal justice characteristics of the case material, characteristics that themselves may be more important, in socioeconomic terms, than the type of drug used or treatment administered. All of these have made it extremely difficult for scholars and researchers to integrate the treatment of narcotics addicts into the larger literature on the socioeconomic analysis of addictions treatment.

Additional technical and conceptual barriers to effective research - including (1) problems defining the targeted problem behavior (drug abuse, dependence, addiction, etc.), (2) disagreement about treatment goals, (3) disagreement about measurement of outcome domains, (4) the problem of length of treatment, (5) variability among treatment programs espousing the same model, and (6) high dropout rates - have been discussed elsewhere (e.g., Apsler, 1991). For these and other reasons, never are the results in Chapters 4 and 5 found between the same covers with those reviewed here in Chapter 6.

Despite these discouragements, the transfer of addictions treatment to groups of narcotics users and those with serious criminal involvement has taken on a broad urgency, being, for instance, identified in the recent report to the Institute of Medicine, *Treating Drug Problems*, as one of the four policy priorities for public activity in the drug treatment sector (Gerstein & Harwood, 1990). In Chapter 6, *Addictions Treatment in CJS Populations and Narcotics Users*, a number of studies that helped spur this policy development are reviewed.

Some of these are extremely expensive and time-intensive studies of drug abuse treatment outcome with, secondarily, socioeconomic implications. By and large, these studies are elements in a vital federal presence in drug abuse treatment and in research on its accessibility and effectiveness that have been initiated at intervals of about a decade, stretching from the Drug Abuse Reporting Program (DARP) studies of the 1970s to the Treatment Outcome Prospective (TOPS) Studies of the 1980s and now to the Drug Abuse Treatment Outcome (DATOS) Studies expected in the 1990s. This is a tradition whose progress is marked by increasingly strong designs, inclusion of broader arrays of service settings and patient types, refinement of follow-up protocols, and so on. As will be shown, results from these studies are typically presented in voluminous reports, from which socioeconomic arguments can only be extracted with difficulty. Their advantages include their huge size, geographic representativeness and longitudinal designs, often involving thousands of subjects in all regions of the country interviewed time and again for periods of a decade or longer.

Another tradition that contributes to this literature is the more university- or institutionally based tradition of research, including the work of the Drug Abuse Research Group at UCLA, studies from various Veterans Administration treatment units and others. Available, as well, to inform the view are a number of excellent and recent reviews of the efficacy (Anglin & Hser, 1990; NIDA, 1988) and cost-effectiveness of drug abuse treatment (Apsler & Harding, 1991; Cartwright & Kaple, 1991), the role of coercion in treatment outcome (Rotgers, 1992), and allied literatures.

As an area of research on the socioeconomics of addictions treatment, narcotics users remain relatively unexplored, despite the fact that an increasing percentage, and in some cases the majority, of admissions to addictions treatment units of all types around the country are sent directly by the criminal justice system or in reaction to severe pressure brought by the criminal justice system. As a recent White Paper by the Office of National Drug Control Policy (ONDCP) argues, " ... as many as 90 percent of the people undergoing treatment [do] not seek it on their own," (p. 9). Thus, "... while the need for treatment is high, the actual demand for it is relatively low. The overwhelming majority of addicts must be 'jolted' into drug treatment and induced to stay there by some external force ..." (p. 10).

Socioeconomic analysts, well-versed in the cost and outcome vectors of alcoholism treatment in the general clinical or workforce populations, are only now beginning to focus on the increasingly important population of serious narcotics users, and need to make many refinements to their methodologies before this new work will take on the elegance and gloss of these other

literatures.

The work of Anglin and Hser (1991) demonstrates some of the complexities of narcotics use that complicate socioeconomic analysis. Figure 6-1 illustrates their model of the relationships between initiation of drug use, habitual use, the treatment system, abstinence, and the criminal justice system. And while an equivalent schematic of pertinent relationships in the general clinical population would contain other elements than the alcohol abuser and the treatment system (e.g., employer, family and friend networks, etc.), the relationships diagrammed in Figure 6-1's view of the narcotics using group must be regarded as more tangled. These are additions to, not alternatives to, the relationships governing the treatment of alcohol abuse. They are the reason why specialists in the treatment of criminally-involved patients feel that their "clients" include the family, the court, the local community and society, as well as the drug abuser him/herself. It is this set of relationships and the effects on the individual and society they govern, that must be approached by socioeconomic research on addictions treatment with narcotics users. This approach has yet, unfortunately, to proceed much beyond the bare schematization of the important interconnections illustrated in the Anglin & Hser review.

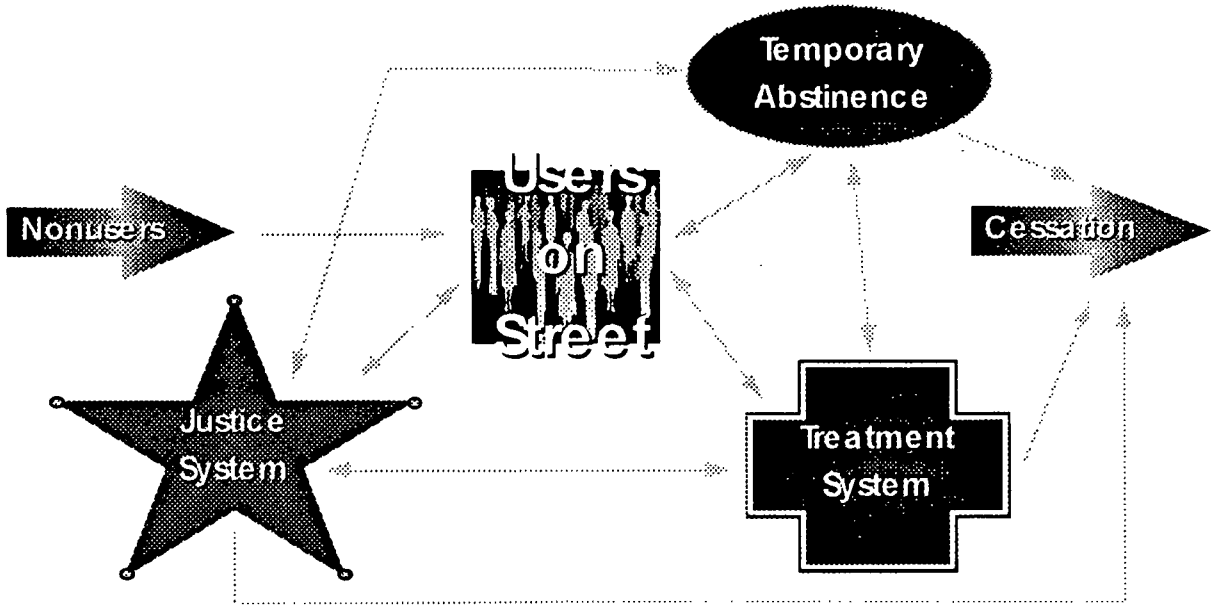
Work in this field has developed along the path outlined by the following questions, taking on greater complexity and elegance as improved databases became available in the 1980s.

First, what are the elements of a quality continuum of care for criminal justice and narcotic using populations and what is the basis for appropriate referral to varying intensities of care? What levels-of-care (or, more accurately, sources of social control) are effective, and does the presence of coercive agency have a curative, or further alienating, effect? This was a question that much of the earliest research was designed to answer, as the nation continued to search for the right attitudinal balance of libertarian, medical, and criminal understandings of drug use and its consequences.

Second, are any treatments - and here, treatment is more accurately construed as treatment setting (long-term therapeutic community, short-term chemical dependency rehabilitation, outpatient counseling) than as treatment content, with the exception of one drug-specific intervention, methadone maintenance - reliably more effective than others? Are any particular aspects

Figure 6-1

Treatment System, Criminal Justice System, and Individual Elements in Patterning of Illicit Drug Use



Adapted from: Anglin & Hser, 1991

of treatment - its duration, its intensity, even organizational characteristics of the agencies providing the service - determinative of treatment outcome? Are patient characteristics such as age, ethnicity, or severity of criminal history important?

Third, on what particular behaviors - from the panoply of relationship problems, criminal activity, drug-dealing, drinking, property crime, etc. - do these treatments have an effect? If some treatments, applied to some patients by some agencies, have a clinical impact, can we expect one result to be lower property crime? Can lower rates of prostitution - possibly even future reduction of HIV transmission in the nondrug-using population - be anticipated as distal benefits of drug treatment administered now? Are improvements in gainful employment and economic productivity to be expected when illicit drug use declines, or does the patient, though now "clean and sober," remain economically marginal? What about other addictive patterns such as drinking or cannabis use? These, too, can pose hazards of various sorts. Does treatment of narcotics use have an effect on them?

Finally, how sustained are the improvements observed? If some treatments for drug abuse can be shown to have an effect on some patient groups in some response domains, are the effects "worth the effort" in terms of being durable? Do they pay for themselves or is supply reduction through criminal interdiction the only way to have an economic effect? On the other hand, is "durability" of treatment effect, as typically approached in clinical research on other psychiatric and medical problems, an appropriate expectation, where "[r]ecycling through new or repeated treatment episodes is a common pattern and may be necessary for some clients to accumulate significant treatment effects," (Hser & Anglin, 1991, p. 74)?

As is readily apparent, these are questions quite different from those raised in Chapter 4, *Addictions Treatment with General Clinical Populations*, and Chapter 5, *Addictions Treatment with Workforce Populations*, though they do, as with the latter, indicate the main thrust of the socioeconomic literature on addictions treatment with narcotics users: Cost-benefit analysis.

Cost-Benefit Studies

Among socioeconomic analyses of addictions treatment with narcotics users, cost-benefit studies are by far the best developed literature. In a scholarly review of drug treatment and its economic impact, Hser and Anglin (1991) outlined six general domains in which the benefits of treatment can be assessed.

First is cessation or reduction of use of the primary (illicit) drug of abuse, and of other concurrently and illicitly substituted agents, as well as alcohol. This outcome domain is most accurately a focus of treatment effectiveness and cost-effectiveness research, and what little quality empirical research can be brought to bear on the cost-effectiveness question is developed below. But though cessation or reduction of drug use is necessary in most cases for benefits in other domains to be detected, these data are not readily translated into the economic terms necessary for cost-benefit analysis.

The second outcome domain is increased social and family functioning, and the third is improved psychological functioning. These two would have a place, either in cost-effectiveness or cost-utility research. Cost-effectiveness, though, is poorly developed in addictions research with narcotics users and cost-utility analysis has never been attempted. It is generally true, in fact, that the "collateral outcome domains" of social, family and psychological health that are so well developed in alcoholism research are rarely touched in drug treatment outcome, much less in socioeconomic evaluations of addictions treatment with narcotics users. Neither, though, are they appropriate to CBA, for the reasons adduced above.

The fourth outcome domain is decreased morbidity and mortality, and improved physical health. While possibly an important outcome vector in the socioeconomic analysis of drug treatment in narcotics users, this domain is appropriate to cost-offset research. Medical care cost-offsets, though well developed in socioeconomic research on addictions treatment in general clinical populations and, to a lesser degree, in research on workforce populations, are almost entirely absent as a focus of research with narcotics users, for reasons discussed in the appropriate section below. Cost-offsets are, in any case, a special type of benefit, not typically found in cost-benefit studies.

Fifth and sixth of Hser and Anglin's outcome domains in narcotics users are ones directly usable by cost-benefit researchers, and it is here that policymakers tend to look for justification of treatment: Decreased level of criminal involvement, including drug dealing, property crime, and prostitution; and increased adaptation to the legitimate economy, including return to mainstream economic productivity and decreased reliance on the social service network. As these questions are approached, however, basic results bearing on treatment effectiveness per se will also be presented.

Anglin, Speckart, Booth & Ryan (1989)

An intriguing place to begin the discussion of cost-benefit studies in the treatment of narcotics users is with the last of several reports published by the Drug Abuse Research Group at UCLA, a research team that has proven expert at turning policy shifts and sudden program closings in Southern California into "natural experiments" that illuminate the cost and benefit vectors of drug abuse treatment in ways not possible with

intentionally designed research. The research series discussed here (Anglin & McGlothlin, 1985; Anglin, McGlothlin, Speckart & Ryan, 1983; McGlothlin & Anglin, 1981) focused not on the costs and benefits of providing treatment (methadone maintenance, in this case), but rather on the costs and consequences of *not* providing treatment. More of this group's research will be returned to at a later point.

In "*Costs and Consequences of Shutting Off Methadone*," Anglin et al (1989) provided an accounting of the kinds of social effects and "cost shifting" that occurred when a publicly subsidized methadone maintenance (MM) program in San Diego County with more than 500 clients closed in response to budgetary pressures in 1978. As the authors note, "MM clients often continue some narcotics and other drug use, and can remain involved in other aspects of the addict lifestyle as well ... Thus, a pervasive public disappointment ... has emerged," (p. 307). Cutbacks in public funding in California have followed this public disappointment but probably not without substantial, possibly hidden, effects, causing the Drug Abuse Research Group to question whether or not costs "... may simply be shifted to other public resources," (p. 308). A similar natural experiment, involving the abrupt closing of a methadone clinic in Kern County, had been detailed earlier by the same group (McGlothlin & Anglin, 1981), but the circumstances around the San Diego program closing had several advantages as a natural experiment, and so are examined here.

These advantages included (1) the more representative, urban character of the San Diego MM group, (2) the lack of shift to criminal surveillance by the San Diego Police Department of the MM clients when their clinic closed, a prophylactic that was exercised in the Bakersfield (Kern County) case and that may have biased the natural outcome of shutting off methadone there, and (3) the development in San Diego of alternative, private MM services, so that the consequences to the public of shutting off methadone could be more straightforwardly assessed.

Anglin et al (1989) sampled 195 male and all 168 female MM clients from the 561 who were public MM enrollees when the San Diego clinic closed. A comparison sample of 129 men and 131 women was selected from the publicly funded MM roles of unaffected clinics in Orange, Riverside and San Bernardino Counties. Approximately 30 months later, the experimental and comparison subjects were reinterviewed so that the effects of shutting off methadone in the San Diego group could be contrasted to the equivalent life eras of the continuously medicated patients in the other counties. An intensive interview involving a time-line follow-back procedure was supplemented by "... official records of arrests and intervals of incarceration, legal status, and treatment," (p. 309). Altogether, information concerning narcotic and nonnarcotic drug abuse, alcohol use, drug dealing and other criminal activity, employment, and other important variables was collected to cover the period of the individual's entire "addiction career" before, during, and after MM clinic involvement.

In a secondary analysis, the 142 San Diego clients who were able to transfer their methadone maintenance to the private providers were compared to the 189 who were unable to make the switch. Altogether, an impressive 91% of the initially selected sample was located and interviewed. Additional strengths of the study include the use of official archival data, inquiry about an array of outcome vectors, the use of subjects of both genders and all ethnic groups representative of their communities, the use of a pre-enrollment baseline that commenced with the first use of narcotics, and follow-up for a substantial post-discharge time period during which the costs and consequences of shutting off methadone could be observed.

The study showed, first of all, that entry into MM generally reduces the use of narcotics and its supporting behaviors. Next, when results from the San Diego sample that had experienced an involuntary program closing were analyzed at the aggregate level (collapsing together results from the clients who had transferred with those who had not) they showed few differences from the behavior of continuously enrolled clients from the other counties. The aggregate San Diego sample showed a substantial increase in arrests, mostly for drug-related offenses, after their methadone was shut off, but few other differences from the comparison groups. As the authors note, "Generally, ... the behavior of the terminated clients does not appear to be substantially different from that of the comparison groups, except in areas where pretreatment differences existed ..." (p. 313).

When private resources, then, are available to fill a gap left by the closing of a public service, and when a substantial proportion of previously publicly served population has the resources to shift to a private provider, costs to the system as a whole appear bearable.

However, when the patients who had transferred or failed to transfer to private MM service were analyzed separately, a clear pattern of results showing return in the aftermath of the clinic closing to illicit narcotic use and an increase in all varieties of predatory, property and "victimless" crime was noted (Table 6-1). Patients unable to transfer to private MM treatment in San Diego showed, over the following 30 months, higher crime and dealing rates, more criminal justice contact, higher daily drug use, and other increases in symptomaticity that had been well contained by MM treatment and were still contained in the successfully transferred patients and those continuously medicated in the other counties. "It is clear that for the nontransfer group, the program closure had a negative impact ... except for

Table 6-1

Transferred vs. Nontransferred MM Clients in the San Diego Sample

STATUS OF BEHAVIOR	% OF MEN		% OF WOMEN	
	TRANS	NONTRANS	TRANS	NONTRANS
Arrested	57	62	43	49
Incarcerated > 30 days	21	47	17	26
Under CJS Supervision	39	57	30	45
Daily Illicit Narcotic Use	40	74	44	76
Dealing Drugs	42	76	34	53
Reporting Property Crime	1	13	6	7

Source: Anglin et al, 1989

the minority (less than 26%) who had achieved sufficient rehabilitation or who had alternate resources to avoid a relapse to addiction," (p. 314).

The return to serious narcotic use in MM clients involuntarily discharged from treatment when their public clinic in San Diego closed resulted in new costs to society and to law-abiding citizens that absorbed almost all of the dollar savings the county had reaped from closing the program, and this was without factoring in those results - decline in psychological and social health, effects on crime victims, etc. - that are not quantifiable for the purposes of cost-benefit analysis.

The authors concluded that the financial incentives for San Diego County to discontinue its public support of MM treatment were nearly defeated entirely by this clinical deterioration. "Overall, the savings in MM treatment costs for men ... are nearly offset by increased costs for incarceration, legal supervision, and other government-funded drug treatment," (p. 318). This was in stark contrast to the behavior of the same clients during active methadone maintenance, when costs associated with criminal justice involvement and social disruption were reduced by 40% over the pre-enrollment era.

> Overall, it is clear that the program closure had dramatic individual and social consequences for the majority of those either unable or unwilling to transfer to fee-for-service programs. That 24% of the nontransfers eventually returned to MM indicates major problems of adjustment for these individuals following closure. (p. 316).

These results are not definitive, but their power to suggest the benefits of treatment by documenting the costs incurred when treatment is disrupted by a policy shift are unique to the Drug Abuse Research Group, and worth citing. Denying access to drug abuse treatment, particularly when it has been offered through the public sector in the past, may be in the long run more costly than continuing to provide the treatment for free. More straightforward cost-benefit figures, though, are available in the studies discussed below.

Drug Abuse Reporting Program (DARP)

Introduced briefly above, the Drug Abuse Reporting Program (DARP) reports were the first node of what was to become an ambitious set of large federal studies of drug abuse, its treatment, the effectiveness of treatment, and, in a secondary way, the economic benefits of treatment. This should be understood explicitly: DARP was not a program of socioeconomic research, and it is not presented here for its direct applicability to socioeconomic questions. Its findings, though, are helpful in suggesting the stability of results on the effects of drug abuse treatment, as these are better developed for cost-benefit and cost-effectiveness purposes in studies such as TOPS reviewed below.

DARP was conceived as a collaborative project of the Institute of Behavioral Research at Texas Christian University, and the National Institute on Drug Abuse, which funded TCU's ongoing data collection process. Known first by the cumbersome acronym "TCU-NIDA DARP," the project eventually took on its simpler title. The main findings were issued in a series of five volumes by Sells (1974) and Sells and Simpson (1976), and were eventually to comprise three studies on client retention, three focused on the behavioral aspects of drug abuse and its treatment, and two focused on discriminant analyses looking at patient and treatment factors influencing outcome. DARP data even now are explored for more subtle findings that continue to find their way into professional discussions and journals.

Altogether, the TCU and NIDA researchers collected patient reports and other data on 43,943 patients admitted to treatment for drug abuse at any of 52 agencies throughout the United States and Puerto Rico, beginning in 1969 and continuing for four years, when the reporting system was supplanted by another clinical information system, CODAP. Three cohorts - 11,383 patients from 23 agencies admitted between June 1, 1969 and May 31, 1971, 15,831 patients from 36 agencies admitted between June 1, 1971 and May 31, 1972, and 16,729 patients from 50 agencies, admitted between June 1, 1972 and March 31, 1973 - were admitted to the study for purposes of some data collection. Of these, 27,460 patients who were diagnosable drug abusers and received treatment at any of 46 agencies were retained in the master database.

This large number of cases was divided along different

categorical dimensions in order to perform analyses of specific interest, so that the DARP sample varies in consistency as a function of the specific report. The patient population consisted of all ethnic and racial groups and both genders but was dominated by the young of primarily urban and lower Socioeconomic Status (SES) backgrounds. Proportions of different demographic groups vary across reports. The availability of different treatment modalities, as well, seemed to cause some degree of patient self-selection, but in general the DARP researchers selected patients representative of the kinds of drug addicts targeted by federal policymakers as at the center of the drug abuse problem with devastating social costs, and therefore requiring higher levels of service and federal support. These tended to be largely urban, young, male, poor heroin addicts involved in criminal activity to support their habits. So it was this kind of patient whose access to the DARP reporting agencies was least restricted and who tended to show up in the research sample. The sample most recently worked with (Simpson & Friend, 1988) is described in Table 6-2.

Table 6-2

Characteristic of Male African-American and White Patients in DARP, *n* = 11,920

TX TYPE / CHAR.	MM	TC	DF	DT	TOTAL
Race					
Afr-American	80	53	60	66	70
White	20	47	40	34	30
Age					
< 18	1	7	8	4	4
18-20	11	26	22	19	16
21-25	35	40	43	45	39
26-30	17	10	12	13	15
. > 30	36	17	15	19	26
Legal Status					
None	66	34	48	55	57
Probation	16	35	23	22	21
Parole	5	9	9	8	7
Pending	12	22	20	15	15
Referral Source					
CJS	7	31	22	10	13
Fam/Friend	38	24	26	30	32
Other	56	45	52	60	55
Days in Tx					
1-30	5	26	25	44	21
31-90	10	24	30	40	22
91-365	36	32	38	15	30
> 365	49	18	7	1	27
Discharge Condition					
Completed	28	20	13	21	23
Quit/Expelled	49	71	77	73	61
Jailed	6	2	4	3	5
Other	17	7	6	3	11

Source: Simpson & Friend, 1989

Treatments were offered in four modalities - Methadone Maintenance (MM), Therapeutic Community (TC), Outpatient Drug Free (DF), and Detoxification (DT). Though treatment might be assumed to be uniform, the DARP researchers (e.g., Sells & Simpson, 1979) pointed out variations within each of the four treatment modalities, though results were rarely analyzed with sensitivity to these differences.

Both MM and DF treatment types were characterized by either a change-oriented approach or an adaptive approach. Just as marked were differences between the TCs studied, which were in either the long-term, Synanon and Maxwell Jones tradition, a shorter duration program with ample professional and institutional oversight, or even a short-term (eight-week) regime of intensive socialization. DT was much longer and involved than the "detox" preceding alcoholism treatment.

Opioid use dominated in all African-American and older white samples (70 to 80% of these patients identified heroin use as the principal drug problem), but mixed substance use was also extremely common, especially in young white respondents, with cocaine, sedatives, stimulants, cannabis and alcohol being used excessively. These data are quite consistent with others reported among youths in treatment for drug abuse. Herrington et al (1981), for example, found in a dual site sample of 238 adolescents that an average of 5.5 different drugs were used concurrently, 2.45 were used in the same week, and 1.58 in the same day, with alcohol and cannabis being the most commonly used agents.

Data were taken in most of the outcome domains discussed by Hser and Anglin (1991):

> The DARP admission record was completed on all patients at intake and provided demographic classification, and individual developmental and background data, as well as baseline information on variables used as outcome criterion measures (drug and alcohol use, productive role activities and employment, and criminality). The status evaluation record was completed bimonthly up to termination and included data on family and living arrangements, each of the criterion measures, and a summary of treatment experience and components attended during each 2-month period. (Sells & Simpson, 1979, p. 572)

Subsamples of the original intake group were selected and followed for up to 12 years beyond initial DARP enrollment. The first follow-up studies commenced immediately after the sample was closed in 1973, and concentrated on 6,402 patients admitted in three

successive years from 34 agencies and followed for an average of six years after DARP enrollment (Sells et al, 1979; Simpson et al, 1978; Simpson, 1984; Simpson & Sells, 1983). A later 12-year follow-up on 697 opioid addicts added a comparison group who were initially registered with a treatment center but failed to receive treatment (Simpson et al, 1986). Follow-up measures varied between the studies, but typically included five composite scales measuring criminality, opioid use, nonopioid use, alcohol use, and productive activities (school or work).

Results of the DARP studies were some of the first to illustrate the potential of the principal treatment vehicles for serious drug problems - methadone maintenance, therapeutic community, and outpatient drug-free - as well as some of their common problems, such as treatment retention, drug substitution problems, difficulties in showing consistent therapeutic effects across outcome domains, and others.

For example, retention in treatment appeared in the DARP data to be a major issue in all treatment programs, but especially in outpatient drug-free counseling, which has neither a substitute drug to offer patients (as is true of methadone maintenance), nor an abode to offer patients (as do therapeutic communities). Between half and three-quarters of patients in TC, DF and DT terminated via early attrition (Sells & Simpson, 1979). "It is apparent that only the MM programs retained any substantial percentages of these patients over 6 months. In the TC and DF programs, ... over half their patients terminated within the first 3 months," (p. 581). The DARP studies, then, were among the first to underline early treatment attrition as a marked liability of drug abuse treatment, and ultimately to focus attention on treatment retention as a first-order programming element.

Another interesting finding helped illustrate what later researchers were to call the "treatment career." For many patients, their DARP admission, ending in treatment dropout or therapeutic discharge, was only one of several treatment episodes. Simpson (1981) found that 57% of DARP patients were readmitted to their agency at some point during a six-year follow-up, and a longer-term follow-up by Simpson and Friend (1988) found that, on the average, DF patients were to experience 3.4 treatment admissions during their addiction career, TC patients were to experience 4.6, MM patients were to experience 5.1, and DT patients 9.9.

This pattern of repeated admissions, each of which was delivered at some cost and produced results which were, ultimately, of finite durability, was another result which cast a troubling light on drug abuse treatment. The problem of repeated admissions and of accounting for their costs and additive benefits in cost-benefit analysis is also one that is only now (Hubbard & French, 1991) beginning to influence thinking about the costs and treatment benefits associated with narcotics use.

On the other hand, the studies illustrated very clear positive effects of treatment on target behaviors. In a special youth sample of patients about 19 years of age, Sells and Simpson (1979) found

> The gross outcome results ... showed substantial reductions of drug use and criminality during all treatment and smaller but statistically significant improvements on other criteria as well ... Overall, the MM treatments showed more effects than other types, particularly on opioid use and criminality. (p. 585-586)

Findings for the main body of DARP outcome studies with implications for cost-benefit analysis are summarized by Simpson and Sells (1983), and abstracted in Table 6-3.

On the whole, these findings are very positive with reference to behaviors with direct cost-benefit and cost-offset relevance: Simpson and Sells (1983), for instance, compared outcome to "... a severe and highly favorable outcome standard ... considering the heavy pretreatment drug involvement and criminal history of the sample, [defined as] no use of any opioid or

Table 6-3

12-Month Outcome for Male African-American and White Opiate Addicts

TX TYPE / CHAR.	% MM PRE-TX	% MM POST-TX	% TC PRE-TX	% TC POST-TX	% DF PRE-TX	% DF POST-TX
Opioids						
Any Use	100	56	100	58	100	64
Daily Use	100	36	100	39	100	44
Cannabis						
Any Use	46	58	56	62	52	69
Daily Use	10	22	17	23	20	30
Other Nonopioids						
Any Use	54	41	60	40	54	45
Daily Use	8	9	10	10	11	10
Alcohol Use						
> 4 Oz/Day	21	39	20	38	21	38
> 8 Oz/Day	12	23	12	21	14	23
Drug Tx						
≥ 1 Month	49	38	53	32	48	33
Employment						
Any	66	67	63	72	60	65
≥ 6 Month	33	57	20	61	24	52
CJS Activity						
≥ 1 Arrest	88	27	95	33	87	34
Jail/Prison	75	28	83	33	66	34

Source: Simpson & Sells, 1983

Table 6-4

Comparative Outcomes in DARP: MM, TC, DF, DT, & Intake Only (IO)

TREATMENT / OUTCOME	% MM	% TC	% DF	% DT	% IO
Highly Favorable	27	28	24	14	14
Moderately Favorable	41	40	33	25	27
At Least Moderately Favorable	68	68	57	39	41

Source: Simpson & Sells, 1983

nonopioid drugs (with the possible exception of less-than-daily marijuana use) and no arrests or incarcerations in jail or prison during the first year after DARP treatment," (p. 16). They also developed "... a moderately favorable standard ... [of] no daily use of any illicit drug during the year and no major criminality indicators (for instance, no more than 30 days in jail/prison and no arrests for crimes against persons ..." (p. 16). Again, though not planned with this kind of comparison in mind, the outcome indicators have clear relevance to a cost-benefit analysis of DARP treatment. Results are given in Table 6-4.

As can be seen, about two-thirds of DARP patients had at least a "moderately favorable" outcome, as defined above. About a quarter had a "highly favorable" outcome, meaning an absence of the aggravated cost elements - crime, incarceration, police and court activity - that had previously marked their untreated drug use. In the DARP long-term (five- to seven-year) follow-up studies, these outcome measures were more favorable still. Simpson and Sells (1983) remarked

> ... there were many instances of progressive improvement on other outcome measures as well that occurred over time during the follow-up period. In the present sample ... 78% had no daily opioid drug use in the last year prior to the follow-up interview, and 37% and 49% met the highly favorable ... and moderately favorable ... outcome standards, respectively. (p. 21).

An effect of treatment, though, which caused much comment but which has now begun to be addressed by the field concerned the increases in drinking and cannabis use by patients in all groups. As Table 6-3 indicates, between one-third and one-half of patients in each condition increased their use of either or both intoxicants, despite the decrease in narcotic use noted for the group as a whole. Three theories can be adduced to account for this anomalous result with potentially important implications for treatment and for cost-benefit and cost-offset analysis of DARP results, since heavy drinking can cause severe health consequences and is, in the DARP sample, the best predictor of mortality over time.

The first possibility is that unsuccessful or only partially successful patients in each condition, following a trajectory of unchanged or only partially remitted narcotic use, increased their cannabis and alcohol use over time as part of a general pattern of increased addictive symptomaticity. Results not presented in Table 6-3 showed similar increases of cannabis and alcohol use in the detox-only group, so this theory has a small element of support and may account for some of the observed increase.

A second possibility is that the increase in drinking and cannabis use was more general, as even successfully treated narcotics addicts turned for the first time to alcohol and marijuana as substitute intoxicants. The third possibility is that alcohol and cannabis are in the histories of most narcotic addicts serious, pre-existing drug abuse problems that are not touched by most treatment programs and that are more prominently expressed when narcotic drug activity is suppressed. In this theory, alcohol and cannabis use are viewed by both clients and their MM, TC and DF treatment personnel as lying below a threshold of clinical significance, and so not worth treating.

This very question was recently addressed by Lehman, Barrett and Simpson (1990) in a 12-year follow-up of DARP patients. In this study, 298 patients were located and reinterviewed in 1982-1983 and were questioned closely about the relationship of alcohol use to their opiate addiction. In general, all three theories presented above received some support in the study. About half of the patients were classified as "nonsubstitutors," and showed no marked increase in drinking after discontinuing narcotic drug use. Another third, though, were classified in the "low substitution" range, and the remainder (n = 40 were classified in the "high substitution" range. These patients tended to have the poorest outcomes in terms of narcotic drug use - that is, they showed more drug use of all kinds than the nonsubstitutors, as the first hypothesis would suggest. These patients also, though, tended to have histories of prior serious alcohol problems and resembled in many ways the "early onset alcoholics" of other literatures, as the third hypothesis would have it. The finding, too, of some amount of substance substitution frankly admitted by the subjects lent some support, as well, to the second hypothesis.

Overall, the continuing problem with drinking and cannabis use in half the DARP patients, and the serious health implications of the untreated and apparently exacerbated alcohol problem, points up the importance of treating addictive problems generally .

Two other important findings of the earlier DARP research must be considered together. The first concerns

the timing of apparent therapeutic benefit. The DARP researchers found that, with few exceptions, therapeutic effect on the target behaviors of drug use and reduced crime occurred early: "In all treatments it was noteworthy that most changes observed occurred early, within the first two months of admission", (p. 586). Effects of treatment on other dimensions of functioning occurred later.

> Time in treatment was a differential factor of major importance in every treatment, particularly with respect to productive activities, employment, and opioid use. Patients who remained in treatment longer generally showed greater improvement on these criteria than shorter-term patients and showed similar results occasionally on other criteria as well. (pp. 586-587)

Positive changes in productive activity and employment were generally not noticeable until three to four months after admission. So, while proximal target behaviors (opioid use and criminal behavior) tended to respond quickly to treatment in all the DARP programs, collateral effects were much delayed and did not become apparent until beyond the point at which less than half the patients in DF and TC were still in treatment. This further underlined the problem of treatment retention for narcotics users.

The second finding concerns the durability of effects. Further follow-up studies suggested that even changes that are initially observable in drug-taking and criminal behavior do not become stabilized in patients who remain in treatment for less than three months. Simpson (1979), for example, found that, at one-year follow-up, patients in MM, TC or DF with less than 90 days of treatment prior to dropout or termination were functioning in every way no better than detox-only or intake-only groups, as though tenure in treatment, any treatment, had unique power to affect outcome. In a further look at this issue, Simpson (1981) selected a DARP subsample of 1,496 patients for six-year follow-up. With this much longer period of observation, time in treatment continued to overshadow other sources of outcome variance.

> Beyond 90 days, the relationship between tenure and posttreatment outcomes was linear. This general relationship was consistent across different types of patients (e.g., addicts and nonaddicts) and the major treatment modalities (i.e., methadone maintenance, therapeutic community, and outpatient drug-free treatment); these results could not be explained by preexisting baseline differences between the tenure groups. Similarly, the length of time spent in other (subsequent) drug abuse treatment programs during the post-DARP follow-up period was also positively related to the magnitude of favorable outcome changes from before to after the treatment episode. (p. 879)

Simpson is saying that, across problem types, treatment modalities, severity of illness, even the nature of the eventual discharge (voluntary vs. involuntary) in MM, time in treatment was the most important mediator of outcome. This is a finding that, as will be seen, has been convincingly replicated. Thus, in drug abuse treatment with narcotics users, a more long-term therapeutic approach is called for than in the treatment of other groups.

> [A] minimum period of several months of treatment seems to be necessary before outcome differences can be observed. After a minimum of about three months necessary for any positive effect, there was a continuous, linear association between tenure and outcome," (p. 879).

The data appear to indicate that a substantial amount of time and therapeutic contact - during which the criminal support of an illicit drug use pattern is interrupted in favor of either a drug-satiation (methadone) regime, a highly supervised environment (TC), or effective counseling (DF) - is required in order for new skills and attitudes to establish themselves in a reliable and durable way.

> It was also suggested that taking into consideration the differential retention rates of MM, DF and DT treatments previously discussed, patients in DF and DT who remained in treatment over 6 months showed as much improvement as patients in MM who remained that length of time, even though the average improvement in DF for all patients was lower than that of patients in MM, whose overall tenure was considerably longer.
>
> ...The analysis of time in treatment revealed further that improvements on opioid use increased throughout the period of treatment. Improvement on productive activities and employment, which generally appeared not before 3 to 4 months after admission, also tended to continue over the entire period that patients remained in treatment. This finding is of major importance since it points to what appears to be a valid therapeutic effect. The widespread early reduction on opiate use, on the other hand, could be interpreted as compliance with agency surveillance," (p. 588).

In the DARP study and elsewhere, the willingness to stay in treatment has not been examined in relationship to the likely mediator - motivation. As a patient is removed from a noxious environment and placed in treatment, particularly inpatient/residential, he/she has the time to progress from an external to an internal motivation for recovery, abstinence and a pro-social way of life. As indicated earlier, many criminal justice referrals like others, enter treatment under duress from the outside and are looking for relief from that pressure. They are not necessarily looking for recovery as they initially begin treatment. It is the task of the treatment program to educate the patient, provide counseling and reward for positive behavior to transform that external pressure into an inner drive of motivation.

The time-in-treatment issue may be the time it takes to accomplish the task of inculcating this motivational growth and change. Of course, this may be just as true with an insured patient who is threatened with the loss of a job or family as it is for the criminal justice referral. The difference may be that the insured patient with a job, family and support network may have additional rewards, a positive value system and a less noxious environment to return to that both quickens and enhances the process.

Additional data bearing on the relative effectiveness of the treatment regimes tested in the DARP program are presented later in the section on cost effectiveness.

Treatment Outcome Prospective Study (TOPS)

The Treatment Outcome Prospective Study (TOPS), which was conducted during the 1980s and is still being presented to the scientific community, has been called "... the largest, most comprehensive study of the effectiveness of drug abuse treatment ever undertaken," (Hubbard et al, 1989, p. xi). TOPS has generated literally dozens of reports on the main systems of drug abuse treatment in this country, including studies of retention, effectiveness, cost-benefit and cost-effectiveness, and others. The results of TOPS form the heart of the discussion in this section on cost-benefit studies and again are introduced in the section on cost-effectiveness, below. Though the literature generated by TOPS is voluminous, it is presented under one cover in the massive *Drug Abuse Treatment: A National Study of Effectiveness* by Hubbard, Marsden, Rachal, Harwood, Cavanaugh and Ginzburg (1989). This is the text referred to here unless otherwise indicated.

TOPS bears many points of resemblance to its predecessor, DARP, including its look at three main treatment vehicles - methadone maintenance (MM), therapeutic community (TC), and outpatient drug-free (DF), as well as having available information on narcotic-detoxification patients - its geographically dispersed sample of thousands of cases, its use of three annual cohorts, its long-term follow-up strategy, and its collection of complex data arrays on each subject. As the scientific successor to DARP, however, TOPS has the advantage of studying programs with policies and client bases that have matured and stabilized. Its sample includes more females, more patients who are older, many more who are returning to treatment rather than entering for the first time, clients with less criminal justice system involvement, and those who are less likely to be predominantly opiate users and more likely to show the common pattern of multiple drug use.

Compared to DARP, "... TOPS provides more extensive information about the nature of drug abuse treatment, describes the characteristics and behavior of abusers prior to treatment more comprehensively, and collects data from clients within the first year after leaving treatment," (p. 8). Multiple outcome measures are available for periods up to five years after the conclusion of treatment. This renders TOPS the premier study of treatment and its effects in the field of drug abuse though another large-scale longitudinal treatment project, the Drug Abuse Treatment Outcome Study (DATOS) is currently underway with NIDA funding, and will study treatment in a still broader array of settings, with still more representativeness in terms of patient mix, fee schedules, and so on.

TOPS was based on the results of a planning meeting and technical review hosted by NIDA in 1975, just after the DARP recruitment pool had closed and initial results were becoming available. The goal of the planners was to answer a number of questions still nagging as DARP's results went to press.

> [DARP's] results strongly suggested that treatment did have impact, and that for many heroin users the impact was surprisingly strong and long lasting. But there were still almost as many questions left unanswered. Would the successors to the prototypic programs work as well without the initial enthusiasm and leadership of their early innovators? Would they work as well for populations of older drug users? Would they work as well with the clients with the most severe problems who returned again and again ..? Would they have any impact on the use of drugs other than heroin? Perhaps of central importance for public policy, *did the money invested in treatment produce equal or greater benefits than money invested in law enforcement, jails, and other alternative policy actions?* (pp. x-xi, emphasis added)

Eventually, a contract to conduct the research that came to be called TOPS was let to Hubbard's team at the Research Triangle Institute (RTI) in 1977. Harwood, a senior economist at RTI, designed the socioeconomic analyses. The study was designed and measures were piloted on 400 patients in nine treatment programs, before the study was deployed formally to the field in 1979. Though criticized in some quarters for employing a quasi-experimental or "naturalistic" research mode rather than the rigorous design of the randomized clinical trial (RCT), Hubbard quite deliberately favored the TOPS design over the RCT, which can create "... artificial selection conditions and atypical treatment atmospheres that cannot be generalized confidently ... , " (p. 17), and which other studies of that era (e.g., Bale et al, 1980) were showing to be vulnerable to problems with treatment compliance, uncontrolled cell crossovers, and high attrition.

> Rather than relying on random assignment, which has not proven successful across modalities .., causal inference is accomplished through extensive measurement of key explanatory variables, .. comparison of multiple cohorts with pre- and posttests, and through

replication that can rule out alternative hypotheses. (p. 16)

TOPS, then, is a quasi-experimental longitudinal prospective cohort design with a total sample of nearly 12,000. A total of 41 selected drug abuse treatment programs - 17 MM clinics, 14 TCs, and 10 DF outpatient agencies - in 10 cities in all regions of the country - Chicago, DesMoines, Detroit, Miami, New Orleans, New York, Philadelphia, Phoenix, Portland (Oregon), and San Francisco - were selected to participate. In 1979, 2,985 program registrants entered the TOPS pool. They were followed in 1980 by 3,626 patients, and in 1981 by 3,378 more. Eventually, nearly 2,000 narcotic-detoxification or contact-only subjects were added, for a total sample of some 11,750. Methadone maintenance was represented by 4,184 registrants, therapeutic communities by 2,891 residents, and outpatient drug-free counseling by 2,914 clients. Of these, careful stratification for treatment modality and time in treatment was used to select a follow-up sample of 4,270 clients.

Clients were interviewed at initial contact, one month after admission, then at three, six, nine and 12 months after admission if they were still in treatment at that time. Otherwise, the follow-up sample was interviewed three months after leaving treatment, then at one year, two years, and three to five years after leaving treatment. Follow-up was quite successful for this difficult to track patient group, with between 70 and 80% of the eligible subjects being re-interviewed at each follow-up interval.

The assessment batteries used at each interval delivered the richest data yet developed in this kind of research, and, where possible, information was independently validated "... through authorized checks of such official records as FBI arrest reports and Social Security Administration employment data, and through urinalysis," (p. 27). Data included (1) demographic information, (2) admission characteristics including source and nature of referral and insurance coverage, (3) drug use history, pattern, route of administration, and current use level for 12 major drugs and drug classes, (4) alcohol use and use history, (5) treatment history for addiction and mental health problems, (6) depressive symptomatology, (7) use and availability of social and community supports, (8) criminal activity and consequences in 11 classes of offense, (9) employment and vocational functioning, and (10) income and expenditures. Most data were collected via face-to-face interviews with full-time "program researchers" located on site but trained and supervised by RTI staff.

Table 6-5

Selected Admission Characteristics, TOPS Treatment Groups

	TREATMENT		
CHARACTERISTIC	% MM	% TC	% DF
Age			
< 21	2	19	27
21-30	57	56	52
> 30	41	25	21
Gender			
Male	68	78	67
Female	32	22	33
Race/Ethnicity			
Non-Hispanic White	41	53	80
Hispanic	21	7	8
African-American	37	40	10
Marital Status			
Married or Living as Married	40	16	22
Never Married	34	55	55
Previous Treatment for Drug Abuse	75	53	34
Referral Through the Criminal Justice System	3	31	31
Public Assistance as Primary Income	24	11	14
Illegal Activity as Primary Income	23	34	12
Involved in Predatory Crime, Last Year	33	60	37
Employed 40 Weeks or More, Last Year	24	15	25
Suicidal Thoughts or Attempts, Last Year	29	44	48

Source: Hubbard et al, 1989

Table 6-6

Drug-Related Admission Characteristics, TOPS Treatment Groups

	TREATMENT		
DRUG, PATTERN, OR CONSEQUENCES	% MM	% TC	% DF
Drug			
Heroin	67	31	10
Methadone	19	5	2
Other Opioids	28	30	15
Cocaine	28	30	17
Minor Tranquilizers	25	28	17
Major Tranquilizers	1	4	2
Barbiturates	6	15	8
Sedatives	6	17	14
Amphetamines	9	30	23
Hallucinogens	1	10	6
Inhalants	0	2	2
Cannabis	55	65	68
Alcohol	47	65	62
Multiple Drug Use Pattern			
Two or More Drugs	79	81	70
Four or More Drugs	32	40	20
Three or More Drug-Related Medical, Mental Health, Family/Social, Legal, Vocational or Financial Problems	41	63	50

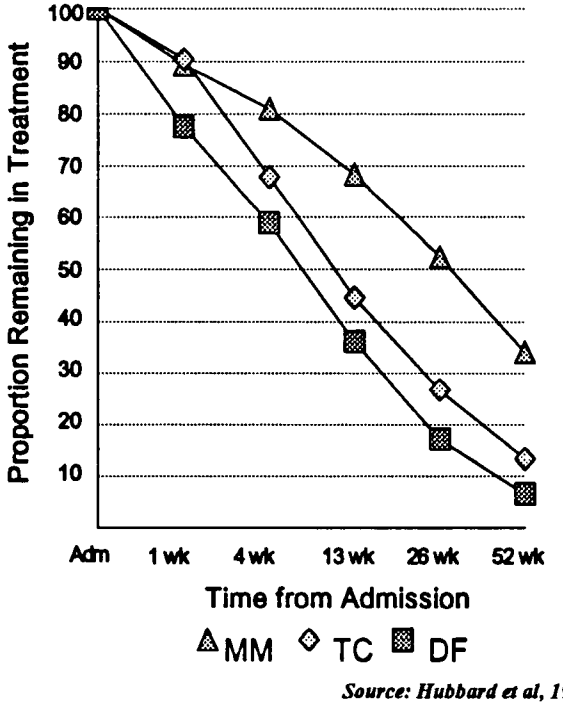
Source: Hubbard et al, 1989

The first results of the study, those describing the patient population, point out the costliness to society of these individuals when still actively addicted to illicit drugs and, by implication, the potential cost savings if treatment can be initiated and gains sustained. Table 6-5 shows admission characteristics for patients in each of the three treatment modalities, selected from the 1989 report. Many clients had experienced multiple treatment admissions, for alcoholism and for psychiatric problems as well as for drug addiction.

While criminal justice system involvement was less pronounced than in the DARP study group, about one-third of TC and DF clients were referred through the criminal justice system and 20% of MM, 50% of TC, and 40% of DF clients reported serious legal difficulties either currently or in the recent past. Sixty percent reported some serious depressive symptoms in the year prior to admission; 23 to 34 % had contemplated suicide, and 6 to 14% had recently attempted it. As shown in Tables 6-5 and 6-6, these are heavy users of social support systems with many stubborn problems. The authors remarked,

Figure 6-2

Continuation in TOPS: Comparative Attrition Rates for MM, TC, and DF



Source: Hubbard et al, 1989

> The young average age of clients, the representation of females, and the large proportions of race and ethnic minorities indicate the need for specialized services, such as family services, day care, and financial counseling. The low educational status of these clients indicates that many need additional education and training in order to assume productive lives. (p. 75).

The full assessment battery deployed by TOPS had obvious advantages for the researchers' ability to describe their sample and estimate the socioeconomic impact of their drug abuse and the potential impact of its treatment. The drug use patterns themselves were described with great specificity in the report, abstracted in Table 6-6. These data show the increased diversity of TOPS drug abuse patterns over the DARP data, which tended to focus on opiate addicts with more secondary use of other drugs.

> Weekly or daily use of heroin is the dominant pattern of drug abuse among outpatient methadone clients. But the drug abuse patterns of residential and outpatient drug-free clients before entering treatment are more diverse. ... [T]here are no dominant drugs of abuse among residential and outpatient drug-free clients. (pp. 78-79).

Data in these tables point out the representativeness of patients in TOPS. Most reviewers would agree the TOPS sample is representative of the cross-section of treatment-eligible drug users nationally.

The findings of the study, again, are complex. Some are reviewed below, others in the section of CEA with narcotics users. Beginning, though, with treatment retention as the criterion of interest, TOPS data repeat the earlier warning of DARP that attrition from treatment is a serious problem, one worthy of further research to improve retention rates.

Figure 6-2 shows survival in treatment for each of the major modalities. Measures of central tendency showed for MM a mean duration of 38.4 and median duration of 28.3 weeks; for TC the mean duration of treatment was 21.3 with a median of 11 weeks, and for DF the mean was 14.6, median 7.9 weeks.

> These results suggest the need for more intensive efforts early in outpatient drug-free treatment. While residence and medication are potential motivating factors in other modalities, outpatient drug-free programs must convince a client that counseling is beneficial. A very positive initial experience is necessary to motivate outpatient drug-free clients to return for subsequent sessions. (p. 95).

Because the DARP researchers had found such a strong effect of treatment tenure on ultimate clinical outcome, the TOPS researchers were interested in attrition and analyzed extensively for case factors that might have

contributed to it. They also took another look at the influence of treatment tenure on ultimate success.

As to the first question, logistic regression was used to search for factors which might have aggravated treatment attrition. Few findings were consistent across modalities, but even some of the treatment-specific relationships were of value. For instance, female patient were observed to remain longer in MM or DF treatment than did males, but to remain for shorter periods in TC:

> The finding that women stay shorter periods in residential programs is consistent with the finding of a body of prior research that cites the demands of family life on women as reasons for their dropping out of residential programs. They may be more likely to complete outpatient programs in which they can maintain family ties more easily. (p. 96)

A similar kind of pattern was observed for married or living-as-married patients, perhaps for the same reason. Overall, though, only two factors seemed to have a main predictive relationship to time in treatment.

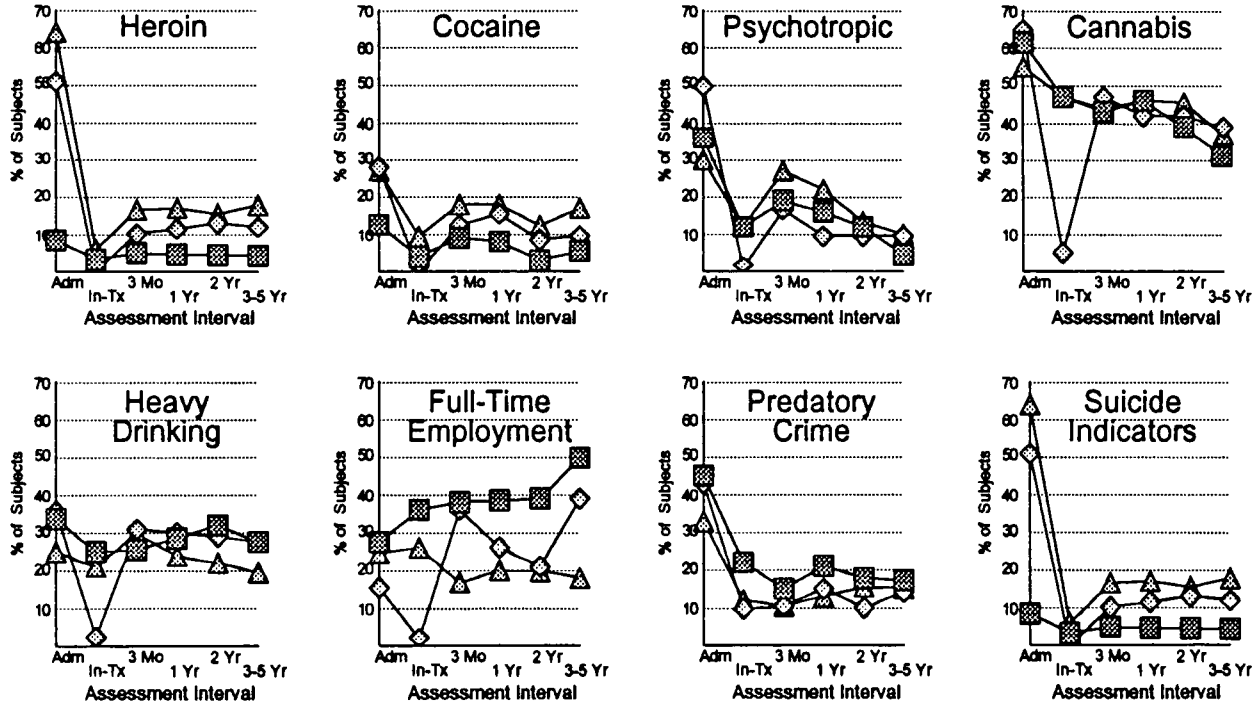
First, heavy drinkers were likely to drop out of treatment early, and criminal justice referrals were likely to remain in treatment, except in the case of MM, where CJS referrals were very rare. Further analyses of time in treatment are returned to below, after an initial look at outcome results for the main TOPS treatment modalities.

In Figure 6-3, patient functioning at six points time - at the time of admission, at the three-month point during active treatment, then at three months, one year, two years, and three to five years after discharge - for each of three treatment modalities is shown for eight separate outcome measures. Three of these - heroin use, cocaine use, and illicit use of pharmaceuticals - were targets of treatment in most modalities. Two more substance use patterns, cannabis use and heavy consumption of alcohol, are included as substance abuse related factors influencing post-treatment functioning, as are suicide indicators included as a post-treatment adjustment factor. Two more measures of outcome - predatory crime involvement and full-time employment - are included as socioeconomic indicators.

Though the TOPS data have been analyzed in much

Figure 6-3

Patient Functioning in TOPS Treatment, MM △, TC ◇ and DF ▩: Admission, In-Treatment, and 3-Month, 1-, 2- and 3- to 5-Year Follow-ups



Source: Hubbard et al, 1989

greater detail, this Figure shows the most important findings of the study, at least in regard to treatment effectiveness. As can be seen, there is in the TOPS outcome data some resemblance to the findings of DARP, though results appear overall more favorable and without the increase in drinking and cannabis use noted in the earlier study.

First, heroin use is not eliminated in any group but is very sharply curtailed in all. Though 64% of MM clients were regular users of heroin at the time of admission, only 18% of MM patients who stayed in treatment at least three months were still using regularly three to five years later. Among TC residents the equivalent decline was from 31% to 12%, and for DF clients the decline was from 9% to 5%. This improvement was immediately apparent for patients with adequate program exposure, and was remarkably durable.

Cocaine use showed a similar pattern of improvement. While 26% of MM clients were regular users prior to admission, only 16% of MM patients who stayed in treatment at least three months were still using regularly at three to five years posttreatment. Cocaine use in TC residents declined from 28% to about 10%, and in DF clients cocaine use declined from 13% to 6%. Pharmaceuticals showed a similar decline, and cannabis use, while not suppressed to the same extent, fell from 55% pre-treatment to 36% three to five years posttreatment for MM clients, from 64% to 39% for TC residents, and from 62% to 31% for DF clients; thus, cannabis use was cut by one-third to one-half for most clients who stayed at least three months in their treatment program. The only substance-related activity that was not so affected by TOPS treatment was heavy drinking, which followed a complex path leading to mild improvement.

> The proportion of heavy drinkers decreased substantially during the first three months of treatment ... In the first three months after treatment, the percentage of heavy drinkers rose, close to pretreatment levels. After this ... however, the percentage of heavy drinkers decreased steadily until three to five years after treatment. Then the percentage of heavy drinkers among those who had stayed in treatment at least three months was about 6 to 8 percentage points less than in the year before ... These findings suggest that drug abuse treatment has a moderating effect on heavy alcohol use. Although the effect ... [is durable] it is not strong. (p. 139)

These improvements in drug use are reflected in the other three indicators shown graphically in Figure 6-3. The frequency of suicidal thoughts and attempts decreased dramatically and stayed suppressed throughout follow-up. Predatory crime (defined in the study as an instance of aggravated assault, auto theft, burglary, dealing in stolen property, forgery or embezzlement, larceny or robbery) was drastically reduced during treatment and, though crime rates rose after treatment (especially for the far more criminally involved TC residents) they showed a long-term reduction of about 75% for DF clients, 50% for MM clients, and 65% for TC residents.

This reduction in income-generating crime was matched in the DF and TC modalities by an increase in full-time employment, with the former patients rising from 27% to 50% three to five years out, and the TC residents going from 15% to 38% steadily employed. That is, for these client in these two treatment modalities steady employment about doubled; this effect was strongest for patients who remained in their TC for at least a year, or remained active in their drug-free clinic for at least six months. MM clients showed no such gain, being in fact less likely to be gainfully employed three to five years following enrollment in methadone maintenance than they were prior to registration. Patients who remained on methadone for at least one year showed more improvement.

Overall, the combination of a double stigma - that of being a drug addict and a criminal - and perhaps, the lack of specific vocational focus in the treatment facilities provides for a mixed review of employment effects. This may be an area for further research and program development.

> In comparison with other outcomes, relatively small changes in the employment of clients are associated with participation in drug abuse treatment. ... the overall treatment experience appears to be associated with an increase in employment, but the increases are not consistent across the time period nor are they large compared with other outcomes. ... Many former clients remain dependent on public assistance as they decrease their illegal activities. *This finding suggests that greater emphasis be placed on the provision of employment and training services.* (pp. 134-137, emphasis added).

The potent findings of treatment efficacy in TOPS are some of the strongest in the literature, and the robust naturalistic design of the study, its long-term follow-ups and high follow-up rates, etc., lend weight to the study as evidence of the usefulness of treatment with narcotics users. The authors concluded in regard to substance use itself, that

> treatment results in substantial decreases in the abuse of both opioid and nonopioid drugs but that the goal of abstinence is achieved for relatively few. ... Pretreatment levels of drug use decline dramatically during treatment, increase slightly immediately after treatment .., and again decline in subsequent periods after treatment. ... Abstinence rates averaged about 40 to 50 percent and improvement rates 70 to 80 percent for [heroin, cocaine, and pharmaceuticals]. (pp. 124-125)

Similarly, for other factors influencing outcome:

> Substantial declines were observed for criminal activity and suicidal symptoms ... Indeed, one-year abstinence rates for criminal activity were the highest for any outcome measure ... Thus, there is a substantial improvement in many of the negative behaviors associated with drug dependency, but the findings for the relative stability of employment indicate that drug abuse treatment does not necessarily guarantee a return to or entry into productive activity. (p. 150)

The final argument made by the authors concerning outcome was raised earlier by DARP researchers: Time in treatment. In the 1989 report, extensive analyses are presented to test the impact of treatment tenure on the main outcome indicators - the use of heroin, cocaine, pharmaceuticals, cannabis and alcohol, predatory crime, employment and depressive symptomatology. Odds ratios were used to test for significant differences in outcome for patients who stayed in treatment for varying lengths of time.

The TOPS researchers unequivocally confirmed the earlier DARP finding, remarking "Indeed, our analyses demonstrate that time in treatment is among the most important predictors of positive outcomes," (p. 94). Posttreatment heroin use, for example, was lower in MM and TC patients who remained in treatment for at least one year, and in DF patients who remained at least six months. A similar pattern was revealed for the use of pharmaceuticals and cannabis, but not for alcohol or cocaine. "Posttreatment cocaine use was not well predicted ... This finding may be more related to the growth in cocaine abuse during this study than to characteristics of treatments or clients," (p. 125). Posttreatment employment was strongly related to time in treatment, as was predatory criminal activity for TC patients, the most criminally involved group.

Three factors, though, were more strongly associated with pretreatment levels of the same illness indicators, at least in some groups. These were heavy alcohol use, signs of suicidality and depression, and criminal activity among MM and DF clients. Among those factors which are under the control of the treatment community, however, such as treatment type or specific treatment ingredient, none were as important as mere time spent in treatment. Longer time spans than the "three month threshold" observed by DARP appeared necessary, though, to achieve lasting results with TOPS patients:

> Time spent in treatment was among the most important predictors of posttreatment drug abuse for all types of drugs. It was a particularly strong predictor of posttreatment regular heroin abuse and psychotherapeutic drug abuse. In contrast to prior studies, however, we found the time in treatment necessary to produce positive outcomes was relatively long: 6 to 12 months. (p. 125)

From these treatment outcome data, "... the most definitive analysis of the cost-effectiveness of drug abuse treatment yet conducted," (p. 41) is presented in the 1989 report. The 1989 data are inclusive of the entire span of TOPS follow-up (three to five years), but are concentrated on the socioeconomic performance of TOPS patients in the year prior to treatment vs. the year following treatment. Another lengthy and more focused socioeconomic analysis of TOPS data appeared independently (Harwood et al, 1988) and is also discussed below. Actually, most of the findings in the 1989 report are CBA rather than CEA analyses, the latter being presented in the appropriate section below. The CBA findings, though, appear robust and are worth a close look.

As already noted, the socioeconomic section of the report was designed by Harwood, who used his 1984 cost-of-illness framework to estimate the costs of the drug-related activities of TOPS patients, and the benefits that could be expected from successful treatment. True to CBA methodology, only those vectors that could be assigned dollar values are included in the analyses, and so the total benefits of treatment are likely to be underrepresented, but the results do "... provide an overview of the magnitude of crime-related costs of drug abuse borne by the nation," (p. 154).

Throughout his analyses, Harwood used two principal, summary socioeconomic measures that intersect, or contain some of the same elements. They have different policy and psychological implications, however, and so their inclusion in the TOPS report is a significant advance.

The first measure, costs-to-society, has three main sources, which are costs to victims, costs of maintaining the criminal justice system, and crime-career costs. Costs to victims include medical expenses if a crime-related injury occurred, property damage, and any loss of a victim's productivity incurred as the result of a crime. Harwood was able to estimate costs to victims based on general population data from the U.S. Department of Justice. He also accessed Justice Department data to estimate average costs for apprehension, adjudication and incarceration.

Crime-career costs, which are losses to the criminal him/herself, and thus to the society of which she or he is a member, due to the predatory criminal's nonparticipation in gainful employment, are difficult to estimate and are typically not attempted in this kind of study. Harwood approached the issue by estimating for each TOPS subject "... the difference between the person's self-reported legitimate earnings and the national average for persons of the same age and sex. ... Also included in this cost were estimates of the losses of expected fringe benefits and household productivity,"

(p. 154). Costs-to-society as a measure neglects some cost vectors which are difficult or impossible to estimate, but is the most inclusive measure used in this research tradition and is most preferred by policymakers.

The second main summary measure favored by Harwood, costs-to-law-abiding-citizens, is a measure from which costs borne by the criminal are excluded, and consists merely of costs to victims and criminal justice costs. This is a more modest measure, but its focus on law-abiding citizens only, ignoring costs to the criminal and his/her consorts, gives it immediate psychological impact. It is also more sensitive to change than the costs-to-society measure, which is based in part on the mainstream economic productivity of the drug abuser, a stubborn factor in some drug abuse cases even when successfully treated. Additional measures of socioeconomic outcome included in costs-to-society and involving only the narcotics user him/herself, including client expenditures on drugs, illegal earning and legal earnings, are also provided in the report and are reviewed here.

As shown in Table 6-7, in which dollar figures are adjusted to the 1979 levels obtaining for the first TOPS annual cohort, the one-year outcomes for treatment are very favorable. "Virtually all economic measures show that the burden of crime and other economic consequences of drug abuse are lower after treatment than before," (p. 155). Costs to law-abiding citizens fell about 20%, costs to victims fell 30%, and costs to society fell about 8%, a lower proportion due, as indicated above, by the relative intractability of the problem of integrating some patients into the legitimate economy.

Table 6-7

Socioeconomic Indicators in TOPS, 1-Year Pre-/Posttreatment

	ECONOMIC PERIOD		
IMPACT CATEGORY	YEAR PRE-TX	YEAR POST-TX	CHANGE
Crime-Related Costs			
Costs to Victims	$1,802	$1,236	(-$566)
Criminal Justice System Costs	3,926	3,049	(-877)
Crime-Career (Productivity) Costs	9,534	9,804	270
Theft and Casualty Losses	3,462	3,094	(-368)
Net change in Crime-Related Costs			(-1541)
Costs-to-Law-Abiding-Citizens[a]	9,190	7,379	(-1,811)
Costs-to-Society[b]	15,262	14,089	(-1,173)
Other Costs			
Drug Expenditures	6,854	2,687	(-4,167)
Illegal Income	6,937	2,546	(-4,391)
Legitimate Earnings	3,437	3858	421

[a] Sum of Costs to Victims, CJS Costs, and Theft Losses

[b] Sum of Costs to Victims, CJS Costs, and Crime-Career Costs

Source: Hubbard et al, 1989

The authors make special note, though, of the decrease in illegal income from nearly $7,000 in the year preceding treatment to about $2,500 in the year following, a 73% decline, and of the nearly identical decline (71%) in personal expenditures on drugs. Referring earlier to the decrease in predatory crime, the implication is clear that, as drug abuse treatment suppresses demand for illicit drugs, less predatory crime is committed and income from that crime declines.

> These decreases in the crime-related costs of drug abuse after treatment are consistent with the decreases in criminal activity among clients in the year after treatment relative to the year before ... They are also consistent with the observation by several authors that criminal activity is lower during periods of nonaddiction ... That is, as drug abuse decreases in severity after treatment .., criminal activity also decreases and the crime-related costs of drug abuse correspondingly decline.

Also worthy of note are economic costs incurred by patients during treatment. These are quantities of some significance in those cases in which treatment lasts many months or even some years, as is frequently the case with MM and even DF cases. Table 6-8 shows, across treatment modalities, the kinds of changes in socioeconomic indicators that can be expected while patients are actively engaged in change-related treatment. The values in the table underscore again the importance of treatment retention in treatment for narcotics use.

> The costs to law-abiding citizens and to society decreased substantially during treatment for clients in each of the modalities. The restrictive nature of residential treatment resulted in particularly low crime-related costs to law-abiding citizens during treatment ... These costs may have been from thefts from other clients, from program staff members, or while working temporarily in the community. The somewhat higher intreatment costs of [MM] and [DF] clients is [sic] probably a function of their less restricted environments. Costs to society among [TC] clients were also substantially lower ... during treatment ... These costs nevertheless remained substantial because the clients could not work and, therefore, had productivity losses while in treatment. (pp. 157-158).

It should be pointed out here at the risk of stealing thunder from the CEA section below that the cost savings observed during treatment alone more than recoup the costs of providing the treatment, even the relatively expensive residential treatment in the therapeutic community. As the authors note, "Posttreatment gains are virtually an economic bonus," (p. 161).

In another analysis, Harwood et al (1988) provided

Table 6-8

Socioeconomic Indicators in TOPS, Effects of Being In Treatment

ECONOMIC PERIOD / IMPACT CATEGORY		YEAR PRE-TX	DURING TX	DIFF PRE-/DUR.	YEAR POST-TX
Costs-to-Law-Abiding-Citizens					
	MM	$6,628	$2,763	(-$3,865)	$8,603
	TC	15,757	237	(-15,520)	9,129
	DF	4,686	1,825	(-2,861)	4,548
Costs-to-Society					
	MM	$16,987	$14,326	(-$,2661)	$15,710
	TC	19,411	12,092	(-7,319)	16,283
	DF	10,202	7,121	(-3,080)	9,610

Source: Hubbard et al, 1989

more detail bearing directly on the costs and benefits of treating CJS-involved patients. One of the strengths of this report is its ability to highlight the treatment-related reductions in costs-to-society and costs-to-law-abiding-citizens that can be observed when treatment is applied to patients who are either CJS-referred or not CJS-referred but criminally active by self-report.

> The major objective of this study is to estimate the economic benefits of drug abuse treatment in reducing criminal activity of drug abusers during and after treatment. The study also examines whether clients referred to treatment from the CJS demonstrate reduced crime costs during the year following treatment discharge. (p. 209-212)

These are matters that, folded into the cost vectors for the TOPS sample as a whole (as in Tables 6-7 and 6-8), are not adequately explored in the 1989 report.

Harwood et al (1988) in a separate report present follow-up data on 2,420 TOPS patients in all modalities who were either referred through the criminal justice system or were criminally active but referred through another channel. Because criminal justice referrals are relatively rare in MM programs - methadone maintenance is not commonly considered by courts or probation/parole officers when referring a drug-involved patient - only data bearing on TC and DF clients are presented in the report. Further selected are only those clients entering therapeutic communities, because they were at the time of admission for the TOPS annual cohorts, the patients most representative of the CJS-referred population as a whole. The clinical and socioeconomic methods in the Harwood study are those of the Hubbard et al (1989) report already described in detail. Only subsampling from the main TOPS database distinguishes the more focused work presented here. Pre-/posttreatment data on the main socioeconomic indicators favored by Harwood in the 1989 report are given in Table 6-9.

As can be seen, specific effects of treatment that are obscured in the group data as a whole become clear when criminally involved subjects are selected for special study. For most of these contrasts, results shown in Table 6-7 (the TOPS sample as a whole) should be compared to Table 6-9, where only the criminally-involved subjects are studied.

First, it is apparent immediately that these patients are much costlier in terms of costs-to-society and to law-abiding citizens than is the TOPS group as a whole, and considerably greater benefits can be expected from their treatment. The pretreatment costs-to-society figure for criminal justice system referrals, for example, is more than a third larger than costs-to-society for the sample as a whole, and the reduction in costs-to-society in the year after treatment is nearly three times as large. A similar reduction in costs-to-society occurs for those subjects who were criminally involved but not referred through the criminal justice system, Costs-to-law-abiding-citizens are nearly twice as great in the pretreatment era for criminal justice system referrals than for the total sample, and the posttreatment reduction is more than three and a-half times as great. Equal or even greater reductions in costs-to-law-abiding-citizens, in both proportional and absolute terms, are seen when criminally involved but self- or other-referred patients enter TC treatment.

In fact, study of Table 6-9 and its comparison to 6-7 show that, in every element used to calculate both costs-to-society and costs-to-law-abiding-citizens, with the exception of crime-career (lost productivity) costs,

Table 6-9

Specific Treatment Effects on Criminally-Involved TC Residents

ECONOMIC PERIOD	CJS REFERRAL		CRIMINALLY ACTIVE	
IMPACT CATEGORY	YEAR PRE-TX	YEAR POST-TX	YEAR PRE-TX	YEAR POST-TX
Crime-Related Costs				
Costs to Victims	$3,045	$1,795	$2,968	$928
CJS Costs	7,137	4,778	3,550	2,093
Crime-Career	10,239	10,758	9,852	10,672
Theft and Casualty	7,210	4,392	4,605	1,620
Costs-to-Law-Abiding-Citizens	17,392	10,963	11,123	4,641
Costs-to-Society	20,421	17,329	16,370	13,693
Other Costs				
Drug Expenditures	5,398	2,666	7,965	4,641
Illegal Income	6,799	3,747	9,932	2,444
Legitimate Earnings	2,601	2,940	3,056	3,054

Source: Harwood et al, 1988

the main pretreatment burden, and most of the pre- to posttreatment improvement - for costs to victims, criminal justice system maintenance, theft and casualty losses, etc. - is observed in the criminally involved patients. Further regression analyses reported by Harwood showed that, again, time in treatment was a determining factor in attaining these gains:

> Crime cost benefits were substantial for legally referred or involved clients, but such clients had to stay in treatment longer than clients not legally involved to accumulate the same crime cost savings. The most consistent correlate of favorable crime cost savings was time spent in treatment; longer stays are associated with lower posttreatment crime costs. ...[I]t appears that there are real returns to society and law-abiding citizens from greater lengths of stay for [criminal justice system] referrals (pp. 226-232)

A remaining difficulty, involving continued crime-career costs and lack of substantial improvement in legitimate earnings may be due to the tendency for even successfully treated but formerly criminally involved subjects to remain economically marginalized. This is a feature of the TOPS data worth a careful look by treatment planners, both for its implications for provision of services as well as liability to relapse in this patient group.

The final important feature of both of the TOPS studies reviewed above was their calculating direct CBA ratios for the three main treatment modalities studied - MM, TC and DF. Though the comparative figures used in the research lend a cost-effectiveness touch to the following discussion (rather than an argument purely in terms of cost-benefit, which is typically not a method for comparing treatments) it is presented here in proximity to Tables 6-5 through 6-9, rather than in a later section, to minimize confusion.

With their figures adjusted to the 1979 base, Harwood and his colleagues were able to cost-out representative treatment units in each modality - a day of residence in a therapeutic community (valued at $18.00), a morning's visit and check-in at a methadone distribution site ($6.00), and the day's share of an ongoing regime of outpatient drug-free counseling of varying intensity and quality (also $6.00). Though these numbers are small in comparison to present price levels, these are not the addictions treatment services for which costs skyrocketed in the 1980's. These figures are used in analyses with other cost and benefit figures which probably inflated at an equivalent rate in the years since the TOPS CBA results were gathered. Thus the data should still be quite valid. Results are shown in Tables 6-10 and 6-11.

Table 6-10

CBA Ratios for Costs-to-Society (CS), by TOPS Modality

	TREATMENT		
	MM	TC	DF
COST OR BENEFIT VECTOR			
Costs and Benefits for Each Treatment Day			
Average Cost of Treatment per Day	$6.00	$18.50	$6.00
Average Benefit (Reduced CS) per Day While In Treatment	5.54	15.77	7.63
Average Benefit (Reduced CS) per Day In Year After Treatment	9.95*	21.40	18.06
Treatment Course of Average Duration			
Average Length of Stay (Days)	267	159	101
Total Benefits (Reduced CS) In Treatment	$1,479	$2,507	$771
Total Benefits (Reduced CS) After Treatment	2,857*	3,403	1,824
Total Benefits In and After Treatment	$1,479	$5,926	$2,595
Total Cost of Treatment	$1,602	$2,942	$606
Ratio of Benefits (Reduced CS) to Costs	0.92	2.01	4.28

* Statistically nonsignificant and not included in CBA ratio

Source: Harwood et al, 1988

Table 6-11

CBA Ratios for Costs-to-Law-Abiding-Citizens (CLAC), by TOPS Modality

	TREATMENT		
	MM	TC	DF
COST OR BENEFIT VECTOR			
Costs and Benefits for Each Treatment Day			
Average Cost of Treatment per Day	$6.00	$18.50	$6.00
Average Benefit (Reduced CLAC) per Day While In Treatment	13.30	33.44	7.65
Average Benefit (Reduced CLAC) per Day In Year After Treatment	10.96	37.62	16.40*
Treatment Course of Average Duration			
Average Length of Stay (Days)	267	159	101
Total Benefits (Reduced CLAC) In Treatment	$3,551	$5,317	$773
Total Benefits (Reduced CS) After Treatment	2,926	5,982	1,656*
Total Benefits In and After Treatment	$6,477	$11,299	$773
Total Cost of Treatment	$1,602	$2,942	$606
Ratio of Benefits (Reduced CS) to Costs	4.04	3.84	1.28

* Statistically nonsignificant and not included in CBA ratio

Source: Harwood et al, 1988

Overall, all treatments appear cost-beneficial. Methadone maintenance shows a benefit-to-cost ratio of slightly below the break-even point of 1.0 when costs-to-society are considered, but this is almost wholly due to the employment intractability of the MM group, and the (probable) particular unhelpfulness, vocationally, of a course of drug-satiation therapy. Since TOPS was conducted, program planners have become more sensitive to this problem, and vocational counseling is a more common treatment feature than formerly. When crime-career or lost-productivity costs are not factored in (as in costs-to-law-abiding-citizens or CLAC), MM has a very attractive CBA ratio, as do the other treatments when both CLAC and CS is in the CBA denominator.

Residence in a TC appears to have the greatest economic return, principally because patients are removed from a noxious environment and influences, remain in treatment longer, and because of the greater control imposed by this kind of treatment. In addition, patients who self-select or are referred by the criminal justice system to this treatment modality have generally higher criminal cost histories than patients who are routed to MM or DR treatment. In terms of costs to society, "The average residential treatment episode cost $3000 and yielded a reduction of $6000 in the costs to law-abiding citizens for both CJS and self-referrals," (p. 225). Though savings (as expressed here principally in reduced crime and related costs) were not as great in the other two modalities,

> The benefits totaled at this point include only the in-treatment period and the first year after treatment discharge. While no multivariate estimates have been made, there is reason to believe that treatment effects may last more than 1 year. Some clients are completely rehabilitated through drug treatment, leaving their drug habits and criminal careers behind. (p. 231).

It is appropriate to let Harwood recapitulate for us the principal socioeconomic lessons of the TOPS study, at least as they have been formulated so far:

> The findings from this study indicate that there are significant economic benefits associated with drug abuse treatment. Generally, these benefits seem to be at least as great as the expense of each modality. There also appear to be greater crime-reduction benefits accruing to treatment in residential facilities than in methadone or outpatient drug-free programs. Longer term outcome must be assessed to determine the duration of these different benefits. (p. 232)

Drug Abuse Research Group Studies

Finally we return to some of the innovative studies by the Drug Abuse Research Group at the University of California, Los Angeles As was true in our look at DARP, these experiments are not adduced because of their primary socioeconomic relevance to questions of addictions treatment with narcotics users.

The studies are brought in to the discussion instead because of their elegance and ability to address some issues suggested in the DARP and TOPS research that must eventually bear on socioeconomic issues, such as the predictive power of time in treatment, the durability of treatment effects, and the kinds of cost savings experienced while the patient is in treatment, not just after he or she has "graduated." The research is often limited by the reliance on methadone maintenance as the prime, sometimes sole, treatment vehicle, as well as by the group's use of data on patients who entered treatment as much as 20 years ago. However, numerous outcome indicators of relevance to the criminal justice population are used, and some of the analytic tools experimented with by the Drug Abuse Research Group are unique to the field.

First, a two-part series on survival analysis in drug abuse treatment evaluation (Anglin & Fisher, 1987; Fisher & Anglin, 1987) is discussed. In these studies, survival analysis, a data analysis technique developed originally in the field of cancer research, was applied to the long-term (six- to eight-year) outcome data of patients treated in public MM clinics in three Southern California counties. Survival analysis is newly introduced to drug abuse outcome research by these researchers, and tests the pattern of "surviving" (not showing a symptom, developing a problem, or remaining in treatment) as a function of the passage of time. As Fisher and Anglin (1987) explain:

> Survivorship analysis was chosen over more conventional statistical techniques for analyzing program outcome data because conventional techniques fail to reflect accurately the temporal aspects of the phenomena they are used to assess. ... survivorship analysis produces functions over time so that significance tests are performed on data represented as temporal functions rather than as single points in time ... Survival curves, also referred to as time-to-failure curves, show the probability of 'surviving' (not relapsing) at each point in time in the follow-up period. (pp. 120-121).

In the Fisher and Anglin (1987) study, 346 subjects selected from males admitted to MM programs in Los Angeles County, San Bernardino County, and Orange County were tracked for an average of 6.6 years after their clinic admission. Ninety percent of the patients were interviewed in 1978 and 1979, resulting in a survey group of 297 subjects. A retrospective interview procedure covering a multidimensional outcome array was used, and was supplemented by objective records from the courts and treatment programs, as in the Anglin et al (1989) report reviewed at the beginning of this section.

Fisher and Anglin then used survival analysis to demonstrate the "survival" (retention in treatment) of MM patients in the three different clinics. They were able to demonstrate statistically different survival curves between the clinics, and further illustrate the relationship between time in treatment as a variable influenced by the clinics' ability to retain patients, and the overall effectiveness of the clinic as measured by other means. This was a finding that, in the admittedly more narrow domain of MM treatment only, validated the DARP and TOPS finding on time in treatment as an important outcome predictor, and also as a variable that can be influenced by clinic policy and qualities.

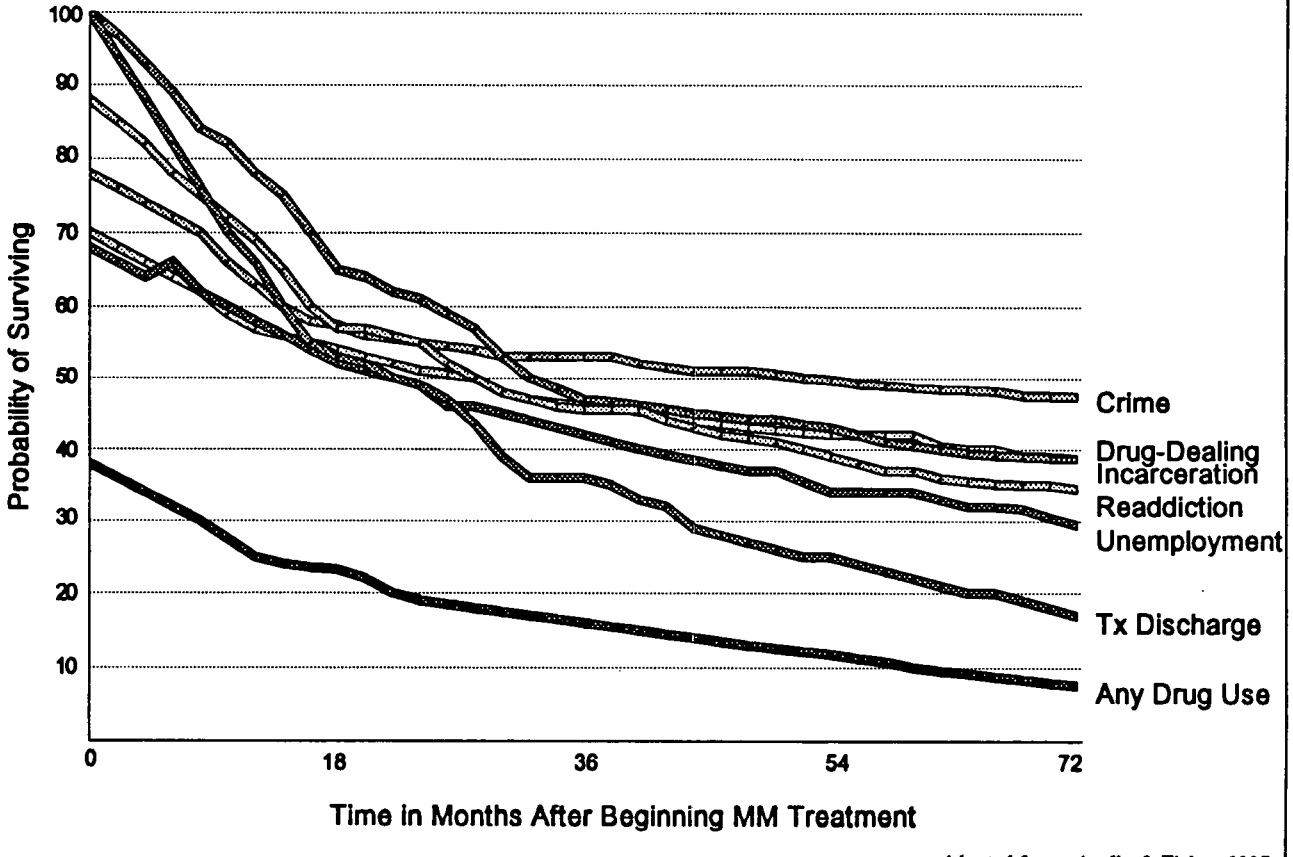
In the Anglin and Fisher (1987) companion piece, survival analysis was applied to the same data, but now collapsed across the three county clinics and targeted more specifically at the durability of treatment effects. "From a social cost-benefits perspective, an overall assessment of treatment intervention is the appropriate level of analysis. However, there are further questions concerning comparative effectiveness during and after treatment that survivorship analysis can also address. ... After-treatment effects seem to attenuate rapidly," (p. 378). Therefore, survival analysis could be used to test the durability of treatment effects and even the order in which effects attenuate over time. This was an important technical advance not available to the DARP or TOPS research teams.

In the study, the 297 MM clients who had been successfully followed more than six years after entering clinic treatment were interviewed according to the methods following:

> Briefly, the procedure involves the preparation, before the interview, of a schematic time sheet that shows all known arrests and intervals of incarceration, legal supervision, and methadone treatment - data that can be

Figure 6-4

Outcome of Methadone Maintenance
Survival Curves of Seven Outcome Variables



Adapted from: Anglin & Fisher, 1987

> obtained from the criminal justice system and treatment program records. In discussion with the subjects, the interviewer first establishes the date of first narcotic use on the time chart and then proceeds chronologically over time to the point when narcotic use changes
>
> ... Data are then collected on narcotic use, employment, criminal behavior, and certain other variables for that interval. The interviewer repeats this process for the next and following intervals, each recorded interval being initiated by a change in status or use, up to the date of the interview. Each interval recorded is homogeneous in terms of narcotic use, legal status, and drug treatment enrollment. Each point in the addiction career of the subject is thus measured in terms of these and other variables. (pp. 118-119)

Using this method, Anglin and Fisher were able to track the behavior of nearly 300 MM clients from the time of program admission, through discharge, and for up to six years thereafter, in seven domains - (1) criminal behavior, (2) drug dealing, (3) incarceration, (4) any drug use, (5) readdiction to heroin, (6) employment, and (7) discharge from the MM program. The typical sequence of events could be established in this way, and the statistical risk of various outcomes at different points in time could be estimated for the average MM client. Results are shown in Figure 6-4.

As can be seen in this figure, and as had already been suggested by the TOPS researchers, few MM patients abstain entirely from illicit drug use. Little more than one-third of MM patients are abstaining entirely while in treatment, a proportion that drops to about a quarter within 12 months after entry, and then gradually declines to less than 10% as the years accumulate. As the authors note, "... any drug use was typically followed by job loss, then a return to dealing, after which came discharge from the program, readdiction, commission of crime, and eventually incarceration," (p. 386).

However, this is not the pattern followed even by most patients, and the survival curves for the variables of principal socioeconomic interest - crime, incarceration, drug-dealing and unemployment - are considerably more encouraging. By the end of the six-year follow-up, the probability of "surviving" (not committing) crime has shrunk only to about 50%, and has clearly by that time reached asymptote, probably not to decline further by an appreciable amount. The probability of not having been incarcerated at any time during the follow-up has shrunk only to about 40%, as has the probability of not being involved in drug dealing, and so on.

These results are considerably in advance of the excessive relapse rates typically expected in the treatment of "hard core" drug addicts, especially those exposed merely to a drug-satiation (methadone) treatment regime without any adjunctive services in many cases. They speak powerfully to both the robustness and durability of treatment effects.

> The analyses' results showed immediate during-treatment and enduring post-treatment effects. The former finding is common in methadone maintenance evaluation studies ... The latter finding is less frequently reported and it is often assumed that posttreatment effects attenuate rapidly. Since the duration of treatment is markedly different across the three [county] programs ... it is likely that the differences in the posttreatment outcomes are related to time-in-treatment effects. (p. 385)

In the final report of the Drug Abuse Research Group reviewed in this section, Hser, Anglin and Chou (1988) developed the idea that treatment not be viewed in terms of a single instance or a single "dose," with treatment effects being related only to that criterion instance. The study instead pursued the view of the "addiction career" - not the immediately pretreatment use level, nor the single treatment episode - as the phenomenon of interest in drug treatment evaluation.

> [A] subject's treatment history is rarely a single episode, but rather is often characterized by several intermittent and sequential episodes. The cumulative effects of treatment are thus often not included in studies where only one treatment episode is investigated. The addiction career history and its embedded treatment periods may cover a long period, often spanning several decades. (p. 548).

Therefore in the authors' view, "... the cumulative effect of treatment on addicts' behavior is a more socially meaningful assessment to make than evaluating isolated treatment episodes," (p. 549). This is clearly a view that has gathered momentum in evaluation research. As Hubbard and French (1991) remarked in a major review of drug abuse treatment effectiveness,

> Weighing the costs and benefits for a specific treatment episode has been a typical approach for benefit-cost models. ... Summing the intreatment and post-treatment benefits often yields a favorable ratio of benefits to costs for society; indeed, in most cases the benefits of providing treatment are substantially higher than the costs. ...[However,] if one considers the costs of previous and subsequent treatment in calculating the benefit-cost ratios, reduction in expected future treatment costs could be considered as part of the benefit equation. A broader perspective requires a summing of all treatment costs compared with the benefits. Thus, the accumulation of benefits over a drug-using career after initial treatment should be compared with the accumulating costs of treatment over that career. (pp. 99-100).

Accordingly, the Hser and her colleagues were not

interested in evaluating the intreatment and posttreatment changes in addicts' behavior, as they did not consider these indices the best gauge of treatment effects in a population with many embedded "intermittent" and "sequential" bouts of treatment.

Instead, using the two databases on public methadone maintenance patients developed by the UCLA group - the first consisting of the data presented in Anglin et al (1989) at the beginning of this section, the second consisting of the Southern California data just discussed in Anglin and Fisher (1987) and Fisher and Anglin (1987) - the authors accumulated data on 720 patients over a long period of time, spanning many treatment admissions for some patients.

As will be recalled from the group's interview technique, inquiry with each subject commenced at the time of first drug use and continued until the time of the interview, so that data spanning the entire addiction career of the individual were ready for analysis. In the current study, the authors found African-American patients to be so poorly represented numerically in their data that the authors chose to exclude the few cases that were present rather than risk making unwarranted conclusions about African-American MM patients on the basis of such limited information. Hispanics, though, were well represented. The final sample consisted of 251 white men and 283 white women, and 141 Chicanos and 45 Chicanas.

All had been followed by interview from the beginning of their drug use, through MM treatment and other drug treatment episodes, and for four to six years postadmission. The data were then collapsed into three categories: (1) Behavior before first treatment, (2) behavior during "on-treatment" periods, including sporadic treatment, and (3) behavior during "off-treatment" periods, inclusive of any time between sporadic treatment episodes as well as (the more usual) posttreatment period.

Interview data were culled for information in twelve domains: (1) daily narcotics use, use of (2) cannabis, (3) nonnarcotics and (4) alcohol, (5) marital status, (6) spouses' drug use, (7) spouses' use of methadone maintenance, (8) employment, (9) receipt of welfare or other public assistance, (10) drug dealing, (11) commission of property crime and (12) legal supervision.

Finally, because of the interest of other groups (e.g., DARP and TOPS) on the time in treatment effect, Hser et al conducted separate analyses after dividing each gender and ethnic group into four cells: (1) the extremely low participation (LP) group which had used methadone treatment less than 33% of the time since their first enrollment, (2) a moderate participation (MP) group that had used methadone 34 to 66% of the time, (3) a considerable participation (CP) group that had used methadone 67 to 90% of the time, and (4) a full participation (FP) group that had used methadone almost continuously (91-100% of the time) since first enrolling in a clinic. The graphical output of the study on three of the principal outcome indicators - daily narcotics use, property crime, and employment - was given for each gender and ethnic group. These data are collapsed across gender and ethnic identity, and are presented in Figure 6-5.

As can be seen in this figure, behaviors of principal clinical and socioeconomic interest - daily narcotics use, property crime, and employment - are strongly and positively affected by treatment. Even while addicts are no longer in treatment or are between treatment episodes, these treatment effects are still apparent. Though there is a great deal of individual variation, and there is variation due to gender and ethnicity that are in the original Hser et al (1988) figures but are not illustrated here, treatment effects for methadone maintenance are generalized and durable. This argument is lent still more weight in view of the fact that the baseline of comparison used in the Hser data is not based on a highly symptomatic immediately pretreatment period, but includes all drug-related activity after initial exposure to narcotics and up until the time of first clinic admission.

> Regardless of sex, ethnicity, or the amount of treatment involvement, dramatic improvements were observed in all groups while addicts were in treatment in terms of reduced daily narcotics use, dealing activities and property crime involvement, and increased employment. During periods when addicts were not in treatment after treatment discharge(s), these improvements are reduced, but rarely achieve the same levels as in the pretreatment baseline. (p. 557).

These results, which have been widely cited as a significant methodological advance and a unique look at the effects of treatment, appear, as well, to have important cost-benefit implications. "Entry into the MM treatment dramatically reduced deviant behaviors, which are costly to society as well as to the addicts themselves. The reduction in social costs achieved by treatment has been shown to be much more than those costs required for treatment," (p. 567). These social costs reduced or avoided by the kinds of symptomatic improvement shown in this and other studies can only have been underestimated, in view of the additional benefit of decreasing HIV transmission which should also be delivered by the kinds of positive effects shown here (e.g., Ball et al, 1988)

Summary of Cost-Benefit Research

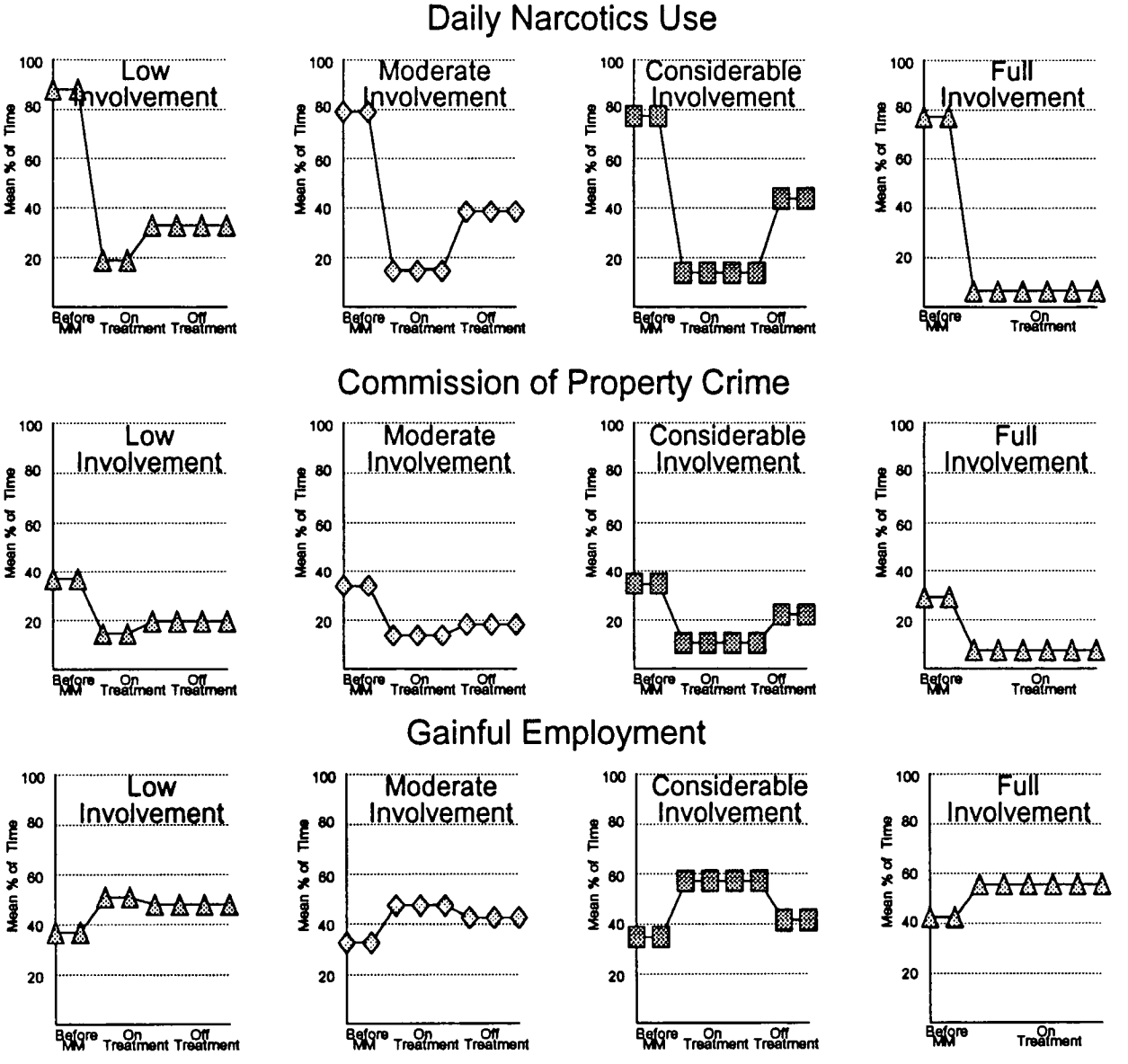
Anglin and Hser (1990), in their review of a literature based principally on long-term treatment with criminally involved opiate users, make a number of judicious remarks. First, they note that treatment with this

population is difficult and that dropout rates are high, but most treatment, once initiated, produces improvements in a variety of outcome dimensions, including opiate and nonopiate drug use, criminality, drug-dealing, legitimate employment, and other dimensions of concern to society. Most of the data presented here, from DARP, TOPS and the Drug Abuse Research Group, support this view. Second, they note that coerced or criminally involved clients do as well as uncoerced or voluntary clients. In fact, coerced clients do better on some dimensions in some studies, and nowhere is there indication that coercion with criminally involved patients produces a countertherapeutic effect. In this Technical Appraisal, data from TOPS were adduced to justify this conclusion.

Third, cultural and other demographic characteristics of clients may determine who is able to make entry to the

Figure 6-5

Patient Functioning Before MM, In MM, and Out of MM Treatment: Response to Low, Moderate, Considerable and Full Involvement in Treatment



Adapted from: Hser et al, 1988

treatment system, but, once in, these characteristics have little to do with who succeeds. Rather, the picture is similar to that obtaining in alcohol research, where good prognostic markers include stability, relatively low pretreatment symptom levels (e.g., low criminality, drug-dealing, etc.), low levels of psychiatric complaints, and positive program parameters (i.e., a professional staff with low turnover and high morale). Many of the data already discussed support this conclusion, and more are presented in the next section.

Finally and perhaps most importantly, Anglin and Hser argue that success is related to time-in-treatment. Retention in the treatment system, accountability of patients and their reporting officers, and good follow-through with treatment plans, all are implicated here. The importance of treatment tenure with narcotics users seems to be a very general and well replicated finding though, again, intervening variables such as patient motivation rather than time-in-treatment *per se* may be most important to developing a good clinical outcome.

When these conditions are met, data examined in detail in this Technical Appraisal show very encouraging cost-benefit ratios for substance abuse treatment with narcotics users. In the TOPS studies, ratios of benefits to costs as high as 4:1 have been produced, lending much weight to the wisdom of providing treatment rather than just coercive control to narcotics addicts, including those referred through the criminal justice system.

Another encouraging result from this literature is the durability and possible additivity of treatment effects, as shown in both DARP and TOPS, as well as in the studies of the UCLA group. Treatment continues to have an effect, even when the patient has completed treatment or, more frequently, has dropped out of treatment and not yet returned. And many patients do return: TOPS showed that about one-third of its study group, most of whom dropped out of treatment at some point, were readmitted during the follow-up period, after an average absence of only 12 months. The robust finding on the positive treatment benefits that even these "dropouts" may have enjoyed, and may have returned to treatment to get more of, encourages further research on the "addictive career" and the "treatment career" concepts, and may have a result on clinical outcome research more generally.

In an extensive review, Gerstein and Lewin (1990) brought up to date the picture of the kinds of treatment examined in this section. They took as look, for instance, at the more recent domination of TC residents by cocaine addiction, at changes in MM policy, and at the rise of chemical dependency (CD) units in the private residential and hospital sector. They considered the use of narcotic detox technology, and even the potential for drug abuse treatment in prison, where 15% of inmates report receiving some form of treatment while incarcerated, typically equivalent in intensity (and perhaps effect) to outpatient drug-free or Narcotics Anonymous (NA) programming. They summed up the literature in the following terms:

> There is qualified evidence that methadone maintenance, therapeutic communities, and outpatient nonmethadone programs are [cost-beneficial]. ... When methadone maintenance was implemented ..., the individual and social benefits over several years were substantially higher than the costs of delivering the treatment. The overall benefits of therapeutic community treatment were also substantial, but the near-term costs were higher .., thus yielding generally higher but still favorable cost-benefit ratios. The benefits of outpatient nonmethadone programs are smaller than those of methadone maintenance or therapeutic communities, but the costs are low and the yields are favorable. (p. 847).

This dearth of information, unfortunately, still holds true. This is especially so in cost-effectiveness (CEA) research, examined next. As already noted, virtually all socioeconomic research on addictions treatment with narcotics users focuses on issues of cost-benefit, already reviewed. Calls for CEA data are growing, for as Apsler (1991) has noted:

> Demands for more capacity to treat drug abusers have escalated sharply in response to large increases in cocaine use and concerns about the spread of the human immunodeficiency virus by intravenous (IV) drug users. These demands come at a time when the country is running a large budget deficit, many states are struggling to avoid budget deficits, and private insurers are under great pressure to restrain health care expenditures. In this climate of rising demand for drug abuse treatment coupled with severe limits on the availability of funds, scarce treatment resources must be carefully allocated so as to maximize their impact. (Apsler & Harding, 1991).

Cost-Effectiveness

The difficulty of conducting quality CEA research in the treatment of serious narcotic problems has so far proved quite daunting. A principal difficulty, of course, in the conduct of CEA research has to do with the kinds of patient-treatment matching and self-selection pressures that the large prospective cohort studies like DARP and TOPS did not attempt to control: That is, patients with different types of problems tend to be recommended to, and tend to self-select for, different major treatment modalities.

To the extent that the problems treated by these modalities differ in severity, they lack the requirement for a powerful CEA test, which should compare on the basis of cost and effectiveness different treatments for the same problem in the same population. One study

which attempted, unsuccessfully, to crack the random assignment nut in the traditional style of the randomized clinical trial (RCT) is reviewed in the next section.

BALE ET AL (1984)

Three Therapeutic Communities: A Prospective Controlled Study of Narcotic Addiction Treatment, Process and Two-Year Follow-up Results (Bale et al, 1984) was to have been an important step in the evaluation of the treatment of serious drug addiction. Designed and conducted in the mid-1980's by a large research team at one of the premier clinical research centers in the country, the Palo Alto Veterans Administration Medical Center, the study was designed:

> to overcome many of the limitations of past investigations of residential communities. Specifically, the design was prospective, with comprehensive baseline data gathered at intake and a wide variety of variables assessed at follow-up in a personal interview in which a urine sample was collected. All patients who began treatment were followed up and 96% were located, including a comparison group who were in treatment a few days for withdrawal only. Finally, a measure of experimental control over patient differences was afforded by randomly assigning patients to the three communities. (p. 186).

The experimental aim, to test the relative efficacy of three different TCs under the control of the same research team, has not been attempted before or since. In the study, Bale and his colleagues assigned 348 male veterans to one of three TC environments - (1) The Family, a peer confrontation program "with direct historical roots to Synanon," (2) Quadrants, a program with a more professionally oriented atmosphere and staff, and (3) Satori, a loosely organized environment with the atmosphere of "a college dormitory during finals." Another 213 subjects initially selected brief narcotic detox and were to be used as a comparison group. Treatment in each of the units was to typically last 180 days. After discharge, subjects were followed up either by in-person interview or, for those who had moved away, telephone survey. Data were taken on heroin use and the use of other illicit drugs, alcohol use, criminal involvement, vocational adjustment, and performance on other outcome indicators.

The results show clearly the difficulty of bringing volunteer patients into an environment as demanding as a TC, and the extreme difficulty of doing RCT-type research with this clinical population. "If the efficacy of a drug abuse treatment program is measured in part by its ability to both attract and retain patients in treatment, all programs were relatively ineffective," (p. 189).

Table 6-12 shows the ultimate disposition of cases. Of the 76 cases that were assigned to the Family, 14 remained in their assignment cell, 23 went to the other programs and more than half migrated to the minimal care or detox-only condition. Among the 139 assigned to Quadrants, 35 stayed, 20 went to the other programs, and nearly two-thirds migrated to minimal care. Of the 134 that were assigned to Satori, 34 stayed, 15 went to other programs, and 85 went elsewhere.

This kind of breakdown of the randomization protocol was caused by allowing patients to make a "free choice" of treatment condition after observing a waiting period if they felt the original assignment was not suitable. This severe failure, which may have been unavoidable for the need to preserve the ecological validity of the research environment at Palo Alto VA in the larger sense, completely compromised the experimental value of the study, as a variety of important self-selection biases, including those that could reasonably be expected to influence outcome, were revealed in post-hoc comparisons of the actual, if not initially assigned, treatment samples.

Surprisingly, none of the three programs was able to induce much more than a quarter of its assigned patients into treatment. Most patients self-selected for detox-only, MM or other minimal intervention. For those who did stay, median length of treatment (from six to 11.5 weeks, depending on the TC) was well below the minimum threshold of efficacy suggested by DARP (which suggested a three-month minimum stay) and TOPS (which suggested a six- to 12-month minimum). Perhaps for this reason, "None of the programs did better in terms of heroin use than the withdrawal-only group at follow-up," (p. 190).

Bale et al (1984), however great a scientific disappointment, has been an important object lesson for the field

Table 6-12

Cell Cross-Over Effects in Study of "Three Therapeutic Communities"

TREATMENT / INITIAL ASSIGNMENT	TOTAL	FAMILY	QUAD.	SATORI
Family	76	14	12	11
Quadrants	139	2	35	18
Satori	134	4	11	34
Other (MM or Detox)	213	5	19	16
Total	562	25	77	79

Source: Bale et al, 1984

of evaluation research with a seriously impaired, difficult to control group like narcotics users. It was ultimately, though, not informative in regard to treatment effectiveness, and particularly not in regard to cost-effectiveness. What little there is to say on the subject must be gleaned, as before, from the large prospective cohort studies discussed already in the preceding section, and from the following suggestive report.

Ball, Lang, Meyers & Friedman (1988)

This report, prepared by researchers at the NIDA Addiction Research Center in Baltimore, is another one of the very rare studies to test the differential efficacy of apparently equivalent, or nearly equivalent, treatment programs for serious narcotic addicts. In response to the growth of HIV as a focus of scientific and public concern, in this report:

> the principal research issue is to ascertain the effectiveness of methadone maintenance treatment in reducing IV drug use and concomitant needle sharing practices among addict patients. Specifically, four research questions were addressed: 1) To what extent does long-term methadone maintenance treatment reduce IV drug use and needle-sharing?; 2) Are some program markedly more (or less) effective than others?; 3) To what extent and how rapidly does relapse occur when patients leave treatment?; and 4) Are patient characteristics or program characteristics more important in reducing IV use and needle-sharing during treatment? (p. 215)

The results of the study, while not formatted in straight cost-effectiveness terms, are illustrative of the kinds of program parameters that must be constantly borne in mind when cost-effectiveness of the treatment of serious narcotic addiction is being contemplated.

The authors selected for study 633 male MM patients distributed among six methadone maintenance clinics in three different Eastern cities, two each in the cities of New York, Baltimore and Philadelphia. "We selected only large stable programs with average or above-average staff/patient ratios in order to exclude transitory or grossly inadequate programs," (p. 216). Both patient characteristics and treatment process variables were studied, with thorough review of records bolstering in-person baseline and follow-up interviews, including the Addiction Severity Index, for which the patients were paid. Initial data were collected in 1985-1986, and 506 patients were interviewed for follow-up a year later.

Many of these patients had been in treatment for several years at the time of their recruitment. Altogether, data were available on nearly 400 subjects covering a baseline assessment window of varying lengths, the admission period, and up to four-years of treatment experience. Another 107 subjects who left treatment early were also followed. Principal focus was on IV drug and needle-sharing as outcome variables, a fortunate choice given the many health (and potential cost-offset) implications of IV drug use practices.

The results as a whole support those of the studies already reviewed. "Almost one-fifth of the patients ... gave up their IV use at the time of admission. ... This finding establishes that [MM] can stop IV use rapidly among some heroin addicts." A continued decline in IV use was observed for as long as the patients remained in treatment, with the largest drop occurring around the time of clinic admission.

Figure 6-6 shows the rate of IV drug use reported by those continuously in MM treatment over a four-year period. As shown in that Figure, the rate of IV drug use, and thus the rate of possible HIV infection from needle-sharing, is cut by more than two-thirds by attendance at a methadone clinic.

This has important health implications, given the high proportion (36.4%) of the sample who reported having shared needles during their last period of IV use. Just as impressive, from the cost-effectiveness point of view, however, were differences in program performance.

> The six methadone maintenance programs varied greatly in effectiveness of reducing IV drug use among patients in treatment ... Four of the programs were reasonably effective; IV use stopped among 75 to 90 percent of their patients. In two programs, however, over 56 percent of the patients were till injecting drugs. (p. 221)

By looking at their information on treatment process variables, the authors were able to identify sources of program variation that accounted for the majority of the variance in current IV use.

First, adequate methadone dosage was found to be an important determinant of success. As methadone dose decreased, patients were more likely to turn to IV use of narcotics in, perhaps, a substitutive way. Also important, however, were a variety of characteristics descriptive of the well administered clinic, on the one hand, vs. the haphazard clinic on the other.

> It is a major finding that some methadone maintenance programs are markedly more effective than others in reducing IV drug use and needle-sharing among their patients because these differences in treatment outcome are related to definite program variables. The more effective programs have high patient retention rates (especially long-term retention rates), high rates of scheduled attendance, a close, consistent, and enduring relationship between staff and patients, and year-to-year stability of treatment staff. Conversely, the less effective programs are characterized by poor patient attendance, inadequate methadone medication, and high rates of staff turnover. (p. 223).

It should be recalled that the programs were selected from among a fairly equivalent group with average or above average staffing patterns. Their specialization in MM delivery, and the status of this modality as a highly systematized and replicable treatment system, probably indicates that the programs had few unit-cost differences that could not be accounted for by geography and location. The authors were frank in stating that they did not expect to find large performance differences that were not based on patient characteristics. Very large differences, however, were observed.

These arguments, though no cost data are provided in the report, converge toward a conclusion about the cost-effectiveness of MM treatments as being variable, suggesting that higher CEA ratios will be found among programs of the "successful" type described above.

Prospective Longitudinal Cohort Studies

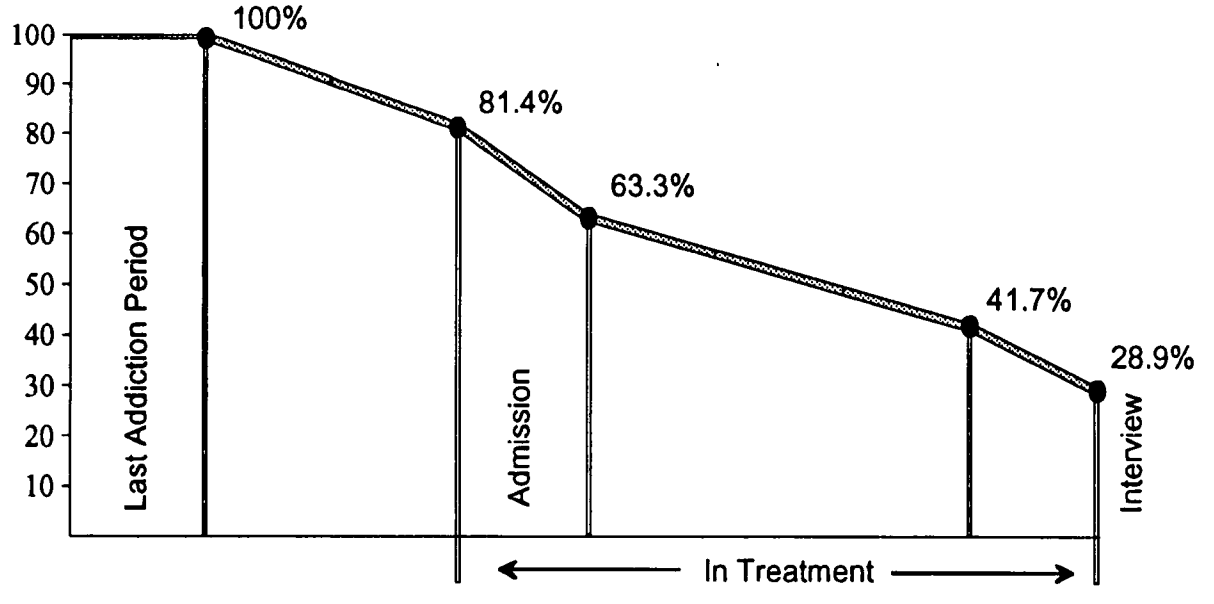
Among the voluminous findings of the large-scale longitudinal studies (DARP and TOPS) surveyed in detail earlier in this chapter, cost-effectiveness data, as opposed to the cost-benefit data amply reviewed, are extremely rare. In one of the DARP reports (Sells & Simpson, 1979), some findings on differential treatment effectiveness are reported - that TCs, for example, are superior on most outcome indicators to MM, that DF shows good effects also on most indicators and may be especially well suited to young patients, that MM has powerful effects on opiate use and criminality but is unsuccessful on most other indices, etc. - but they are specific to the youngest patients in the DARP sample, and are completely compromised by the kinds of self-selection pressures discussed at the beginning of this section.

The only finding on differential treatment effectiveness, and thus cost-effectiveness, that appears to surface reliably in DARP, TOPS, the studies of the Drug Abuse Research Group, even in Ball et al (1988), is time-in-treatment. Time-in-treatment is the one variable always observed to carry enormous weight in most outcome studies of criminally involved drug users and narcotic addicts.

The relationship between tenure and outcome does not appear to be a simple or straightforward one. A minimum threshold of three months above which treatment begins to "take," and below which outcome fails to differ from rapid dropouts, has been suggested, as have somewhat longer periods. As we've already noted, the influence of client characteristics and attitudes such as motivational variables and of program parameters on treatment tenure is not well understood at this time.

Figure 6-6

Effect of Methadone Maintenance on Intravenous Drug Use: Proportion of 388 Male Patients Reporting IV Use



Adapted from: Ball et al, 1988

However the basic link between favorable outcome and time spent in treatment, much more than intensity of treatment, appears to be well supported throughout the literature reviewed here.

In the kinds of treatment provided to narcotics users, the per-unit cost of additional treatment provided beyond the "threshold" amount required to produce a minimum effect - that is, the "marginal cost" or "cost on the margin" of the treatment that begins to produce a measurable and durable clinical effect - tails off sharply over time. Marginal costs decline after the service-rich admission and early treatment era, when assessment and treatment planning is heavy and when program administrators are busy with the paperwork ands record-keeping of the case. This observation, combined with the very strong effect of time-in-treatment, leads in a very clear way to the conclusion that programs with good retention rates, especially those that are able to keep patients allied with the care provider for a respectable fraction of a year or longer, are most cost-effective.

This conclusion is in all likelihood general and robust: In the literature reviewed, positive changes are evident for both coerced and noncoerced clients, and in both restrictive (residential) and nonrestrictive (outpatient) treatment contexts, so long as treatment is sustained. This is not to say that treatment must be sustained as a single episode. "Recycling through new or repeated treatment episodes is a common pattern and may be necessary for some clients to accumulate significant treatment effects. The considerations suggest that the lifetime cost-benefit for individuals whose drug dependence career is modified by treatment is an important measure of cumulative and aggregate treatment efficacy" (Hser & Anglin, 1991, p. 74).

An additional cost-effectiveness advantage, then, might flow to programs which, losing clients to attrition, are able to re-attract them, or are able to attract for the first time patients who have been treated elsewhere before and lost to follow-up. However, the argument concerning marginal cost, combined with the strong and extensively replicated finding on time-in-treatment, renders nearly conclusive the idea that sustained treatment with CJS populations has the best hope for showing attractive CEA ratios.

Conclusions

Though the research reviewed in this chapter focuses principally on issues of cost-benefit and, to a much more limited degree, on issues of cost-effectiveness, several conclusions appear warranted.

First, addictions treatment with narcotics users is highly attractive from the perspective of costs and benefits when patients are retained in treatment beyond what may be a threshold length of at least several months. Positive effects of therapy can then be observed on indices of reduced use of narcotics, less intravenous use and needle-sharing, reduced use of other illicit drugs, much reduced levels of predatory crime and other legal involvement, less abusive drinking and use of cannabis, less pronounced signs of depression, and increased gainful employment.

Second, enough work with patients from a variety of ethnic and racial backgrounds, age ranges, levels of police involvement and both genders is available to indicate that these treatment effects are fairly general, being observable across the populations treated. Moreover, the effect of court involvement, once thought to hopelessly compromise the privacy of the patient and his/her ability to form a good therapeutic alliance, appears if anything to keep patients in treatment longer and help them to achieve a more favorable and stable outcome.

Third, the larger and better longitudinal cohort studies which have followed patients for up to six years and more after admission show that treatment gains are durable. TOPS is especially clear on this, showing that what were formerly thought to be treatment gains visible only while treatment is active are instead detectable five years out.

Fourth, the innovative work of the Drug Abuse Research Group shows that the effects may be additive across many treatment episodes, slowly aggregating until the problematic behavior of patients in this once "untreatable" group are substantially reduced. This intriguing finding on the internal consistency of a *treatment career* effect is an important development from which addictions research generally may benefit.

Fifth, most research shows that effects not specifically targeted by treatment - such as vocational planning, in most cases, or alcohol or cannabis use, in many instances - are not as robust as those built in to the treatment regime. These are effects that, in the case of productive employment, have important consequences for the CBA effects of treatment and, in the case of excessive drinking, for the eventual profile of cost-offsets. Both should be more vigorously pursued by addictions programmers working with narcotics users as well as others.

Sixth, given the very high risk behavior of many narcotics addicts with criminal justice involvement, and given also the ability of quality treatment to diminish IV drug use and its attendant risks for HIV transmission, it is almost certain that the total benefits to society, estimated to be in ratios as high as 4:1, are seriously underestimated. When the potential effects of narcotic drug use, cocaine addiction or HIV

positivity on fetuses carried by pregnant addicts is factored in, true CBA ratios must be much higher than even the positive ones adduced here. This is material for the next chapter, *Addictions Treatment with Pregnant Women*, and will be discussed there. Several of these points indicate the potential for real savings from a cost-offset as well as a cost-benefit perspective, as well as the potential for collateral cost-offsets.

It is far less clear that any one treatment is more effective, much less more cost-effective, than others with this treatment population. Although a number of models specific to criminal justice populations and narcotic users have been proposed (e.g. ONDCP, 1991), there has been no consensus in this area, though a national model developed by the American Society of Addiction Medicine (ASAM, 1991) is being tested and is gaining in acceptance. From both a clinical and research perspective, the use of more general criteria as opposed to ones specific to criminal justice populations and narcotic users would be preferable. It is probably only on the basis of this kind of sensible distribution of cases, each reaching an appropriate level of care with appropriate treatment elements, that meaningful socioeconomic research, and more meaningful clinical research, can even be attempted.

The issue of patient assessment and treatment placement will be discussed in more detail in Chapter 8 - *Conclusions and Recommendations.*

However, the very clear implication of most of the research reviewed here speaks more to the second goal of Apsler and Harding: Improved retention and more vigorous follow-up. The work of Hser and her colleagues on treatment additivity shows that treatment benefits are not entirely lost when patients exit therapy, but they appear to be less robust and durable when treatment terminates too soon. Much more attention needs to be paid to the very substantial problem of retaining patients in treatment. Moreover, new work needs to be undertaken to find better and more vigorous ways to follow-up patients who discontinue, and to entice back those who have dropped out of sight. The diminished marginal costs of providing extra "doses" of treatment in outpatient drug-free counseling, methadone maintenance, or therapeutic community residence lends support to the cost-effectiveness of this notion.

Brief treatment does not appear efficacious, and therefore cannot be cost-efficacious, with narcotics addicts and perhaps with others who are criminally involved. It is likely that treatments administered by staffs of the kind described as successful by Ball and his colleagues - organizationally stable, satisfied with their agency and their caseload, with access to required medication resources, etc. - will prove themselves to be among the most clinically effective, but not among the least expensive. Narcotics users require treatment that is involved and sustained. The results adduced in the first section of this chapter show that treatment of this sort is likely to pay off handsomely from the cost-benefit perspective.

Treatment of pre-existing alcoholism in drug addicts, the use of other drugs by methadone maintenance patients, the relapse potential of drug addicts who drink, and other "cross addictions" relationships remains to be addressed. Hopefully, future research will clarify some of these issues. Finally, the creative work with collateral health care benefits in the general clinical populations has not had the equivalent interest or examination in criminal justice or narcotic abuser populations. This issue will be discussed in more detail in Chapter 8 - *Conclusions and Recommendations.*

7 ADDICTIONS TREATMENT WITH PREGNANT WOMEN

NO GROUP'S PROBLEMS WITH ALCOHOL AND OTHER DRUG USE ARE VIEWED WITH GREATER CONCERN by as many people as are those of pregnant women. Women who use alcohol or other drugs while pregnant place their babies at increased risk for birth defects and a host of later developmental problems. Economic issues join compassionate and ethical concerns when considering the reality of perinatal drug exposure.

It is likely that with the currently overburdened health care system and high costs of health insurance, policymakers will look at economic costs to society as a principal reason to prevent perinatal addiction, thereby relieving our strained health care system. In this regard, birth defects produced by alcohol and drug use during pregnancy have been shown to significantly increase the length of stay and costs of hospitalization, medical treatment, educational needs and lost job productivity to society.

Little is known about the prognosis for recovery from neurological damage due to perinatal drug exposure or the most clinically or economically effective modes of treatment for those already affected. In cases involving cognitive impairment, remedial education programs coupled with behavioral therapy or similar treatments used in other illnesses (e.g., Down's Syndrome) may be illuminating, but treatment outcome studies in perinatal addiction have not garnered the same level of research support as other clinical populations. Since economic and other losses due to perinatal drug exposure are recurrent and they are 100% preventable, the proverbial ounce of prevention is certainly worth a pound of cure in the case of perinatal drug and alcohol exposure.

To date, there are only a handful of studies that estimate the direct and indirect costs associated with perinatal drug exposure; they focus on alcohol, cocaine and cigarette smoking. These will be discussed, as will general estimates of cost-offset.

Finally, because more is known about the socioeconomics of alcohol use during pregnancy, this review will use the term "alcohol" to distinguish it from other drugs.

The pernicious relationship between alcohol consumption and birth defects has been known since ancient times. For example, in Greek mythology, alcohol intoxication in Hera and Zeus, at the time they conceived their son Hephaestus, was believed to cause his deformity. In the biblical book of Judges (13:7) an angel cautioned Samson's mother not to drink alcohol while she was pregnant with her son. Numerous anecdotal observations have been made since ancient times, but it was not until 1968 that Lemoine, Harousseau, Bortelyru and Menur reported a syndrome in the offspring of alcoholic women. Shortly thereafter Jones and Smith coined the term fetal alcohol syndrome (FAS) to describe a constellation of symptoms found in the children of mothers who drank heavily during pregnancy (Jones and Smith 1973).

FAS is by far the best known and most well studied drug-related birth defect. At birth, the symptoms of FAS include: low birth weight, craniofacial malformations, microcephaly, audiological deficits, cardiac and kidney defects, and mental impairment ranging from minimal brain dysfunction to severe retardation. Unlike many other birth defects, FAS is a completely preventable birth defect with a known etiology: heavy alcohol consumption during pregnancy. Although FAS describes a unique set of morphological features, emerging data on the use of cigarettes and cocaine during pregnancy suggests that their biomedical, psychosocial and economic impacts are similar to those of alcohol.

In addition to FAS, a separate diagnosis, Fetal Alcohol Effect (FAE) is often used for children of mothers with

a positive history of alcohol use during pregnancy but who do not meet the diagnostic criteria for full-blown FAS. Streissguth et al. (1989) found that the children of healthy, middleclass mothers who drank as little as 3 drinks per day, had reduced IQ scores. It is estimated that there are 2-15 FAE births for each FAS birth. The long term consequences of FAE include cognitive disabilities such as attention deficit disorder, other learning deficits, and speech and hearing disorders. These deficits may be present in these children even in the absence of mental retardation.

The overall costs associated with FAS are determined by estimating the number of children born with FAS and multiplying that number by the costs associated with the medical, educational and social services required by those children over the course of their expected lifetime (usually age 0-65). Estimates of the incidence of fetal alcohol syndrome based upon retrospective or prospective studies vary considerably.

Earlier studies place the rate at from 1 to 1.6 per 1,000 births. More recent analyses have been based upon an FAS birth rate of 1.9 per 1,000 (Abel and Sokol 1987). However, the most recent systematic study of FAS births has estimated that the incidence is closer to .33 per 1000 with a range of 0-1.58 per 1,000 depending upon ethnic and socioeconomic status (Abel and Sokol 1991b). Based upon the total number of live births per year, these lower estimates predict that there are approximately 1,200 FAS births per year in the United States. Racial differences exist within this distribution. For example, among Caucasians the rate is .29 per 1,000 and for African Americans, .48 per 1,000 births (Abel and Sokol 1991b).

In a unique and ambitious study, Chasnoff and Schwartz (1993) analyzed birth records from 15 hospitals in twelve states that participated in a program of systematic data collection on drug-related birth defects over a period of three years. The study did not directly measure the incidence of FAS in a random population; however, of 440 infants randomly sampled because of known substance exposure, 59 (13.4%) were diagnosed as having FAS. Once completely analyzed, these data will probably add substantially to our understanding of the pervasiveness and costs of perinatal drug exposure.

As part of our review, we contacted by telephone the Departments of Health, Division of Maternal and Child Health (or similar agency) in all 41 states participating in FAS/FAE and Fetal Drug Effect (FDE) data collection under a program of the Centers for Disease Control of the United States Public Health Service. We asked that they share their results with us. Fourteen states (Alabama, Connecticut, Idaho, Kansas, Kentucky, Louisiana, Nevada, New Hampshire, New Mexico, New York, Oregon, Utah, Vermont and Wisconsin) reported that they had no statewide statistics on FAS. Thirteen states (Alaska, Colorado, Georgia, Illinois, Indiana, Maine, Maryland, Minnesota, Nebraska, North Carolina, Pennsylvania, Tennessee, Virginia) indicated that they have an FAS reporting system or that FAS is identified on the birth certificates.

Some agencies had unanalyzed statewide data or analyzed local reporting; most state agencies that we contacted indicated that FAS was under-reported because of failure to diagnose on the part of the physician, denial from the mother about alcohol (or drug) use during pregnancy (because of guilt or fear of prosecution, e.g. child abuse) or poor record keeping in general. Only two states, Georgia and Montana, indicated that they formally collect data on the use of drugs other than alcohol by pregnant women.

Cost-of-Illness Studies of Alcohol

Direct economic costs associated with FAS are expenses accrued in the hospital from birth to discharge, rehospitalization after birth, corrective surgery and lifelong social services including special educational programs or institutionalization. There are relatively few systematic cost-of-illness studies on FAS. This is due, in part, to the difficulty in estimating the actual number of FAS births per year. Critical to accurate economic analyses of illness are assumptions about the number of patients, their expected life span, and the costs of services.

The data summarized in Table 7-1 are based upon various rates of FAS in their respective geographic populations. Irrespective of the incidence rate used, it is clear that the actual costs for treatment vary either as a function of inflation over time or because of regional differences in the cost for services. In this regard, it is noteworthy that in the Abel and Sokol (1991b) study, which provides the most conservative cost and incidence estimates for FAS to date, the investigators reported the cost of neonatal intensive care as $20,000 - $40,000 per child whereas in Alaska, such treatment, even when correcting for the difference in FAS incidence, was about $47,000 per child.

Other direct costs associated with FAS include the treatment and rehabilitation of physical defects and special social and educational services required to treat or provide postpartum care because of mental deficiencies. The latter costs are alarmingly high because of their frequency and clinical severity.

Regardless of the estimates of incidence of FAS in the population, there is general agreement that over time, the largest cost to society stems from long-term treatment and the institutionalization of these victims. Since about 53% of all FAS patients have an IQ of less than 70 (avg. 67), it can be estimated that 53% of FAS patients born each year will be eligible for residential placement. Correcting for the high neonatal and infant mortality in children born to alcoholic women, Abel and Sokol (1991b) estimated that about 511 FAS patients will be admitted to residential care facilities each

Table 7-1

Cost-of-Illness Estimates of Fetal Alcohol Syndrome

STUDY	REGION	ANNUAL COST (millions)	FAS BIRTH RATE PER 1000
Russell (1980)	New York State	66.5	1.9
Minnesota Dept. Health 1985	Minnesota	42.4	1
Weeks (1989)	Alaska	103.9	1.9
Abel & Sokol (1987)	United States	321	1.9
Abel & Sokol (1991a)	United States	249.8	1.9
Abel & Sokol (1991b)	United States	74.6	0.33

year. From this analysis it is estimated that the total cost per year for these full-time residential patients is approximately $34 million. The remaining patients with minimal brain dysfunction who are semi-independent will probably cost less. Using a similar methodological approach, 33% of FAS children with IQs in the 70-85 range, the annual cost to provide semi-independent living for these individuals is about $2.2 million (Abel and Sokol 1991b).

Thus, depending upon the FAS birth rate in the U.S., the direct economic costs alone, that is the total cost of medical, educational and related social services ranges from about $74.6 million per year (.33 per 1000) to about $249.6 million per year (1.9 per 1000). (see Table 7-2).

The attention to methodological detail in the Abel and Sokol (1991b) study helps to correct against over-inflated estimates in several ways. For example, accounting for the projected distribution of FAS within racial and ethnic groups reduced overestimations that may result from using incidence rates from a high risk group and applying that estimate to the general population. Also, the incidence of various birth defects (low body weight, heart defects, mental retardation, etc.) in the general population were "subtracted" from the data.

On the other hand, the use of Abel and Sokol's data to estimate the economic impact of fetal alcohol exposure should be considered conservative for several reasons. Many of these *caveats* were recognized by the authors.

First, these costs only refer to medical problems that are very serious, most of which require surgery, as in Table 7-2. Costs for medical exams, lab tests, medications, etc. not leading to surgery were not itemized in their analyses. Second, the authors point out that they did not include the costs for anesthesia used in surgery because anesthesiologists charge fees on an hourly basis and these vary considerably. Third, the value of pain and suffering as well as the loss to society in job productivity are not included in these cost estimates. That is, these estimates are only for direct costs. Fourth, these data are based upon an average incidence of .33 FAS births per 1000 births.

A second limitation is that this estimate does not include native Americans and other ethnic groups who have higher rates of alcohol abuse, alcoholism and FAS than other Americans, including African Americans. For example, among Alaska Native children born between 1981 and 1988, a study conducted by the Alaska Area Native Health Service shows that the highest recorded FAS rate among any population in the world is in the Copper River region of Alaska where the rate is 250 FAS cases per 1000 births (Weeks, 1989).

This estimate may be confounded to some extent by race-related bias that can occur when the norms from one group (e.g. those making the diagnosis) are applied to another group (patient population). This is most likely to occur when, for example, facial features of the experimenter are different from those of the child. Since facial features (e.g., epicanthal folds of the eye) are used to make a diagnosis of FAS, experimenter bias may occur (Bray and Anderson, 1989). Nonetheless, rates of FAS among Native Americans is alarmingly high. Finally, this cost-of-illness study is limited to FAS and does not include cost-of-illness of alcohol

Table 7-2

Specific Direct Costs of Fetal Alcohol Syndrome

BIRTH DEFECT	ASSUMED INCIDENCE 1.9 PER 1000		ASSUMED INCIDENCE 0.33 PER 1000	
	COST (MILLIONS)	% AFFECTED	COST (MILLIONS)	% AFFECTED
Low birth weight	$76.58	30.66%	$12.39	16.62%
Heart defects	12.0	4.81	1.91	2.55
Spina bifida	1.32	0.53	0.22	0.29
Cleft palate	3.5	1.4	0.57	0.76
Serous otitis media	7.27	2.91	1.25	1.68
Sensory-neural deficit	0.94	0.38	0.11	0.14
Inguinal hernia	1.07	0.43	0.17	0.23
Hypospadia	1.83	0.73	0.3	0.4
Mental retardation	145.3	58.36	57.7	77.3
TOTAL	249.75		74.56	

Adapted from: Abel & Sokol (1991a,b)

use during pregnancy that results in FAE.

In summary, these data conservatively place the direct economic cost of treating FAS victims at about $75 million dollars per year. Most of these direct costs are related to intensive treatment an procedures in the neonatal period and later. This estimate does not include indirect costs.

In addition to the direct economic costs associated with pregnancy, indirect costs, that is economic loss due to lost job productivity associated with mental impairment in the victims of FAS, must also be considered.

> The 45 percent of FAS victims that experience mild to moderate mental retardation not requiring institutionalization are unlikely to achieve a level of productivity comparable to the general population and will be much more limited than others in their age cohorts. They are likely to be partially disabled and may, at best, be able to function in a sheltered work environment. The 52.5 percent of FAS victims characterized as having Minimal Brain Dysfunction (MBD) are also expected to have reduced levels of productivity. The 2.5 percent of FAS victims that are severely mentally retarded and, consequently, institutionalized, will certainly never be full participants in the work force. (Harwood & Napolitano, 1985, p. 41)

From the Harwood and Napolitano analysis, it is assumed that severe to profoundly retarded victims of FAS will be unable to work (100 percent reduction in productivity). Moderately retarded victims will be 50% impaired in their ability to work and those that are mildly retarded will have a 25% reduction in their work productivity. Victims with minimal brain dysfunction (MBD) will likely experience a 10% reduction in work productivity. Harwood and Napolitano (1985) estimate that the average expected loss in productivity per FAS victim is 21.25%, obtained by multiplying impairment rates times respective incidence (e.g. 10% x .525) + (25% x .36) + (50% x .09) + (100% x .025).

From age 25-55 when the average productivity value for American workers is about $25,000 per year, the economic loss to society from FAS victims is about $5,300 per individual (25,000 x .2125). During these years of peak productivity, the economic loss to society for a single year of FAS births, conservatively estimated at 1200 is more than $190,800,000 (30 x $5300 x 1200). Left unchecked and assuming same dollar value and incidence rate for FAS until the year 2000, the cost of lost productivity due to FAS will be nearly 1.4 billion dollars during the remainder of this decade. Coupled with conservative direct cost estimates, the total cost to society by the year 2000 will be nearly $2 billion for FAS-related birth defects alone. This does not include the cost of treatment for the thousands of FAS victims born prior to 1993.

Present discounted value (PDV) is a frequently used analytic approach applied to policy planning (Luce and Elixhauser 1990). The PDV indicates that amount of money that would have to be placed in an interest bearing account (at 4, 6 or 10% interest rate) today, to pay for treatment of health care costs over the life span of the individual and is often used to determine the "maximum economic value that could be spent to prevent an FAS birth" (Harwood and Napolitano 1985).

Table 7-3

Present Discounted Value of Costs for 1 FAS Case in 1980

COSTS	UNDISCOUNTED LIFETIME VALUE	DISCOUNTED VALUE AT DISCOUNT RATES 4%	6%	10%
Direct	$405,000	$169,000	$124,000	$76,000
Indirect	$191,000	$79,000	$39,000	$11,000
TOTAL	$596,000	$248,000	$163,000	$87,000

Source: Harwood & Napolitano, 1985

Table 7-3 may be helpful to policy makers and planners in designing and making funding decisions about future education and treatment programs. The PDV is less than the total cost because of compounding interest.

Considering the present economic environment, a PDV based upon a 4-6% rate of return would probably be more realistic of actual costs. According to the authors:

> These values demonstrate the significant savings of society's resources that might be realized by preventing FAS births. If a discount rate of 6 percent is used, then society could realize a positive net return from a program that spent up to $163,000 per prevented FAS birth. (p. 43)

Using Abel and Sokol's conservative estimate of 1,200 FAS births per year and the 6% discount rate, FAS prevention efforts costing up to nearly $20 million per year that reduced the number of annual FAS births by 125 ($163,000 x 125) would be cost-effective.

When compared to more recent cost-of-illness studies, the PDV analyses of Harwood and Napolitano are probably underestimates because of cost of treatment assumptions made at the time their study was completed. In their analysis, total direct costs per individual at age 0 are estimated at $4,122, reflecting costs associated with neonatal care. Abel and Sokol (1991b) calculated the cost of neonatal care specifically due to low birth weight and found it to be about $20,000 to $40,000 per FAS child.

Thus, it is apparent that the PDV estimates provided, and which are the only data available on this subject, probably grossly underestimate the actual expenditure

in prevention that would still net a positive return to society.

Cost-of-Illness Studies of Cocaine and Other Drugs

Data from many sources indicate that cocaine, cigarettes and marijuana are used by many women during their pregnancy and that these substances also place the infant at increased medical risk. As with alcohol, a large portion of the direct costs associated with these children stems from, but is not limited to, low birth weight. Of the illicit drugs, cocaine has received the bulk of the scientific and popular attention, largely because of the work of Chasnoff, the founder of the National Association for Perinatal Addiction, Research and Education.

It is now known, at least to segments of the medical and scientific community, that cocaine significantly increases risk for *abruptio placentae*, intracranial hemorrhaging, poor brain growth as well as cardiac, intestinal and central nervous system disorders and urogenital and limb malformations. These birth defects are probably related to the vasoconstriction action of cocaine which can both increase blood pressure, producing hemorrhaging, and decrease fetal blood supply to developing organs and other structures (Hoyme , Jones & Dixon, 1990). This is important in prevention and intervention because risk to the fetus is uniformly distributed throughout gestation, not just during critical windows of developmental sensitivity.

Similar to the consequences of perinatal alcohol exposure , cocaine use during pregnancy increases postnatal hospitalization costs. Again, a large portion of these costs are related to growth retardation and the need for neonatal intensive care unit (NICU) care due to low birth weight and the myriad of teratogenic effects produced by this drug. The long term consequences of these effects are, as yet, unknown. Recent studies indicate that growth retardation in infants of cocaine/polydrug using pregnant women is still present at age two (Chasnoff, Griffith, Freier & Murray, 1992).

Table 7-4

Estimated Annual Incidence of Fetal Drug Exposure

STUDY TITLE	*ESTIMATES OF NUMBER OF INFANTS EXPOSED*
General Accounting Office (1990)	91,500 - 240,000
Institute of Medicine (1988)	350,000 - 625,000
Gomby & Shiono (1990)	554,000 - 739,000

Data Derived from 1988 & 1990 NIDA Household Surveys

Table 7-5

Prevalence of Illicit Drug Use During Pregnancy

	DRUG		
REGION OF STUDY	*COCAINE*	*CANNABIS*	*OPIATES*
Pinellas Co., Florida	3.4	11.9	.3
Rhode Island	2.6	3.0	1.7
Fairbanks, Alaska	2.4	9.8	0.5
California	1.4	1.7	0.6
Illinois	2	3.0	1.9
Texas	2	–	–
United States[a]	4.5		

Source: Chasnoff & Schwartz, 1993, and 1990 NIDA Household Survey

Because of frequent alcohol and polydrug use, estimates of cocaine use during pregnancy are often collapsed with other illicit drugs (Table 7-4). Estimates of cocaine exposed infants in the United States vary considerably (Table 7-5).

The percentage of pregnant women who consume illicit drugs is high. Studies conducted on women indicate that 11-20% (Cohen, 1990; Shaw, 1990, Skolnick 1990b, NIDA 1989) used drugs other than alcohol and nicotine during their pregnancy; 20-48% used tobacco (Abel 1984; Ershoff, Quinn, Mullen & Lairson, 1990) and 11-20% used cocaine (Vandegaer, Schindler & Imaizumi, 1989.

The most conservative estimates indicate that in the United States, between 91,500 and 240,000 neonates were exposed to cocaine and other drugs in 1990 (U.S. General Accounting Office 1990). Individual studies of cocaine use during pregnancy, as determined by actual toxicological testing at birth, yield significantly higher incidence rates.

McCalla and colleagues (1991) reported that among an inner New York City obstetric population of 1,111 patients, 127 parturient women (11.5%) tested positive for recent cocaine use (114 per 1,000) based upon urine tests for cocaine metabolites.

The kind of cocaine exposure documented in this research has serious consequences for health care and its costs. Chiu, Vaughn and Carzoli (1990) reported that based on a sample of 207 cocaine exposed infants and 182 controls, the average length of stay of cocaine-exposed infants admitted to normal nursery was 6.7 days compared, to 2-3 days for most normal (non-cocaine exposed) infants. Nearly half (45%) of the

extended patient days were due to detainment of the infant so that a home placement investigation could be conducted. Each cocaine exposed infant averaged $801 more in total hospital costs than non-cocaine exposed infants who received normal nursery admissions.

Twelve percent of the sample of cocaine-exposed infants required admission to a NICU because of various medical complications (e.g. low birth weight, congenital infections). The average NICU stay was 21.5 days at a cost of $36,481 per patient compared to $17,721 per patient for non-cocaine exposed controls also receiving NICU treatment.

Phibbs et al (1991) examined a population of 355 cocaine-exposed and 199 cocaine-negative infants. Infants that tested positive for cocaine at birth had a greater length of stay in a NICU, a greater length of stay until medically cleared for hospital discharge (11.5 vs. 5.1 days) and significantly greater costs until medically cleared for discharge ($7,957 vs. $2,757). Even when medically cleared for discharge at 11.5 days, however, many neonates were not ready to go home for a variety of social and other reasons, so that actual hospital discharge occurred at 22.5 days, for an average NICU charged $11,523 .

The Phibbs study also found that infants who either tested positive or whose mother had a positive family history of cocaine use during pregnancy had increased medically indicated hospital costs of $2,610 and length of stay of 4 days more than controls. The expansion of costs and lengths of stay was significant when time spent in the hospital waiting for a social evaluation or foster care placement was also included in the analysis. When cocaine use was combined in the delivering mother with use of other drugs (excluding marijuana), hospital costs increased to $8,450 vs. $1,283 for comparison subjects, and length of stay expanded to 10 days (vs. 2.7 days for comparison subjects). Of significant import was the finding that receiving *any* prenatal care reduced costs between $4,300 and $5,000 and length of stay between 2.9 to 3.6 days. Thus, prenatal care as part of the treatment package for alcohol and other drug addicted mothers is more than justified by these data.

Chasnoff and Schwartz (1993) examined length of stay in neonates presenting symptoms of convulsion/irritability because earlier studies indicated that irritability was one of the problems of cocaine exposed infants. They found that compared to infants identified with FAS, drug withdrawal syndrome or suspected damage to the fetus from other maternal substance use, the length of stay for cocaine-exposed neonates was, on average, 16.5 days longer (26.3 vs. 9.8) over the three year study. In drug free control neonates, the length of stay averaged about 3.5 days. Although these data do not specifically separate cocaine exposure from exposure to other illicit drugs, it is clear that the use of illicit drugs during pregnancy increases length of stay and overall hospital costs. In this study, the costs for substance exposed infants were increased from $2,000 - $13,800 per case or more depending upon which groups are compared.

By far, the most significant cost factor was required NICU stays related to low birth weight or premature birth. In this regard cocaine-exposed infants were 50% more likely than unexposed infants to require NICU stays and more than twice as likely to have very low birth weights. A large portion of hospital costs are "boarding" costs which could be reduced by implementing prevention and intervention prior to and during pregnancy, and including a prenatal social evaluation.

Cost-of-Illness Studies of Nicotine

We have chosen to examine the effects of cigarette smoking for two reasons: among the non-alcohol drugs, it is legal and in comparison to all drugs including alcohol, its use is pervasive among pregnant women. Ironically, the link between maternal cigarette smoking and adverse pregnancy outcome has been known for at least ten years longer than alcohol (Simpson & Linda, 1957).

In comparison to nonsmoking pregnant women, maternal tobacco use during pregnancy is causally associated with lower birth weights and premature delivery. The mechanism through which this occurs is not fully understood, but may be similar to cocaine in that the carbon monoxide produced by cigarette smoking crosses the placenta and produces carboxyhemoglobin which reduces oxygen binding in red blood cells (Longo, 1977).

Although this effect is directly related to the combustion of tobacco leaf, nicotine may also affect fetal vasculature to produce some of these untoward effects. It is because of this joint action that the generic term cigarette is used to connote the path of injury rather than the pharmacological drug nicotine, when studying the impact of this substance on pregnant women.

Data from the 1985 National Health Interview Survey (NCHS, 1988) obtained information about smoking during pregnancy from more than 90,000 recent mothers. About 32% of the women smoked at some time during the year preceding their pregnancy, but this was related to educational achievement. Women who did not complete high school smoked more during pregnancy than those who did (46% vs. 13%).

Of particular concern was the number of women who continued their pre-pregnancy pattern of smoking throughout gestation. Twenty one percent of the women stopped smoking and an additional 36% reduced their smoking once they learned they were pregnant. Therefore, 43% of the women surveyed continued smoking at the same rate during their pregnancy.

According to the U.S. Department of Health and Human Services:

> Smoking is probably the most important modifiable cause of poor pregnancy outcome among women in the United States. Recent estimates suggest that the elimination of smoking during pregnancy could prevent about 5 percent of perinatal deaths, about 20 percent of low birthweight births, and about 8 percent of preterm deliveries in the United States. In groups with a high prevalence of smoking (e.g. women who have not completed high school), the elimination of smoking during pregnancy could prevent 10 percent of perinatal deaths, and about 35 percent of low birthweight [births].

By now, it should be apparent that one of the most costly consequences of perinatal drug exposure is the need for NICU and other treatments necessary in low birth weight babies. Maternal cigarette use produces the same effect. Unlike alcohol and possibly cocaine, most costs related to neonatal cigarette exposure are currently limited to newborns; until we have a better understanding of the longitudinal effects of maternal cigarette smoking, indirect costs cannot be calculated. However, the possible exclusion of indirect costs in economic analyses are quickly offset by the high incidence of cigarette smoking in pregnant women. For example, Manning, Keeler and Newhouse (1989) estimated that the direct costs from infants born with low birth weights due to maternal smoking added $652 million to national costs for neonatal health care.

Cost-Effectiveness of Smoking Treatment

Marks, Koplan, Hogue and Dalmat (1990) examined the cost effectiveness of smoking cessation programs by comparing the costs of such programs with the medical costs of pregnant women who continued to smoke during their pregnancy. The Marks study determined that it would be cost-effective to spend up to $30 per pregnant smoker. When the NICU costs for low birth weight babies of smokers were examined, it was concluded that for each $1 invested in prevention, the program would save $3.31.

Shipp, Croughan-Minihane, Petitti and Washington (1992) took a slightly different approach than the Marks et al. study by comparing the medical costs with an intervention against the cost of adverse medical consequences without an intervention.

> [W]e estimate that $35 per pregnant woman is the largest amount the program could cost without exceeding the cost of care for LBW (low birth weight) infants later on....To obtain the amount that could be invested per smoker, the "per patient" cost is divided by the prevalence of smoking in the population (e.g., in a baseline population with a smoking prevalence of 25%, $32/.25, or $128.00, could be spend for each smoker." (p. 387)

The larger the percentage of smokers in the treatment population, the higher the break-even costs will be. Similarly, the lower the rate of smoking cessation, the lower the break-even point for treatment. In the Shipp et al. study, their baseline analysis was derived from a quit rate of 23% obtained in another study that used intensive interviews, a home visit, monthly telephone follow-ups and twice-per- month mailings about smoking cessation. If the quit rate were as low as 10%, the break-even cost would decrease to $12 per woman; if the quit rate was 29%, the break-even cost would be $41 per woman.

Conclusions

At the present time, the economic evaluation of perinatal addiction is in its infancy. For the most part, only a small number of cost-of-illness studies were available for review; cost-benefit analyses were very rarely encountered and cost-offset analyses do not exist in the perinatal addiction field. Unlike the use of alcohol and other drugs in the workplace, a behavior that has a measurable and often immediate cost in terms of lost productivity, increased insurance claims and liability, the economic impact of perinatal addiction is insidious for several reasons.

Many of these children do not enter the workforce so their loss is not as visible as the employee who loses work time because of an active addiction. Also, the number of individuals affected by *in-utero* alcohol or drug exposure is still not known. Estimates based upon drinking rates in the population have obvious shortcomings and incidence reporting is far from systematic. Moreover, it is likely that some percentage of individuals are misdiagnosed completely. All of these factors may diminish research funding interest because the magnitude of the problem is not as visible as in other areas of addiction.

Even so, the U.S. General Accounting Office (1990) reports that median hospital charges were $1,100-4,100 higher for drug-exposed (all drugs combined) infants than for controls. According to GAO estimates, the use of the lower rate adds an additional $385 million to health costs whereas the higher rate adds about $3 billion. In addition to these costs, indirect costs for FAS alone are estimated to be about $190 million which brings the annual economic loss to society to about $.6 to $3.3 billion per year. Not included in this review or estimate is the unknown incidence of AIDS in newborns. The Chasnoff and Schwartz (1993) study surveyed the number of neonates who were tested for HIV, but their initial analysis did not include any incidence data. Some inner-city hospitals report that more than 1 in 5 infants born test positive for HIV infection (Mitchell, personal communication).

Despite variations in drug use among pregnant women as well as different estimates of incidence and cost of

treatment, two important fact patterns emerge. One is that for the most commonly used drugs - alcohol, cocaine and cigarettes - the most acute health care cost is related to a decrease in neonatal birth weight. The length of stay and length of NICU treatment in infants at risk is also significantly greater compared to non-drug exposed controls.

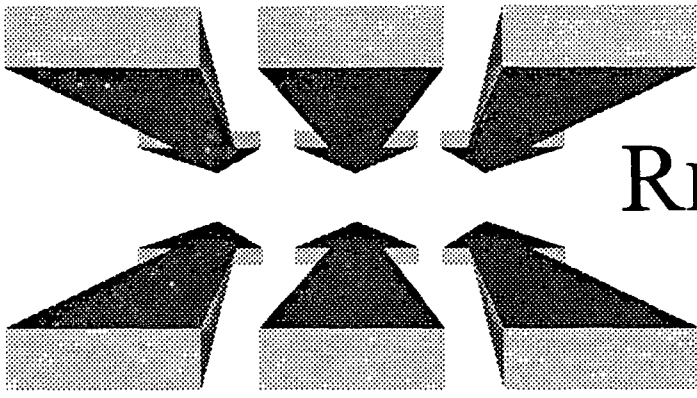
Secondly, women who stop smoking during the first trimester of their pregnancy have normal weight babies (DHHS 1988); the amount of prenatal care is positively correlated with increased birth weight in cocaine-using mothers (Chasnoff & Schwartz, 1993); and pregnant women who decrease their alcohol consumption have significantly larger babies than those that do not (Little et al, 1985; Rosette et al, 1980).

Public awareness about perinatal drug effects is surprisingly mixed. In 1985, a survey of 20,000 men and women aged 18-44 were asked about drinking and pregnancy. Approximately 84% associated heavy drinking with problems associated with pregnancy and drinking alcohol was perceived to be more harmful than smoking cigarettes in terms of fetal risk.

Interestingly, although a large percentage of respondents knew that drinking increased risk for adverse pregnancy problems, only about half of the sample had even heard of FAS, and only about a quarter of the sample knew what FAS was (Fox et al., 1985). This suggests that the more specific and clearly the most harmful effects of alcohol are not as well known by women of childbearing age and their partners as they should be. Since that time, the introduction of warning labels on alcoholic beverages has been put into effect and regional prevention efforts aimed at raising awareness about the harmful effects of perinatal drug use have gained steadily. In New Jersey, for example, recent legislation has mandated that all 17,000+ retail liquor establishments in the state place posters in their store that depict a pregnant woman with the warning that "*A pregnant woman never drinks alone.*" The actual cost of designing, producing and distributing the poster was less than $10,000, but this did not include volunteer and other time expenditures (Kaslander, personal communication).

The cost of perinatal alcohol and drug exposure warrants many recommendations, only a few of which are included in this chapter. To begin with, one course of action might be to institute national public education programs to prevent alcohol and drug use during pregnancy. This should be done at several levels. For example, substance abuse education should be integrated into the curricula of all medical schools so that physicians are prepared to recognize alcohol and other drug abuse and work with their patients to provide appropriate interventions and referrals to perinatal specialists (Chasnoff 1991). It is clear that the increase in cost of newborn care is closely related to birth weight. Moreover, secondary prevention coupled with early diagnosis would almost certainly reduce the postpartum costs of alcohol- and drug-exposed babies. In addition, funding must be made available for perinatal addiction specialists to be on the staff of every hospital to provide in-service and broad based community education and prevention in perinatal addiction. Finally, all school programs should have alcohol and drug awareness curricula that specifically includes the effects of alcohol and other drugs on fetal development. This is probably most critical in high school, when most women are entering into their child bearing years. Perinatal addiction specialists working within the community could cost effectively participate in this training.

In summary, alcohol and drug use during pregnancy places infants at risk for a constellation of medical and social problems beginning at birth and continuing for some time thereafter. The resulting costs of acute and long term care, coupled with the loss of job productivity, place an extremely high economic toll on an overburdened health care system. At the present time it is known that for alcohol, these costs are recurrent at every step. As generations of neonatal drug-exposed children enter our school systems, job markets and other sectors of our society, a better understanding of the long term costs of this population will develop. In closing, it is obvious that if health care costs are to be contained tomorrow, the value of prevention must be appreciated today.



8 CONCLUSIONS AND RECOMMENDATIONS

VERY BROAD ISSUES are raised in the data, studies, commentaries and reviews of the literature surveyed in this Technical Appraisal. In Chapter 2, *Methods of Socioeconomic Evaluation*, the reader is alerted to most of the arguments to be addressed in later sections, beginning with Chapter 3, *Cost-of-Illness Studies of Addictions*. Thereafter, Chapter 4 reviews *Addictions Treatment in General Clinical Populations*, Chapter 5 studies the socioeconomic effects of *Addictions Treatment in Workforce Populations*, Chapter 6 analyzes the economic value of *Addictions Treatment in CJS Populations and Narcotics Users*, and Chapter 7 looks at the initial results on *Addictions Treatment with Pregnant Women*. A great deal of ground is covered in this single document. We in fact know of no other integrated review in which such disparate literatures are brought together, analyzed according to the same rules, and used to inform each other.

In each of the chapters preceding, brief summary sections end the discussion, and are salted throughout the chapter when the quantity of information has warranted a summarizing section. Also in the chapters preceding, the unifying principle for each was the population studied - general clinical, workforce, narcotics users, criminal justice, and pregnant women - with a structure then applied to each literature to organize findings on cost-benefit, cost-effectiveness, and cost-offsets.

In this final section, Chapter 8, *Conclusions and Recommendations*, we will draw appropriate conclusions, inferences, and recommendations for both policymakers and scientists laboring in the field of socioeconomic analysis of addictions treatment. To do this, we will no longer organize our material by the population studied but rather will "reverse the lens" and look at each socioeconomic issue in turn - cost-of-illness, cost-benefit, cost-effectiveness and cost-offset - appealing to findings across the different population literatures to inform our view.

COST-OF-ILLNESS

If this Technical Appraisal is an attempt to integrate these diverse studies and concepts bearing on addictions, the necessity of integration, and encouragement for other scholars to do likewise, has been proven out by the very serious socioeconomic dimensions of alcohol and other drug use. As is shown in Chapter 3, with its special attention to the work of Rice and her colleagues (1990), and in Chapter 7, with its focus on cost-of-illness of fetal alcohol and drug effects, alcohol and other drug addiction poses a great risk and enormous cost to society, more than $140 billion in 1988 alone.

All indications are that most such figures are arrived at by essentially conservative means. Additional elements that are not well enough understood to be adequately treated yet in cost-of-illness studies must swell the true costs of addictive disorders to limits well beyond those sketched out by cost-of-illness researchers.

It has been amply demonstrated that the costs of addictions are revealed in many forms. For instance, alcohol dependence promotes expanded health care costs for direct care, for the treatment of the medical aftereffects of decades of heavy drinking, for the treatment of injuries sustained both by the drinker and his/her victims when drinking has been excessive, and for the treatment of stress-related and other illnesses suffered by the close families of heavy drinkers. When medical

Table 8-1

Areas of Improvement for Cost-of-Illness Studies on Addictions

GENERAL CATEGORY	SUGGESTED IMPROVEMENT
Case Recognition	COI analysis should examine methods for including in cost expressions those costs derived from the alcohol or other drug use of medical, CJS or job-action cases who manifest covert or subthreshold addictive disorders
Generalization of Problems to the Social System	COI analysis should move beyond the patient-centered, individualistic bias of the medical model, so that collateral health effects can be utilized in COI estimates
Secondary Effects - 1	COI analysis should attribute to drug abuse those costs due to AIDS and HIV prevention in which intravenous drug use is the likely or threatened path of HIV infection
Secondary Effects - 2	COI analysis should more closely monitor health costs due to the remediation of health and behavioral problems caused by prenatal drug exposure
New Pathogens	COI analysis has not yet been adequately applied to emergent drug problems such as crack-cocaine, new amphetamines, smokable heroin, and so forth
Case Differentiation	COI analysis has not generally been sensitive to the role of case severity, psychiatric comorbidity, and other behavioral pathology factors in determining health care costs

costs stemming from other drug addiction are factored in, especially the relatively new cost vectors of HIV transmission and fetal effects of alcohol and other drug exposure - not to mention the enormous costs in deaths and tertiary health care of nicotine addiction, not treated in this Technical Appraisal - it is not difficult to estimate that as much as 15% of some health care budgets are used to remediate, long after the fact, the consequences of addiction.

What is more difficult to understand is the tiny proportion of the total costs of alcohol and other drug addiction - less than 10 and 5%, respectively - dedicated to the treatment of the addictions themselves. If 15% of the health care dollar is used to remediate the effects of alcohol and other drug use, only between 1 and 4% is used to treat the underlying addiction. Compared to the budget proportions for the care of any other chronic medical condition, even for psychiatric illnesses where up to 41% of the total cost-of-illness is borne directly by treatment and treatment-supporting activities, alcohol and other drug treatment is underfunded, markedly so, and *unwisely so* in view of the cost-offset findings reviewed in this Technical Appraisal.

But health care costs, central now in a growing national debate, are only one of the ways in which the socioeconomic effects of alcohol and other drug use become manifest. Large morbidity costs or losses of productive capacity are the single largest cost of alcohol abuse. A related effect, the diversion of youth from a path of productivity to a marginal "crime career," combines with serious costs in the form of property theft, criminal violence, and elaborate and expensive legal controls to account for most of the costs - 76% - of drug abuse. Therefore, evidence that bears only on the role of addictions and their treatment in the management of the nation's health care crisis neglects the other channels - work productivity, crime, and expanded social welfare services and control mechanisms - into which scarce resources drain. These are matters that must be addressed from the perspective of cost-benefit and cost-effectiveness research, and are the focus of much of the material examined in the later chapters.

The true dimensions of the health care and other social costs of alcohol and other drug addiction, including the costs of nicotine addiction, need to be better understood if one of the principle aims of cost-of-illness research, focusing public attention, is to be adequately accomplished. It is our view that five elements missing from, or underrepresented, in most cost-of-illness studies need to be brought into the discussion in order for more realistic cost-of-illness estimates to be forthcoming (Table 8-1).

First, the costs of hidden, covert, subthreshold or comorbid addictions need to be better studied. Typically, cost-of-illness estimates use health care and other data pertaining only to cases when an alcohol or drug use diagnosis is given as a primary diagnosis. Though Rice et al (1990) attempted to move beyond this limit to include data on illnesses and events with a high likelihood of alcohol involvement, a fairly broad literature on the detection of covert alcoholism in general medical settings, not to mention our continued ignorance of most drug abuse contributions to illness and trauma, indicates that the true effects of addictions of all types on the emerging health care cost crisis are still not well understood and are almost surely underestimated in cost-of-illness studies, the methods of which force a conservative and skeptical attitude about attributing costs to causes.

Clinical evidence, though, is that many, probably most, of the patients who are seen in clinic or admitted to hospital for alcohol or drug-related reasons are never identified as such. Therefore, their problems are not entered into cost-of-illness estimates for alcohol or drug addiction. There are a variety of disciplinary, historical and sociological reasons for this minimization of alcohol and other drug abuse in the medical setting, but movement on this issue may be an area of scientific development in which socioeconomic research, on the

one hand, and the emerging area of behavioral medicine and health psychology, on the other, can provide mutual support. In other areas than health care, as well - social welfare dependency, domestic disturbances requiring police involvement family court, employee-employer disputes, etc. - too little attention is paid to the role of covert alcohol and other drug problems. The conservative bias of cost-of-illness researchers, who hesitate to attribute effect to cause without incontrovertible evidence, may do well with some leavening when the causal factors are disorders as ill-esteemed and easily denied as alcohol and other drug use.

Second, not enough is yet known about the role of alcohol and other drug addiction in inducing physical illnesses as well as psychiatric illnesses in close family and other relations. Called collateral health effects in Chapter 4, these are costs that most utilization data would suggest are quite large. The Aetna study, for example, suggests that the health care costs for family members of untreated alcoholics may be twice the level of nonalcoholic comparison families.

The number of individuals who may be at risk for collateral health effects - prevalence estimates for alcohol and serious other drug dependence suggest that as many as 35 to 40 million non-using family members may be affected in some way by alcohol and other drug use - and the magnitude of their health care costs (up to 100% above comparison levels) clearly suggest that collateral health effects may be an enormous but mostly unrecognized cost vector in the true costs of addictive disorders. Collateral health costs alone may in fact exceed the costs sustained by the care of the alcohol or drug user. These costs are completely absent from all cost-of-illness studies, or are attributed to a cause centered in the nonalcoholic but affected relative, rather than to his or her alcoholic or drug addicted family member. The collateral health effects of drug dependencies other than alcoholism are entirely unknown. In essence, cost-of-illness studies are in most instances captive to the same individuocentric bias that is characteristic of the health care system generally, but that runs increasingly counter to the "systems" trends in the larger social culture. This, too, may be an area where health psychology, and findings on the etiology of psychosomatic illness, as well as systems theory, can inform and enlarge the work of the health economist.

Third, cost-of-illness studies have not adequately expressed the mortality and morbidity costs associated with intravenously transmitted HIV and resultant AIDS, for which lifetime medical care per case may exceed $75,000 (Hellinger, 1990). By some estimates, direct and indirect costs for AIDS are expected to top $65 billion annually in the early 1990's, of which 20% can be traced to intravenous drug use. The addition of this quantity to the cost-of-illness of drug abuse would more than double the mortality and morbidity costs already associated with drug abuse. This trend has not been missed or minimized in cost-of-illness research; rather, quality data just has not been available yet. As new cost-of-illness studies emerge in the 1990's, a greatly enlarged cost for narcotic drug use, reflecting the effects of the AIDS epidemic, can be expected.

Fourth, cost-of-illness studies have not found adequate expression for the lingering medical and behavioral problems of the alcohol and drug-exposed infant. Typically, costs included in studies reflect only those deriving from the long-term custodial care of very seriously impaired FAS cases. Nevertheless, "... the emergence in recent years of crack cocaine users and the resulting burden of care for their children ... will obviously add to ... costs," (Rice et al, 1990, p. 153). This, too, is an area that is recognized by cost-of-illness researchers, who have been awaiting the availability of quality data, and this too is a reason to expect expanded cost-of-illness estimates due to both alcohol and other drug use in the coming decade.

Fifth, cost-of-illness data are typically behind, rather than in front of, "the curve," particularly when data are needed to reflect the health and broad social effects of phenomena that change as rapidly as the availability and prevalence of intoxicants in the modern world. Simply put, the epidemiology of drug abuse marches much faster than the socioeconomics of it, and socioeconomic researchers are not always aware of changes in drug use at the level of "the street" that have wide repercussions for cost-of-illness research. All three of the last areas discussed are matters in which socioeconomic researchers should seek the close collaboration of drug epidemiologists, who can inform the search for appropriate but otherwise hard to identify cost vectors.

Finally, because cost-of-illness data are largely archival and reported and aggregated at only the grossest clinical levels, they tend to be insensitive to other factors that guide outcome, aggravate the severity of symptomatology and associated features, and that, overall, may control a great deal of the variance in terms of cost-of-illness. These include clinical features increasingly measured at the case level - severity of addiction, family history and psychopathological subtype, comorbidity with mood or personality disorder, etc. - but never reflected in cost-of-illness data. Thus, a level of sophistication is required that is well above anything approachable in the foreseeable future, but as increasingly sensitive assessment technology gets installed at the clinical level, it should be encouraged to filter up to the socioeconomic one.

Cost-Benefits

Though there is a great deal of unevenness and clumping of cost-benefit data in some areas while there is an absence of data in others, overall there is some evidence that the treatment of alcohol and other drug

dependence yields positive benefit-to-cost ratios in general clinical populations, good evidence that such ratios are enjoyed in workforce populations, and quite excellent evidence that they are seen in the treatment of narcotics users with criminal justice involvement.

When tested in circumstances, locales and with problems as diverse as hazardous drinking in Oklahoma (Rundell & Paredes, 1979), drinking and drug use among factory workers in Detroit (Foote et al, 1978), methadone maintenance in San Diego County (Anglin et al, 1989), or mixed substance abuse at a therapeutic community in Manhattan (Hubbard et al, 1989), addictions treatment appears to deliver benefits at least as great in dollar value as the resources consumed to provide the treatment. Cost-benefit ratios are typically considerably higher than the break-even point of 1.0, and range much, much higher, depending on the study and the level of analysis. The benefits, of course, are many: more orderly and independent lives for the alcohol
abuser in the general clinical population, better rates of earning and ease of advancement for the worker, lower out-of-pocket expenses for the purchase of beer, liquor and illicit drugs, lower and much more orderly use of social welfare services, much reduced demand on the criminal and family court and greatly reduced costs to law abiding citizens stemming from the illicit use of heroin, cocaine and other narcotics - all of these and more are benefits that can be derived from addictions treatment and that can be directly translated into dollar-valued resources that can be saved, reinvested, or deployed for another social purpose altogether.

These cost savings can be very large. For example, the TOPS study reviewed in Chapter 6 showed that, based on all treatments for mixed narcotic and nonnarcotic drug abuse with outcomes measured at one year, costs to law-abiding citizens fell about 20%, costs to victims fell 30%, and costs to society as a whole fell about 8%. Illegal income fell from nearly $7,000 in the year preceding treatment to about $2,500 in the year following treatment, a 73% decline, a figure nearly matched by the decline of 71% in personal expenditures on drugs. These effects in purely cost-benefit terms are robust - benefit-to-cost ratios for costs to law-abiding citizens in the TOPS study ranged from 1.28 to 4.04, depending on the treatment modality - and they are quite general: "Virtually all economic measures show that the burden of crime and other economic consequences of drug abuse are lower after treatment than before," (Hubbard, 1989, p. 155).

Employers, too, are in a position to reap good cost-benefit ratios as the result of addictions treatment. For example, the Detroit Study (Foote et al, 1978) reviewed in Chapter 5 found savings in reduced absenteeism and sickness and accident benefits ranging from $1,250 in the first year after occupational addictions program intervention to more than twice that figure, depending on the specific company. A host of other studies, amply surveyed in the Jones and Vischi (1979) review and n Chapter 5 in this Technical Appraisal, attest to the cost-benefits of addictions treatment in both workforce groups and the general clinical population.

The implications of these positive findings on cost-benefits of addictions treatment should be carefully considered by those who fund treatment services. First, private payers and managed care providers stand to profit significantly from the provision of treatment benefits, an issue which will be raised below in the discussion of cost-offset effects. Second, public funding entities, at both local and state levels, should be aware of findings on alcoholism like those of Foote et al (1978) in the Illinois Medicaid Study, Rundell and Paredes (1979), Cicchinelli et al (1978), the TOPS and DARP studies on treatment of narcotics use, reports coming out of the Drug Abuse Research Group in Los Angeles, and so on. These studies clearly indicate that the costs of alcoholism and narcotics treatment provided through the public sector are recaptured over time. In this regard, it should be recalled that the JWK Study (1976) of NIAAA treatment centers found that it is the cost-bearer close to the alcohol user - the local community or state government unit, the employer, the managed care vendor - that bears most of the costs of alcohol and drug use and so stands to benefit most from their treatment. This means that benefits from alcohol and other drug treatment flow directly to the family, the boss, the HMO, the municipality, the state, an observation that should weigh in favorably when the distribution of public and private monies is considered.

Third, employers as funders of treatment, or as purchasers of occupational addictions programs, appear to recoup their expenses, in the form of improved productivity and worker behavior. The poor quality of much of the research published in this area makes this an argument harder to defend, and the Kurtz et al review (1984) suggests that the actual benefits derived from occupational programs are considerably more slender than the field has been generally willing to recognize. However, the more modest findings shown in the Canadian Rail Study, wherein work performance indicators "ramp up" prior to a vocational emergency, and then abate and converge toward the normal range when an occupational addictions program referral is effected, seem to provide a veridical picture of response to treatment, one made more convincing by its close resemblance to changes in health care utilization patterns over time when treatment for alcoholism is administered.

A factor in cost-benefit research that is rarely mentioned, but that greatly magnifies the argument made here, is that attractive cost-benefits are shown for treatment groups *as a whole*, without respect to the varying levels of effectiveness with which treatment is applied and its effects manifested. That is, by ignoring all

Table 8-2

Areas of Improvement for Cost-Benefit Studies on Addictive Diseases

GENERAL CATEGORY	SUGGESTED IMPROVEMENT
Experimental Control	CBA analysis should conform to the recommendations of other reviewers (e.g., Kurtz et al, 1984), to incorporate appropriate comparison groups, provide for adequate follow-ups, use reliable and valid outcome measures, treat sizable numbers of patients, and so on
Documentation	CBA researchers should make better efforts to estimate and document treatment costs
Clinical Sensitivity	CBA researchers should strive to explicate cost-benefit relationships that are influenced by differences in treatment effectiveness rather than report generalized CBA ratios obtained from group averages
Openness to Innovation	CBA research with workforce populations and narcotics users has much to gain from concepts and techniques worked out elsewhere, including ramping effects, collateral effects, statistical modeling of no-treatment conditions, and others

aspects of treatment effectiveness, studies have repeatedly shown that treatment with *average levels* of effectiveness shows positive cost-benefit ratios. Currently, a great deal of research is ongoing to expand treatment effectiveness in all areas of the addictions, and to find better methods of matching patients to optimum levels of care and treatment vehicles.

This is the visible edge of a powerful scientific movement within the field of addictions research to transfer basic knowledge about the addictions to clinical applications, and so improve the quality of treatment, the breadth and durability of its effects. Particularly as patient-treatment matching becomes a more acceptable and rule-guided process, and as average levels of effectiveness are converted to matched or customized levels of effectiveness, cost-benefit ratios in addictions research can only be expected to improve.

This is not to say that cost-benefit research cannot be itself improved. Some means for improvement are shown in Table 8-2. First, reviews such as those of Kurtz et al (1984) should be used to guide the development of future high-quality cost-benefit research. Too much research, especially but not exclusively in workforce applications, has been of poor quality. Improvement will call for the cooperation of socioeconomic researchers and clinically trained outcome methodologists, a partnership that could easily be accomplished.

Second, cost-benefit researchers should make renewed efforts to scale not just the effects of their treatment, but also the costs of their treatment. Some studies, such as the Detroit Study, DARP and many others made no attempt to estimate and report treatment costs, leaving in an embarrassed position the cost-benefit argument that could otherwise be made from their data. Even generally well conducted and reported studies like TOPS only estimated treatment costs at a gross level, without the kind of fine-grained analysis that may be necessary as economic arguments sharpen in health care and other areas of resource allocation. Researchers should also bear in mind that costs of treatment are elements that can not be approached well from the perspective of the randomized clinical trial. The extra demands on internal validity of the randomized clinical trial tend to distort cost features and other design elements that must retain ecological validity if they are to have any worth as a policy guide. This need of the cost-benefit researcher to have access to secure treatment cost estimates may serve to again raise the stock of a more suitable kind of study paradigm - the program evaluation - and may require another look by funding agencies and outcome researchers at program evaluation as a research model.

Third, cost-benefit research should, as indicated above, begin to address the fact that cost-benefit ratios differ as a function of the clinical effectiveness of the treatment in particular cases. Cost-benefit ratios are almost universally reported in terms of average costs and average benefits, but it is difficult to imagine a treatment that is other than cost-beneficial with some patients under some conditions, and not cost-beneficial under others. Even simple and easy to conduct comparisons - calculating separate cost-benefit ratios for patients who completed vs. dropped out of treatment - would improve the sensitivity and usefulness of cost-benefit research. Some of the DARP and TOPS studies, by exploring differences between patients who remained in treatment for varying lengths of time, have started to work in this direction, but researchers in the general clinical and workforce population tradition have been slow to follow suit.

We would also make a few other observations. The integrated review presented here suggests that there is a very clear promise for different areas of socioeconomic research to inform each other and allow the transfer between formerly disconnected literatures of concepts and methodological improvements. This is especially promising for cost-benefit research which, except in its special case of cost-offset research, has not been notably welcoming of innovation. We note in this respect that the concept of pretreatment "ramping" that is so apparent in the large cost-offset studies with general clinical populations (e.g., Blose & Holder, 1991; Holder & Blose, 1991) is almost perfectly replicated in the pretreatment ramping of negative performance indicators found for instance in the Canadian Rail Study

(Groeneveld et al, 1985). It is quite possible that similar ramping effects for criminal activity, drug-dealing, etc., would be found with narcotics users and criminal justice populations, were studies so designed to reveal the ramping effect. This kind of finding has significant implications for research methods, the design of baseline measures, and the estimation of true treatment effects. Similarly, the kind of gradually declining cost curve observed after treatment in the large cost-offset studies, and the long windows of observation required for the health care costs of treated alcoholics to finally resemble those of normal controls, may have a great deal to tell cost-benefit researchers: Namely, that improvement following treatment is gradual, incremental, but ultimately quite convincing when cases are followed over long enough periods.

Another methodological suggestion stems from a different strength of cost-offset research with general clinical populations: the use of Markov Chain and other stochastic techniques to mathematically model the behavior of a group of patients under "no-treatment" conditions. These sophisticated techniques have never been tried out in cost-benefit research but could easily be imported to studies with both workforce populations and narcotics users.

In still another example of a possible transfer between these disparate literatures, we find that the collateral health effects noted in some of the research on general clinical populations must have a conceptual equivalent in the matrices of both workforce and criminal justice effects.

That is, in the case of the workforce, it is reasonable to assume that job performance indicators of a worker with an addicted person at home are impacted by this situation, or the performance of supervisors and coworkers are hurt by the presence on their team of an alcohol or drug addict. These might be called *collateral job performance effects*, in much the same way as the physical health of a family is impaired by the presence of an alcoholic or drug addicted member. Lack of research in this area is unfortunate because this is the very kind of effect - wide damage to the productivity of a workforce and the functioning of an industry - that promoted the expansion of the employee assistance movement in the first place.

In the case of the criminal justice system, what greater stress does a family have to contend with than the triple stigma of a spouse, parent or child who is addicted, a criminal and unemployed? It is very likely that family members are also addicted, are high users of health care, social and welfare services and the criminal justice system. Treatment of the identified addict may produce substantial reductions in these indicators in other family members as well.

Collateral job performance and collateral criminal justice effects are concepts with a clear precedent in collateral health effects in the general clinical population. It is unfortunate that collateral performance effects - changes in work performance indicators of a worker with an addicted person at home or next to them at the work site - or changes in the health, social and welfare utilization of family members of criminally involved individuals - have never been studied in cost-benefit research in workforce or criminal justice populations. It is quite likely that attention to such collateral effects and their amenability to improvement when the alcohol or other drug addicted person on the factory floor or in the criminal justice system is treated, would markedly elevate cost-benefit ratios already observed in occupational, criminal justice and health care programs.

In addition, the case has been made in the general clinical population, and would be considerably strengthened by research in the workforce and criminal justice populations, for the inclusion of coverage for family members for addiction intervention and treatment insurance plans, HMOs, Medicaid, Medicare, VA benefits, etc.

Finally, we note that treatment with narcotics users who suffer a double stigma - an addict and a criminal - indicates that benefits *derived* - such as increases in productive labor, decreases in drinking and cannabis use, etc. - must be treatment effects that are *planned for* and treated for. Cost-benefit ratios in workforce settings and in the general clinical population could probably be vastly improved if the behaviors which are looked for as a measurable benefit - on-time behavior, appropriate use of social welfare agencies, shifting from visits to the emergency room to scheduled visits to the general practitioner, etc. - are specifically addressed in addictions treatment. The use of addictions treatment to expand patients' job skills, to improve the appropriate use of social services, to encourage the use of preventive rather than tertiary health care services, etc. - all these are innovations toward which clinical service delivery and socioeconomic research could walk hand in hand, and which would further enhance the performance of treatment from a cost-benefit perspective.

Cost-Effectiveness

Demands for more treatment capacity at all levels for the care of alcohol and other drug abuse, and exhortations to improve the quality and durability of treatment effects, have escalated sharply in recent years. This is in response to a number of crises and emergencies that have seized public attention, including the spread of crack-cocaine and the new amphetamines, the HIV epidemic among intravenous drug users, the continued alcohol-driven carnage on the nation's highways, and other causes of concern. These demands for action,

unfortunately, arrive at a time when the health care industry is under siege for cost-containment reasons, when the federal and most state governments are striving to hold in check large budget deficits, and when dollars for even the best of causes must too often be refused. In this environment, treatment for alcohol and other drug addiction must be shown as more than merely productive of good cost-benefit or cost-offset results. Treatment must also be shown to have maximum possible impact for a given level of resource expenditure.

Thus, even the optimistic pictures sketched above do not abate the need to contain costs in the health care system, nor the mandate to perform quality cost-effectiveness research in all areas of addictions treatment. The evidence reviewed in this Technical appraisal, however, indicates that the cost-effectiveness picture for addictions treatment generally may be considerably more complex than a peek at any one literature would suggest. The argument is not helped by the dearth of good data - few areas are more unexplored than cost-effectiveness of addictions treatment generally, but a few conclusions appear warranted.

First, cost-effectiveness will be most pronounced when treatment is instituted early, when it is targeted at behaviors that produce the desired outcomes, and when it is dispersed over time in all but the lightest and most uncomplicated cases. Holder et al (1991) show that alcohol dependence in the general clinical population may be more briefly addressed, but all other literatures show the definite value of *following up* the patient, of keeping him or her in treatment, no matter the level of treatment intensity, just so long as the patient remains attached to the caregiver. This later treatment era is especially attractive from a cost-effectiveness point of view, for it is here that marginal costs of treatment tail off while the powerful effects of the early treatment era are cemented in place.

This may not require that patients remain in treatment for a long time in a single episode. The Drug Abuse Research Group's intriguing findings, along with a similar suggestion in the Illinois Medicaid Study, that treatment has *additive effects* over treatment episodes across time must serve to focus new research attention on the *treatment career* rather than the single treatment episode as the true vehicle of incremental change. But this lays an additional burden on the treatment system beyond the mandate to keep patients in treatment - namely, treatment additivity will require the development of a system that will track patients across time, transfer diagnostic information and treatment planning goals from episode to episode, caregiver to caregiver, and that will encourage more use of a master case manager concept than the present system of the competitive, isolated service provider has been so far willing to accommodate. However, the decreased marginal costs observed as treatment continues, and the findings like those of DARP and TOPS on minimal threshold levels of treatment, indicate that the best solution to treatment from a cost-effectiveness perspective is to provide treatment over time in a single episode.

And finally, the case has been made several times for valid, consistent and reliable patient-assessment and treatment-matching. There are both treatment quality and research reasons for the use of a common rather than numerous competing approaches. The instrument developed by the American Society on Addiction Medicine (ASAM, 1991) is a rational design that defines the four primary treatment levels - outpatient, intensive outpatient/partial hospitalization, residential and inpatient hospital. In addition, ASAM defines five dimensions that encompass "medical necessity" for each treatment level - biomedical conditions and complications, emotional/behavioral condition and complications, treatment acceptance or resistance, relapse potential and the recovery environment (see figure 8-1). In the ASAM plan, after the detox/withdrawal condition is determined and safely navigated, the patient is assessed, using the dimensions outlined, and an appropriate treatment level is recommended. There are related progressive criteria, using the same dimensions, for determining length of stay and discharge.

Figure 8- 1
ASAM Levels of Care and Medical Necessity Dimensions

	Level I Outpatient	Level II Intensive Outpatient	Level III Residential	Level IV Hospital
Dimensions:				
Withdrawal/Detox Potential				
Biomedical Complications				
Emotional/Behavioral Complications				
Treatment Acceptance/ Resistance				
Relapse Potential				
Recovery Enironment				

adapted from American Society of Addiction Medicine (1991)

Although the ASAM model was not developed for criminal justice populations and narcotic abusers, and does not specifically have criteria for methadone maintenance, the basic outline, with some modifications could be utilized for any population. Revision and updating are occurring as of this writing.

Cost-Offsets

Cost-offset results are, in our view, the most convincing literature studied in this Technical Appraisal, a

literature made more important because of its promise for relieving some of the burden of an ever-increasing health care crisis in American generally. The substantial health care cost-offsets observed in every quality study in both general clinical and workforce populations, not to mention the collateral cost-offsets that may be as large or larger, indicate that a rational system of addictions treatment can be a component of health care reform that will save enormous sums in the long run. The data, most of them in Chapters 4 and 5, speak for themselves and require no summarizing here, other than to say that cost-offsets "pay for" the cost of treatment within two to three years, are exceedingly durable, and are equally marked in female and male treatment populations.

Unfortunately, other than the observation that cost-offsets are particularly strong when younger patients receive treatment, very little evidence can be adduced to show specifically that the treatment of drug problems other than alcoholism produce cost-offsets in the area of medical care by itself. The matter is difficult to settle in the absence of the kind of data generated by cost-offset studies of alcoholism treatment, and it would be possible to argue either an optimistic or pessimistic position concerning health care cost-offsets from other addictions treatment. It may in fact not be the health care sector, but rather the agents of society such as the criminal justice system that pay for social controls and remedial social services, that stand to benefit from treatment of other drug addiction. Savings appear to be achievable in these domains.

There simply are no data available yet to clarify this picture and in their absence the wisest course is probably an agnostic one, viewing the health care cost-offsets from alcoholism treatment as the upper bound of what can be expected from the treatment of other drug abuse, with the probable values somewhat lower.

A firm exception to this involves the treatment of alcoholism and of heroin, cocaine and other narcotics use in pregnant women. This is a group with, clinically, powerful motives to change behavior and with generally good prognoses. The enormous cost risks their drug use raises -medical risk managers and actuaries can easily conceive of single cases of prenatal drug exposure that will result in lifetime care costs of hundreds of thousands of dollars - make very large cost-offset effects for treatment likely. Data will probably not be available to document this for many years - cost-offset research will require at a minimum the prior completion of quality longitudinal studies of infant and child development in FAS/FDE cases, along with the application of expensive remedial measures that can be costed out (so that the tragic dimensions and costs of "no treatment" conditions for the pregnant user can be known), and will require also studies on the efficacy of treatment for pregnant women. It is difficult to imagine circumstances in which strong cost-offsets will not be derived, and surely human motives can drive the intervention process until socioeconomic ones can be justified.

Humane concerns will also be necessary to support treatment for the older alcohol abuser, and perhaps for the most severe and chronic alcohol abusers and drug users of all ages. The GHAA Study (Plotnick et al, 1982), with its demonstration of a Good Alcoholism Treatment Outcome / Poor Medical Care Outcome patient-type comprising 15% of the treated group, as well as the excellent data on age cohort effects in the cost-offset findings from the Aetna (NIAAA, 1985) and Midwestern Studies (Blose & Holder, 1991) indicate that even when patients respond well to treatment for alcoholism, their physical state may continue to deteriorate. However, a problem with this research is that while health care costs under fictitious "no treatment" conditions have been estimated by a variety of sophisticated statistical means, these estimates are always applied to the group as a whole, and separate "no treatment" cost estimates are never made for different age cohorts. Therefore, the health care cost curve that fails to decline much after the treatment of alcoholism in an older or more chronic alcoholic may be substantially lower than the costs that would continue to ramp sharply upward if treatment were not delivered. An additional complication here is the matter of treatment effectiveness, and the limited availability, so far, of customized treatment for older addicted people. That is, the health care cost-offset problem with the older population may be a treatment effectiveness problem with older alcoholics: Cost-offsets may not be as great because treatment is not as effective, particularly the kinds of "mainstreamed" treatment that is generally available, developed with a younger patient prototype in mind. Cost-offsets are in all cases are dependent on minimal levels of treatment effectiveness, and data are simply not available to clarify the treatment effectiveness picture with this underserved and understudied group. However, without treatment, cost reductions in health care spending with this group are unlikely and once again, additional savings could conceivably accrue in other systems.

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