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Economic Costs, Cost-Effectiveness, Financing, and Community-Based Drug Treatment

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Economic Costs, Cost-Effectiveness, Financing, and Community-Based Drug Treatment

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Introduction and Summary

William S. Cartwright and James M. Kaple

There is renewed interest in the role of health services research in assisting the Nation to improve the delivery of basic drug abuse treatment. The first National Institute on Drug Abuse (NIDA) technical review to focus on the drug services research agenda was convened May 21-22, 1990. The purpose of the technical review was to identify and plan services research dealing with social and economic costs, cost-effectiveness, and financing of drug treatment, prevention, referral, and followup care in health and community settings. The Financing and Services Research Branch (FSRB), Division of Applied Research, NIDA, sponsored this technical review to examine research to develop new methods of analysis and to improve current methods in these areas,

The scientific environment in drug abuse services research is one of active and intense interest in which scientific and programmatic policies are rapidly evolving after a period of neglect. In June 1990, the Office of National Drug Control Policy (ONDCP) issued a White Paper titled *Understanding Drug Treatment* (Office of National Drug Control Policy 1990*a*). In September 1990, the Institute of Medicine (IOM) published its report, *Treating Drug Problems* (Institute of Medicine 1990a), and a previous IOM report, *Broadening the Base of Treatment for Alcohol Problems* (Institute of Medicine 1990b), also was published earlier that year. The ONDCP has published two reports, both titled *National Drug Control Strategy* (Office of National Drug Control Policy 1989, 1990b), and each discusses national policy and research needs and emphasizes services research as an important and integral part of a well-rounded research strategy. The FSRB is charged to nurture the development of basic and applied research in the drug abuse services field.

This technical review used three main themes to organize the issues. First, the review focused on the development of the latest cost estimates associated with drug abuse and considered new approaches to improve the methodology. Second, issues surrounding the state of cost-effectiveness research of alternative drug treatments were dealt with in four chapters. Third, a review of drug treatment financing from the public and private perspectives examined

how funding the delivery of drug treatment and other appropriate services was undertaken. Finally, suggested services research opportunities and data collection needs were examined, building on presentations made throughout the technical review.

Services research investments over the next few years will lead to an improved understanding of the relative effectiveness of organizational, structural, and financial approaches to the Nation's drug treatment system and the clients it serves. Services research now in place and planned for the future will enhance the knowledge base necessary to inform future policy decisions affecting financing and delivery of drug treatment in the public and private sectors. This technical review contributes to the research process by providing guidance in the assessment of economic costs, cost-effectiveness, and financing issues.

ECONOMIC COSTS OF DRUG ABUSE

Establishing the economic costs of drug abuse presents an interesting challenge to those who develop such estimates and those who would use such estimates for policy purposes. The first chapter, by Rice and coworkers, summarizes the most recent findings on drug abuse economic costs from an FSRB-sponsored study (Rice et al. 1990) that included mental health and alcohol costs. Sindelar and Harwood offer cautionary notes to researchers and policymakers concerning the interpretation of the findings.

Rice and colleagues present a careful analysis of the burden of drug abuse on society. The study uses the human capital approach rather than the willingness-to-pay approach. The study also uses a prevalence approach to estimate a 1985 base period of costs rather than an incidence approach that would attempt to estimate lifetime cost over the sum of affected individuals. The reader should remember that estimates were generated on data acquired before the crack/cocaine epidemic in the late 1980s and therefore do not capture the additional costs of this new drug usage. Overall, the computations result in a 1985 estimated cost to the Nation of $44 billion, which is updated by inflation only to an 1988 estimate of $58.3 billion. In 1988, $325 billion represented crime-related costs-a large burden to the economy and to those who do not use drugs. Such high crime-related costs distinguish drug abuse costs from those related to alcohol and mental health costs.

This cost-of-illness study contributes, among other things, two technical innovations. First, in estimating productivity losses (income losses) by age and sex, the authors develop a model that takes into account the timing and duration of the drug abuse disorder on current income. To do this, the National Institute of Mental Health Epidemiology Catchment Area data are used along

with the available information on time of onset of last drug abuse symptom relative to the time of the interview. Second, new variables for alcohol and drug abuse and mental illness are used as explanatory variables in the income loss equations. A major finding was that the income loss was lower for alcohol and drug abuse than was found in an earlier study conducted by the Research Triangle Institute (Harwood et al. 1984). The new study had the advantage of newer and more complete databases and new statistical models and methods.

The striking thing about these cost estimates is how large the burden is and how much of it falls on society rather than on the individual drug user. The crime portion of this estimate accounts for nearly 74 percent of the total cost. For policymakers, this crime factor creates a unique situation for financing and reimbursement policy because there are such large external costs on other members of society. One effect of these external costs is a willingness to pay a subsidy for treatment to reduce these costs. The subsidy is present already in the State block grant for alcohol, drug abuse, and mental health (ADM) services, but at what level the subsidy should be set is a question of intense policy interest.

Although such cost-of-illness studies indicate a large burden on society, Sindelar cautions that this is not sufficient information for decisionmaking about the allocation of scarce resources. Additional information must be collected on the marginal effectiveness of policies and programs if decisionmaking is going to move toward an optimum. Second, she recommends focusing studies on individuals with defined constellations of ADM comorbidities rather than artificially parceling diseases into distinct categories when dealing with polysubstance abuse. Finally, Sindelar recommends that attention be paid to certain hidden costs such as the deadweight loss attributable to government taxation to finance public problems.

Harwood suggests additional caveats to the interpretation of cost-of-illness studies. He notes that such studies provide a metric to summarize the burden of disparate diseases, but it is a metric that is limited in calculating other aspects of drug abuse problems such as pain and suffering. He reminds us that, from 1980, cost-of-illness studies have undergone dramatic improvement in methodology. As a result, estimates of the impact of drug abuse on persons in the work force have fundamentally increased over previous estimates. Finally, Harwood points out that economic concerns of efficiency and equity are primary in the development of a national drug control strategy.

The editors wish to point out the significance of research findings related to the large costs in productivity losses for individuals in the workplace. Such findings underlay the basis for economic arguments of the benefits of workplace drug

policies related to testing and treatment. Of course, there will be a need for additional estimates of such effects, although such measurements must be conducted In an environment of heightened consciousness of workplace drug problems. This heightened consciousness potentially biases the best efforts of researchers to control for all Intervening variables. For example, increased levels of general information affected the measured impact of health interventions for reducing heart disease because controls generally were subject to better knowledge concerning changes in healthy behavior. The overall result Is an increased difficulty in detecting a measured difference between the controls and the treatment groups and, hence, a bias to not finding a treatment effect in the workplace.

COST-EFFECTIVENESS

Apsler's review of the cost-effectiveness literature is a critical assessment of accomplishments to date. For his purpose, the important question is, Are today's drug treatment programs cost-effective? Apsler develops a three-part argument about the results in the literature. First, there is evidence that some "typical" drug programs are of "questionable" cost-effectiveness. Moreover, there is also evidence that some treatment strategies are "cost-ineffective." Finally, there is evidence that certain treatments have a positive cost-effectiveness. Underlying these various estimates is what Apsler suggests is a lack of rigor in research design and implementation. To redress this, he recommends a renewed commitment to undertaking cost-effectiveness studies and to using better research methods.

Hser and Anglin have comprehensively reviewed the effectiveness of drug treatment in a paper published elsewhere (Anglin and Hser 1990). In the chapter for this monograph, they point out new directions for research into cost-effectiveness studies of drug treatment. They start with the definitional and conceptual framework for cost-effectiveness studies and then focus on the dynamic aspects of the treatment system and the client's career in drug addiction and treatment. Hser and Anglin discuss the use of time-series analysis and its potential for studying the addiction career and for policy analysis. They also discuss survival analysis, Markov and Semi-Markov Modeling, and system dynamics approaches. Within such a methodological focus, they argue that in the framework of these models interventions can be examined to provide policy analysis of alternatives.

Hubbard and French maintain that, on balance, treatment is "an effective and cost-effective strategy." They recommend that attention be shifted from a defensive posture regarding treatment outcome findings to a more offensive one so that the maximum return on each dollar invested in treatment can be

achieved. This theme is strongly recommended throughout the first section on social and economic costs. Hubbard and French's chapter lays out new perspectives on research to study treatment careers, components of treatment, and the effects of client impairment (assessed at treatment entry). Hubbard and French take a reductionist approach to disaggregating the "black box" of treatment and the client types in the system. They argue that only through this approach can a better understanding of what is cost-effective be developed.

Lampinen examines cost-effectiveness issues in the prevention of acquired Immunodeficiency syndrome (AIDS). He reviews epidemiologic and public health Issues in evaluating cost-effectiveness of drug treatment as an AIDS prevention strategy. The problem Lampinen perceives is that Federal AIDS prevention dollars are distributed to areas with the highest cumulative incidence rates of diagnosed AIDS cases. This is problematic because AIDS among intravenous (IV) drug users is underweighted in resource discussions and allocations and because the latency period for AIDS is so long. In assessing alternative prevention strategies for IV drug users, he notes that the drug treatment approach may be limited by the lack of treatment slots and the costs associated with treatment. Outreach initiatives to conduct AIDS education and prevention still remain the most logical alternative given the current size of the drug treatment system. Finally, consideration must be given to epidemiologic information on rates of infectivity in weighting prevention strategies so that resource allocations will be more effective.

FINANCING

Gerstein lays out fundamental questions to guide policy research and development. In particular, policy research must focus on public support for financing drug treatment. He posits three principles on which such public policy should focus: (1) reduce external social costs, (2) increase access to care, and (3) stimulate effective treatment. In developing his thesis, Gerstein explores several topics in a wide-ranging discussion that goes beyond considerations of financing. In particular, he discusses the role of cost-of-illness studies, cost-effectiveness and efficiency in treatment, and financing. In financing issues, a problem unique to drug abuse clients is the moral conception about those needing treatment. These moral conceptions play a role in determining the willingness of others to pay for drug treatment and rehabilitation either through the public system or through private, risk-pooling arrangements of private health insurance. Gerstein advocates further research into Medicaid financing of drug treatment, utilization management, incentive effects of regulatory controls, and data requirements.

Duggar notes that in spite of the lack of comprehensive data there are indications that third-party reimbursement for drug treatment has expanded to a greater number of health insurance plans. There has been an expansion in drug treatment coverage as measured in some national surveys, but details on various reimbursement characteristics are not available. Limitations on drug treatment benefits seem more restrictive than what is customary for other health care benefits, but there has been expansion to provide drug treatment and rehabilitation in what are called "other approved facilities," which include residential treatment facilities and freestanding drug abuse clinics as opposed to costly inpatient care.

Duggar sees great possibilities in Medicaid program expansion where States institute Medicaid coverage for drug treatment. Where this occurs, State licensure activity for Medicaid reimbursement eligibility seems to stimulate private payers' interest in recognizing legitimate drug treatment programs and in reimbursing for treatment. However, most Medicaid programs exclude reimbursement for residential treatment facilities because there is no Federal funding designated for this activity.

Duggar reports on some preliminary data concerning Pennsylvania's establishment of a "Health Insuring Organization" (HIO) to enroll a subset of Philadelphia Medicaid clients. The HIO contracted with primary care physicians on a capitated basis to have them serve as gatekeepers to medical care. Preliminary results indicate some reductions for inpatient hospital costs, but none for drug treatment costs because of the lack of HIO control over outpatient drug treatment episodes. He recommends that such Medicaid demonstrations are important natural experiments for studies of reimbursement for drug treatment.

Pauly examines the current state of financing of treatment for drug abuse and important economic factors that determine adequacy and future policy. He highlights the dual and virtually separate drug treatment provided in the public and private sectors. A fundamental problem facing both sectors is the skepticism of payers that treatment works with any certainty. Thus, third-party payers such as insurance companies, employers, and governments have the difficult problem of determining whether treatment dollars are well spent. Pauly further Indicates that, if there is a rational expectation of effective treatment, then why would treatment be denied? He also asks, Why do the public and private programs differ so greatly?

Pauly develops a series of research questions in logical sequence about public and private financing of drug abuse treatment, with a special section on employment-related insurance coverage. Under public and private financing,

drug treatment has a role of providing effective health investments for communities or individuals. Along with such investments, consideration must be given to the distribution of costs across various groups in society. In employment-related insurance coverage, there are several issues, with State mandates for minimal levels of drug abuse treatment coverage having several effects that need to be studied and verified.

McGuire and Shatkin focus on the difficulties of estimating the cost of health insurance for drug treatment. The cost of drug treatment has been perceived as rising rapidly and requiring special attention to manage the cost of insurance. State and Federal laws attempt to meet social goals by imposing mandates and minimal requirements on the benefits and insurance contracts that may be written in a State, which in turn increases costs to others elsewhere in the economy. Estimates of these costs are a critical component in evaluating the tradeoffs in achieving social goals. The authors critique two studies that examine the impact of providing drug treatment on health insurance premiums and the impact of State mandates to provide drug treatment benefits. McGuire and Shatkin call for studies that can exploit large data sets of insurance claims to examine the response to different reimbursement policies and for studies that focus on determinants of health insurance coverage for drug treatment.

Cartwright and Woodward survey the use of health insurance questions in national surveys to determine appropriate methods for estimation of insurance coverage, substance abuse benefits, and access to care and propose a set of questions to be added to the National Household Survey on Drug Abuse (NHSDA) or other small area surveys. The chapter examines the Current Population Survey (CPS), National Medical Expenditure Survey, and the National Health Interview Survey. In asking questions about illicit use of drugs, it must be remembered that confidentiality and anonymity requirements are important factors in the survey design of the NHSDA. Obtaining household information is difficult because the most knowledgeable person about the household situation may not be questioned because persons within the household are randomly selected. There are also many adolescents who may have limited knowledge about their health insurance coverage. In the face of these problems, it is necessary to use more than one survey to derive a picture concerning health insurance coverage and drug coverage. The authors recommend a strategy using CPS health insurance questions to link data with the NHSDA. In this way, the CPS may be used to provide fundamental data on the Nation's population and household characteristics that may inform the study of access to and adequacy of drug treatment.

CONCLUSION

This technical review was a first step for the FSRB toward defining a national research agenda for drug abuse services research. This monograph presents several exciting research opportunities for multidisciplinary research teams to undertake. The technical review examined the methodology of cost-of-illness estimates and reviewed cost-effectiveness and benefit-cost studies, two areas that must be closely linked in the development of the research agenda. However, financing also was included because of its potential role in providing an important source of information on both costs and benefits. Furthermore, financing issues are sources of research questions on efficiency and equity in the drug treatment system. In drug services research, all the complications of understanding the various roles of the public and private sector are conjoined in questions of financing of the treatment system. The continued development of the services research agenda represents a challenge for the research community as theoretical work is combined with applied, empirical research to achieve the goal of improved public health in the United States.

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Economic Costs of Drug Abuse

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INTRODUCTION

Drug abuse and drug addiction are costly to the Nation in medical resources used for care, treatment, and rehabilitation; in reduced or lost productivity; in crime enforcement; and in pain and suffering of drug abusers and their families and friends. Although the overall use of drugs has decreased in recent years, drug addiction continues to be widespread and its consequences are more serious (Committee on Ways and Means 1990). The 1988 National Household Survey on Drug Abuse (National Institute on Drug Abuse 1990) estimates that almost 28 million Americans over the age of 12, about one in every seven persons, had used illicit drugs one or more times in the past year. Of these, marijuana (including hashish) was the most commonly used illicit drug, with over 21 million users in the past year, and heroin with about 600,000 users in the past year. The 1988 survey also showed that over 1 million persons used crack in the past year and that nearly 2.5 million persons had used the drug at least once in their lifetime. Crack cocaine, the most addictive drug that scientists have ever confronted, coupled with the emergence of acquired immunodeficiency syndrome (AIDS) among intravenous (IV) drug users, are major public health problems in the United States, flooding hospitals, emergency rooms, drug treatment centers, child welfare systems, and ultimately the Nation's morgues.

Drug abuse imposes a substantial burden on individuals as well as society as a whole. Although it is difficult to quantify all aspects of the burden that drug abuse imposes on society, it is important to translate this burden into economic terms to facilitate decisionmaking. With the continued rise in health care expenditures and the growing pressures for cost-containment, limited financial resources may limit the health care Americans need. Priorities should allow for the greatest improvement in welfare or well-being per dollar spent. To determine the expenditures on prevention, education, treatment, control, interdiction, and research on drug abuse, it is necessary to understand the burden it places on society as well as the cost and effectiveness of alternative interventions.

The research presented in this chapter developed estimates of the economic burden of drug abuse in 1985. It is part of a larger study, *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985* (Rice et al. 1990), conducted for the National Institute on Drug Abuse (NIDA) and the Alcohol, Drug Abuse, and Mental Health Administration. This chapter summarizes the methods and sources of data used in estimating the direct and indirect costs of drug abuse and presents the results for 1985 and 1988. The same methodology applies to the costs of alcohol abuse and mental illness that are part of the larger study.

METHODOLOGY

Cost-of-illness studies are typically divided into two major categories: core costs and related costs. Core costs are those resulting directly from the illness, whereas other related costs are the costs of secondary, nonhealth effects of Illness. Within each category, there are direct and indirect costs. Direct costs are those for which payments are actually made, and indirect costs are those for which resources are lost. Indirect costs consist of morbidity and mortality costs. Morbidity costs are the value of lost productivity by persons unable to perform their usual activities or to perform them at a level of full effectiveness due to the illness. Mortality costs are the value of lost productivity due to premature death resulting from illness; lost productivity is calculated as the present discounted value of future market earnings plus an imputed value for housekeeping services.

Human Capital and Willingness-To-Pay Approaches

This study uses the human capital approach, whereby an individual is seen as producing a stream of output over time that is valued at market earnings or the imputed value of housekeeping services. It assumes a social perspective and has the important advantage of using data that are reliable and readily available. It is useful for answering questions regarding the economic burden of disease for a specific duration (e.g., drug abuse in 1985) or for cost-benefit analysis (e.g., determining the cost savings of a specific procedure or intervention program that reduces illness and/or improves survival rates). The human capital approach also has limitations. Because the value of human life is based on market earnings, it yields very low values for children and the retired elderly. Many drug abusers fall into these categories, especially young persons. This approach may undervalue or overvalue life if labor market imperfections exist and wages do not reflect true abilities. Finally, certain dimensions of illness and death such as pain and suffering are ignored.

A conceptually different approach, willingness to pay, captures other aspects of the value of life. This method values human life according to what indlviduals

would be willing to pay for a change that reduces the probability of illness or death (Schelling 1966; Acton 1975). Objections to the willingness-to-pay method are that it is difficult to implement in practice, that the value of individual lives depends on income distribution (with the rich able to pay more than the poor), and that people have great difficulty in placing a value on small reductions In the probability of death (Hodgson and Meiners 1962). However, the methodology has been refined considerably in recent years (Rice et al. 1989).

Prevalence and Incidence Approaches

Two approaches can be used to estimate the cost of illness by the human capital method. Prevalence-based cost provides an estimate of the direct and indirect economic burden incurred in a period (the base period) as a result of the prevalence of illness during this same base period, most often a year. Included is the cost of base-year manifestations of illness or associated disability with onset in or at any time before the base year. Prevalence-based cost measures the value of resources used or lost during a specified period regardless of the onset of the illness or injury.

Incidence-based cost represents the lifetime cost resulting from the illness. Incidence cost refers to the total lifetime cost of all cases with the onset of disease In the base year. Incidence cost is difficult to estimate because it requires knowledge of the likely course of an illness and its duration, including survival rates since onset; the amount and cost of medical care to be used and its cost during the duration of the illness; and the impact of the illness on lifetime employment, housekeeping, and earnings (Hodgson 1983; Scitovsky 1982).

Most cost-of-illness studies employ the prevalence-based approach, as does the one employed in the current study on the economic costs of drug abuse.

Definition of Drug Abuse

Drug abuse is defined as any of the diagnoses listed in the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM), as shown in table 1. Included are drug psychoses; drug dependence; nondependent abuse of drugs; poisoning by drugs, including opiates and related narcotics, sedatives, and hypnotics; psychotropic agents, central nervous system (CNS) depressants and stimulants; and heroin, methadone, opiates, and related narcotics causing adverse effects In therapeutic use. These ICD-9-CM diagnoses are used for estimating the direct drug abuse treatment costs of hospital and ambulatory care from the National Hospital Discharge Survey (NHDS) and the National Ambulatory Care Survey. They

TABLE 1. *Drug abuse diagnoses*

Diagnosis	ICD-9-CM[a] Code
Drug psychoses	292
Drug dependence	304
Nondependent abuse of drugs	305
Polyneuropathy due to drugs	357.6
Narcotics affecting fetus or newborn via placenta or breast	760.72
Hallucinogenic agents affecting fetus or newborn via placenta or breast	760.73
Drug withdrawal syndrome in newborn	779.5
Poisoning by opiates and related narcotics	965.0
Poisoning by sedatives and hypnotics	967
Poisoning by CNS muscle-tone depressants	968.0
Poisoning by psychotropic agents	969
Poisoning by CNS stimulants	970
Heroin causing adverse effects In therapeutic use	E935.0
Methadone causing adverse effects in therapeutic use	E935.1
Other opiates and related narcotics causing adverse effects in therapeutic use	E935.2
Sedatives and hypnotics causing adverse effects in therapeutic use	E937
Other CNS depressants and anesthetics causing adverse effects in therapeutic use	E938
Psychotropic agents causing adverse effects in therapeutic use	E939
CNS stimulants causing adverse effects in therapeutic use	E940

[a]*International Classification of Diseases, 9th Revision, Clinical Modification*

also are used for estimating mortality costs based on the number of deaths from these diagnoses reported in the National Mortality Detail File.

For estimates of morbidity costs, the Epidemiologic Catchment Area (ECA) Surveys are used, which classify disorders according to the *Diagnostic and Statistical Manual of Mental Disorders III, Revised.* The ECA data provide diagnostic information on drug abuse and dependence for each of six substances (barbiturates, opioid [heroin], cocaine, amphetamines,

hallucinogens, and cannabis [marijuana]) as well as a summary measure of the six, considering each equally disordered.

Estimation Models

Estimating the economic costs of drug abuse is complex, involving a variety of methods and sources of data that are spelled out in considerable detail in the full report (Rice et al. 1990). This section briefly summarizes the models for estimating the cost of drug abuse for 1985 by type of cost.

Direct Costs. The direct costs of drug abuse are the value of resources that could be allocated to other uses in the absence of drug abuse. Direct costs include the amounts spent for personal health care for persons suffering from drug abuse, including care in drug-related specialty and Federal institutions, short-stay hospital care, and physician and other professional services. Also included are support costs related to the treatment of drug abuse, such as expenditures for research, training costs for physicians and nurses, program administration, and net cost of private insurance. Other related direct costs encompass the costs of crime, including public police protection costs, private legal defense, and property destruction.

In general, the direct costs of drug abuse are estimated as the product of two components: total utilization of services and unit prices or charges. For example, short-stay hospital days of care were obtained from the 1984, 1985, and 1986 NHDS public use tapes. Included are days of care associated with a primary diagnosis of drug abuse and the additional days of care (by age and sex) reported as secondary or comorbid drug abuse diagnoses. Expenses per patient day were applied to these days of care to obtain total short-stay hospital costs. Table 2 summarizes the core costs of drug abuse by type of cost as well as the data sources used.

Other related direct costs of drug abuse include the following components: criminal justice system, drug traffic control, private legal defense, property destruction, and social welfare administration. For each component, the costs attributed to drug abuse are estimated employing the offense-specific methodology developed by Cruze and associates (1981) and Harwood and associates (1984) in which causal factors that represent the proportion of offenses or arrests considered to be due to drug abuse are applied to the number of known offenses and then multiplied by the costs per offense. Table 3 summarizes the other related costs and the data sources used.

TABLE 2. *Core costs of drug abuse by type of cost, 1985*

Type of Cost	Amount (millions)	Percent Distribution	Data Sources
Total	10,624	100.0	-
Direct Costs	2,082	19.6	-
ADM[a] specialty and Federal institutions	570	5.4	-
Federal providers	176	1.7	Personal communications with Veterans Administration, Department of Defense, and Indian Health Service
State and county psychiatric hospitals	91	0.9	National Institute of Mental Health (NIMH) 1988
Private psychiatric hospitals	30	0.3	NIMH 1988
Other ADM[a] institutions	273	2.6	NIDA 1983; National Institute on Alcohol Abuse and Alcoholism 1983
Short-stay hospitals	1,242	11.7	National Center for Health Statistics (NCHS) 1986-88; American Hospital Association 1987
Other treatment costs	69	0.6	-
Office-based physicians	52	0.5	NCHS 1985a
Other professional services	17	0.2	Personal communications with American Psychological Association and American Council of Social Workers
Support costs	201	1.9	U.S. Executive Office of the President 1986; Jolly et al. 1986; Klemmer et al. 1987; Health Care Financing Administration 1987
Indirect Costs	8,542	80.4	-
Morbidity	5,979	56.3	-
Noninstitutionalized population	5,943	55.9	NIMH 1980-1985
Institutionalized population	36	0.3	Manderscheid 1988
Mortality[b]	2,563	24.1	NCHS 1985b; U.S. Bureau of the Census 1985; U.S. Bureau of Labor Statistics 1986

[a]Alcohol and other drug abuse and mental illness
[b]Discounted at 6 percent

NOTE: Percents may not add to total due to rounding.

TABLE 3. *Other related costs of drug abuse by type of* cost, *1985*

Type of Cost	Amount ($ millions)	Percent Distribution	Date Sources
Total	32,401	100.0	
Direct Costs	13,209	40.7	
Crime	13,203	40.7	
Public expenditures	11,063	34.1	
Criminal justice	9,508	29.3	
Police protection	5,810	17.9	U.S. Department of Justice 1987a, 1986a
Legal adjudication	1,108	3.4	U.S. Department of Jusice 1987a, 1986a
Correction	2,500	8.0	U.S. Department of Justice 1987a, 1986b
Drug traffic control	1,535	4.8	
Prevention	175	.5	U.S. Office of Management and Budget 1988
Law enforcement	1,380	4.3	U.S. Office of Management and Budget 1988
Private Legal Defense	1,381	4.3	U.S. Bureau of the Census 1985
Property destruction	759	2.3	U.S. Department of Justice 1987b
Other direct expenditures[a]	**6**	[b]	Blxby 1988
Indirect Costs	19,252	59.3	
Victims of crime	842	2.6	US. Department of Justice 1986c and average earnings per day
Incarceration	4,434	13.7	U.S. Department of Justice 1985, 1986d, 1087c, 1987a, 1988 and average earnings
Crime careers	13,976	**43.1**	NIDA 1988: U.S. General Accounting Office 1988; Nurco et al. 1985; U.S. Bureau of the Census 1987

[a]Social welfare expenditures
[b]Less than one-tenth of 1 percent

NOTE: Percents may not add to total due to rounding.

Morbidity Costs. Morbidity costs, the value of reduced or lost productivity due to drug abuse, are estimated as the product of the number of individuals affected times the average income loss per individual due to drug abuse. Each of these terms is further divided into two parts: (1) The number of drug abusers is the size of the reference population times the drug abuse prevalence rates; and (2) the average income loss per drug abuser is the percentage loss due to the disorder per individual times the average income level the individual would

have earned had he or she not been affected by this disorder. Each of these terms is disaggregated by age, sex, and disorder, except average income for persons without these disorders, which can be disaggregated only by age and sex.

The identity is given below:

$$\$LOSS = \Sigma\Sigma\Sigma (POP_{ij} * PREV_{ijk}) \quad (b_{ijk} * Y_{ij})$$

Where:

$LOSS=the aggregate loss in income due to drug abuse

POP_{ij}=the size of the population by age and sex

$PREV_{ijk}$=the prevalence rate by age, sex, and disorder

b_{ijk}=the percentage income loss per individual with drug abuse by age, sex, and disorder

Y_{ij}=the average Income by age and sex for individuals without disorders

Summing this four-term product over age, sex, and drug abuse disorder provides an estimate of the aggregate loss of income due to drug abuse among the entire population.

A timing model was developed in the estimation of impairment rates (percent of income loss) that were applied to average incomes, including an imputed value of housekeeping services, by age and sex. Maximum likelihood estimation is employed to estimate impairment rates based on a model that measures the lifetime effect on current income of individuals with these disorders, taking into account the timing and duration of the drug abuse disorders. Timing and duration are based on measures of time of onset and time of last symptom relative to the time of interview. The impairment rates are the adjusted cross-section coefficients obtained when the probability of each observation in the likelihood function is estimated by the integral of the error in the income equation over the reported income interval. The error is equal to the difference between the natural logarithm of personal income and coefficients multiplying lifetime measures of functions of the timing and duration of individual drug abuse disorders and other control variables. Multiplying the impairment rates by average incomes, therefore, yields measures of the annual income loss per individual with the disorder by age, sex, and disorder.

Alcohol and other drug abuse and mental disorders are not neatly segregated among drug abusers who often abuse alcohol and vice versa, and both types of substance abusers have higher than average rates of mental illness (Collins and Schlenger 1983; Grande et al. 1984; Miller et al. 1983; Rachal et al. 1981, 1982; Wolf et al. 1988).

In the larger study, all income losses due to these disorders are distributed among the three categories. The prevalence of multiple disorders in individuals presents a unique problem-namely, how to allocate income loss attributable to multiple disorders among the disorders. This problem was addressed by first determining if measurable interaction effects of overlapping disorders were identifiable. In initial regression studies, multiple diagnostic variables were included to determine if overlapping prevalence introduced additional income loss (over and above that found from first-order prevalence measures). Because of the colinearity introduced by these additional variables, however, it was not possible to statistically discern such effects. As a result, the analysis assumes that the effects of overlapping prevalence are additive but not interactive. In other words, the impairment rate found for drug abuse is the same whether it is a sole disorder or in the presence of an alcohol and/or a mental disorder.

Mortality Costs. Mortality costs are the value of lost productivity due to premature death resulting from drug abuse. If an individual had not died prematurely, he or she would have continued to be productive for a number of years. The estimated cost or value to society of all deaths is the product of the number of deaths and the expected value of an individual's future earnings with sex and age taken into account. This method of derivation considers life expectancy for different age and sex groups, changing pattern of earnings at successive ages, varying labor force participation rates, an imputed value for housekeeping services, and the appropriate discount rate to convert a stream of costs into its present worth.

The formula for calculating the present value of lifetime earnings (V) per person is presented below:

$$V = \sum_{n=a}^{85+} \frac{(X_n W_n + H_n K_n) P_{a,n}}{(1+i)^{n-a}}$$

Where:

a=the midyear age for the given cohort of persons

X_n=the annual mean earnings for all persons with earnings in an age group where the midpoint is age n

i=the discount rate

H_n=the annual mean imputed value of housekeeping services for all persons in an age group where the midpoint is age n

K_n=the average housekeeping participation rate in the age group with midpoint age n

W_n=the average labor force participation rate in an age group with midpoint age n

$P_{a,n}$=the probability that a person of age a will survive to age n

A discount rate of 8 percent is used to convert the stream of lifetime costs into its present value equivalent, and an average annual increase of 1 percent in the future productivity of wage earners was assumed.

The estimate of lifetime earnings is based on varying labor force participation rates. The assumption is that people will be working and productive during their expected lifetime in accordance with the current pattern of work experience for their sex and age group. The economic variables used for estimating lifetime earnings are shown in table 4.

Output losses are based on annual mean earnings by age and sex adjusted for wage supplements such as employer contributions for social insurance, private pensions, and welfare funds. Cross-sectional profiles of mean earnings by age and sex are employed to estimate lifetime earnings. In applying these data, the future pattern of earnings of an average individual within a sex group is assumed to follow the pattern reported by the U.S. Bureau of the Census (1987) during a base year. The average individual may expect his or her earnings to rise with age and experience in accordance with the cross-sectional data for that year.

Marketplace earnings underestimate the loss resulting from injury because many persons are not in the labor force. Many of these persons, as well as those in the labor force, perform household services. The value of household work, therefore, must be added to earnings. For this study, estimates are developed of hours

TABLE 4. *Selected economic variables used in estimating mortality costs by age and sex, 1985*

	Percent of Population With Earnings		Mean Annual Earnings ($)[a]		Mean Annual Value of Housekeeping Services ($)[b] In Labor Force		Mean Annual Value of Housekeeping Services ($)[b] Not In Labor Force	
Age Group	Male	Female	Male	Female	Male	Female	Male	Female
15-19	44.9	41.5	6,706	6,353	1,835	4,691	3,611	9,330
20-24	85.0	71.8	19,357	16,030	2,220	7,076	4,706	11,715
25-29	94.1	75.5	25,771	19,702	2,604	7,862	5,091	12,396
30-34	94.4	74.1	30,950	22,268	2,871	8,491	5,327	13,130
35-39	94.8	75.6	36,075	22,077	2,960	8,911	5,446	13,549
40-44	93.5	75.4	36,856	21,642	2,989	8,282	5,475	12,920
45-49	93.2	73.0	36,884	21,252	2,989	7,469	5,475	12,108
50-54	90.5	65.4	37,497	20,476	2,989	7,469	5,475	12,108
55-59	82.0	55.7	35,936	19,878	3,196	7,338	5,682	12,029
60-64	62.6	40.3	35,409	19,270	3,196	7,338	5,682	12,029
65-69	24.6	13.3	33,412	19,552	3,196	7,155	5,712	11,793
70-74	12.9	5.5	27,898	16,529	2,276	5,094	4,067	8,397
75-79	8.4	3.0	23,284	13,988	1,547	3,464	2,766	5,710
80-84	5.5	1.5	19,418	11,824	899	2,013	1,607	3,317
85+	3.5	1.0	16,212	9,999	509	1,139	909	1,878

[a]Mean annual earnings for year-round, full-time workers, including suppliments, consisting mainly of employer's contributions to social insurance.
[b]Values are imputed by muitiplying hours spent In each type of domestic activity by the wager for corresponding occupations.

SOURCES: U.S. Bureau of the Census 1985, tables 34 and 36; U.S. Bureau of Labor Statistics 1986. table 3.

spent on household labor employing regression analysis to control for socioeconomic and demographic factors (Douglas et al. 1990). The hours are then valued on the basis of 1985 wage rates. The present value of lifetime earnings by age and sex at a 6-percent discount rate are shown in table 5.

AIDS. Drug abuse has contributed to the spread of the human immunodeficiency virus and other sexually transmitted diseases, IV drug users account for about one-fifth of the AIDS cases (Centers for Disease Control 1990). To estimate the cost of AIDS attributed to drug abuse, 20 percent is applied to the total direct and indirect costs of AIDS in 1985 developed by Scitovsky and Rice (1987).

Cost Estimates for 1988. The total cost of drug abuse is updated for 1988 by employing economic data and indexes with known relationships to the drug

TABLE 5. *Present value of lifetime earnings ($)[a] by age and sex, 1985*

Age	Males	Females
<1	208,631	173,738
1-4	236,117	196,515
5-9	293,977	244,559
10-14	374,790	311,678
15-19	468,782	384,026
20-24	541,021	425,804
25-29	568,546	424,982
30-34	565,043	402,178
35-39	532,289	364,873
40-44	471,190	319,090
45-49	389,462	268,529
50-54	294,646	214,826
55-59	194,878	159,614
60-64	101,085	105,272
65-69	39,713	61,103
70-74	17,802	33,574
75-79	8,789	17,531
80-84	4,457	8,655
85+	1,408	2,257

[a]Calculations are based on a 6-percent discount rate.

abuse cost estimates, To obtain the 1988 values, inflationary and real changes are taken into account. Direct costs are adjusted using the percentage change in the components of total personal health care expenditures between 1985 and 1988. These data incorporate inflation in the medical care market as well as the effect of changing demographics and patterns of health care utilization. For indirect costs, inflation and real change are estimated separately. The change in hourly compensation in the business sector is used for inflation; the change in the U.S. civilian labor force is used to reflect real change for morbidity; and the change in the total number of deaths is used to reflect real change for mortality.

Similarly, for other related crime expenditures, the gross national product implicit price deflator for government purchases of goods and services is used to reflect inflation, and the change in the number of arrests is used for real

change. For AIDS, inflation is accounted for by the change in the medical care component of the Consumer Price Index and real change by the significant increase in the number of AIDS cases diagnosed.

RESULTS

The 1985 costs to society of drugs are highlighted below. Crack cocaine addiction and its devastating consequences are not included in the cost estimates because this major public health problem emerged after 1985.

- The total economic costs of drug abuse amount to $44.1 billion in 1985, including direct treatment and support costs (5 percent), indirect morbidity costs (14 percent), indirect mortality costs (6 percent), other related costs (74 percent), and the cost of AIDS (2 percent) (table 6).

TABLE 6. *Economic costs of drugs by type of cost, 1985 and 1988*

Type of Cost	1985 Amount ($ millions)	1985 Percent Distribution	1988 Amount ($ millions)	1988 Percent Distribution
Total	44,052	100.0	58,279	100.0
Core costs	10,624	24.1	12,896	22.1
Direct	2,082	4.7	2,656	4.6
Treatment	1,881	4.3	2,407	4.1
support	201	0.4	249	0.4
Indirect	8,542	19.4	10,240	17.6
Morbidity	5,979	13.6	7,194	12.3
Mortality	2,583	5.8	3,046	5.2
Other related costs	32,461	73.7	42,202	72.4
Direct	13,209	30.0	18,782	28.8
Indirect	19,252	43.7	25,420	43.8
AIDS	967	2.2	3,181	5.6

[a]Calculations are based on a 6-percent discount rate.

- Direct costs of drug abuse amount to $2.1 billion for 1985. Of this total, three-fifths are for short-stay hospital care of persons with primary and secondary diagnoses of drug abuse.

- Private sources account for 36 percent of the $2.1 billion direct costs for treatment and support of drug abusers; 64 percent is borne by public sources-39 percent from Federal funds and 25 percent from State and local sources (table 7).

TABLE 7. *Drug abuse core direct costs by treatment setting and source of payment, 1985*

Treatment Setting	Amount ($ milllons) Total	State end Federal	Local	Private[a]
Total	2,082	806	517	759
ADM[b] specialty and Federal institutions	570	233	298	39
Federal providers	178	178	-	-
State and county psychiatric hospitals	91	13	74	4
Private psychiatric hospitals	30	4	3	23
Other ADM institutions	273	40	221	12
Other treatment costs	1,311	509	204	598
Short-stay hospitals	1,242	504	202	538
Office-based physicians	52	4	1	47
Other professional services	17	1	1	15
Nursing homes				
Drugs				
Support costs	201	64	15	122

[a]Includes prlvate health insurance, direct payments by patients, and philanthropy
[b]Alcohol and other drug abuse and mental Illness

- Drug abuse morbidity costs, the value of reduced or lost productivity, amount to $6 billion based on a prevalence rate of 3.6 percent among adults ages 18 to 64, or 5.2 million persons, and 1,775 residents In mental facilities suffering from this disorder. Prevalence is based on a diagnostic measure, defined in terms of clinical criteria for a medical diagnosis of drug abuse or dependence. People who use marijuana, hashish, cocaine, and other illicit drugs without clinical manifestations of drug abuse or dependence and without meeting severity criteria are not included here.

- More than 6,100 deaths in 1965 are attributed to drug abuse, representing 231,000 person years lost, or 37.6 years per death and a loss of $2.6 billion to the economy at a 6-percent discount rate, or $416,657 per death (table 6).

TABLE 8. *Drug abuse mortality: number of deaths, person years lost, and productivity losses by age and sex, 1985*

Age and Sex	Number of Deaths	Person Years Lost Number (thousands)	Per Death	Productivity Losses ($)[a] Amount (millions)	Per Death
Both Sexes	6,118	231	37.8	2,583	418,857
<15	61	4	71.5	14	238,244
15-24	581	30	53.9	277	492,928
25-44	4,007	169	42.1	2,049	511,452
45-84	885	22	25.4	209	241,696
65+	824	6	10.2	13	21,108
Males	4,290	182	37.9	2,050	477,989
<15	30	2	88.5	8	252,967
15-24	383	20	51.7	203	529,138
25-44	3,108	127	40.8	1,700	547,389
45-84	485	11	23.5	135	278,883
65+	288	3	9.2	5	17,111
Females	1,828	69	37.7	512	280,132
<15	31	2	74.4	7	220,080
15-24	178	10	58.7	74	415,007
25-44	901	42	48.5	349	387,585
45-84	380	11	27.7	74	194,514
55+	338	4	11.1	8	24,487

[a]Calculations are based on a d-percent discount rate.

NOTE: Numbers may not add to totals due to rounding.

- About three-fourths of drug abuse deaths occur among persons ages 15 to 44 years. This age group accounts for 66 percent of the person years lost and 91 percent of the mortality costs of drug abuse.

- Core costs (direct and indirect health-related costs) account for $10.6 billion. Adults ages 15 to 44 account for two-thirds of the total core costs. The cost for men is almost twice that for women-$6.9 billion compared with $3.7 billion (table 9).

- The major cost component for drug abuse is other related costs, amounting to $32.5 billion and constituting almost three-fourths of the total economic costs of drug abuse. Direct crime expenditures amount to $13.2 billion, two-fifths of the other related costs. Crime expenditures include public police protection costs, private legal defense, and property destruction.

TABLE 9. *Core costs of drug abuse by age and sex, 1985*

Age and Sex	Amount ($ millions)	Percent Distribution
Total	10,624	100.0
<15[a]	96	0.9
15-44	7,216	67.9
45-64	3,015	26.4
65+	295	2.6
Males	6,953	100.0
<15[a]	57	0.8
15-44	4,977	71.6
45-64	1,792	25.6
65+	127	1.6
Females	3,671	100.0
<15[a]	41	1.1
15-44	2,239	61 .0
45-64	1,223	33.3
65+	168	4.5

[a]The <15 age group includes costs for 15- to 17-year-old persons for several cost categories (including alcohol and other drug abuse and mental illness specialty institutions and Federal providers); thus, the costs for the <15 age group are overstated and the costs for the 15 to 44 age groups are correspondingly understated.

- Other related costs also include the value of productivity losses for those who, as a result of heroin or cocaine addiction, engage in crime as a career rather than in legal employment. These productivity losses are estimated at $14 billion. In addition, the productivity losses of people incarcerated in prisons as a result of conviction of a drug-related crime are estimated at $4.4 billion.

- The direct and indirect costs of AIDS associated with IV drug users is estimated at almost $1 billion. Of this total, indirect costs constituting four-fifths of the total, mainly due to high mortality among persons with AIDS.

- The total cost of drug abuse is estimated at $58.3 billion for 1988 (table 6).

LIMITATIONS

The cost estimates presented in this study are based on the most current and reliable data available and new methodology developed specifically for this study. Nonetheless, several qualifications are in order.

Several known costs are excluded because data are unavailable. No attempt is made to capture the costs of pain and suffering, and no attempt is made to value the services of family members and friends who care for drug abusers. This "informal care" cost is likely to be significant, but there are no reliable data from which to make estimates.

Some of the cost estimates are likely to be low, again due to data limitations. For example, hospital discharge data records may not list drug abuse diagnoses because of the stigma associated with this disorder (Gfroerer et al. 1988). In one study, physicians identified only 40 percent of patients who suffered from alcohol or other drug abuse (Coulehan et al. 1987). To compensate for the probable omission of hospitalization of some drug abusers, we use average expense per patient day in all non-Federal community hospitals applied to the reported days of care to obtain total hospital costs. Because most drug abuse short-stay hospital episodes do not involve surgery, the average expense per day for drug abuse patients is probably less than for the average patient, which is likely to overestimate the costs.

No estimates are made for drug abuse income loss among the transient and the military populations, resulting in underestimation of costs. Estimates of income loss among the civilian noninstitutionalized resident population are calculated only for ages 18 to 64. To the degree that those younger than age 18 and older than 64 suffer earnings losses due to drug abuse, the costs are understated. Productivity losses are based on personal income rather than personal earnings, Personal income, which includes receipt of transfer payments, may be less sensitive to the effects of drug abuse than personal earnings, resulting in possible understatement of costs.

A d-percent discount rate is employed to estimate the present value of future earnings lost. Use of a lower discount rate would yield higher mortality costs. Using the d-percent discount rate results in low estimates of mortality costs.

Full-time, year-round earnings for the civilian noninstitutionalized population and average life expectancy are used in the estimates of forgone earnings. These measures should be adjusted to reflect earnings and life expectancy without drug abuse, but data are not available to make these adjustments, thereby introducing a downward bias into the estimates.

For these reasons, the cost estimates presented in this study can be interpreted as a lower limit of the true cost of drug abuse. As better data become available, the approach can be refined and improved.

CONCLUSIONS

The measurable economic costs of drug abuse are high, amounting to $44.1 billion in 1985 and an estimated $58.3 billion for 1988. Each year an estimated 2 million individuals are hospitalized, and 125,000 visits with a drug abuse diagnosis are made to office-based physicians. In 1985 more than 6,100 deaths are attributed to drug abuse, of which three-fourths occur among persons 15 to 44 years of age, representing 231,000 person years lost, or 37.8 years per death.

The cost to society of crime estimated to be due to drug abuse is exceedingly high, amounting to $32.5 billion, almost three-fourths of the total economic costs of drug abuse. Included are expenditures for police protection, private legal defense, and property destruction as well as the value of productivity losses for those who engage in crime as a career as a result of heroin or cocaine addiction and for people incarcerated in prison as a result of conviction of a drug-related crime.

In light of these high costs, more attention must be directed at comprehensive research-based strategies to reduce drug abuse in the United States. In January 1990 President Bush announced a coordinated and comprehensive National Drug Control Strategy to make drugs undesirable and difficult to obtain through a mix of supply and demand policies by using all the drug reduction tools at hand: criminal justice systems; drug treatment programs; prevention activities in schools, businesses, and communities; international efforts aimed at drug source countries; interdiction strategies; and a variety of intelligence and research resources (Office of National Drug Control Policy 1990). Special attention should be given to improvement of data collection, analysis, and evaluation to provide reliable and timely information for policy use. These expanded data efforts will enable the conduct of services research studies to better estimate the economic costs to society of drug abuse.

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Economic Cost of Illicit Drug Studies: Critique and Research Agenda

Jody L. Sindelar

INTRODUCTION

This chapter suggests three main approaches for increasing the usefulness of cost-of-illness (COI) and related studies. (1) Although economic cost studies give an indication of the burden of the illnesses on society, they do not indicate how to allocate scarce resources. Instead, one needs information on the marginal effectiveness of policies and programs (i.e., information on the marginal benefits of averting costs). (2) Instead of trying to parcel diseases into distinct categories in the face of polysubstance abuse and comorbidities, one could define types of individuals based on constellations of comorbidities and use these sets of categories for analysis and cost estimates. (3) Hidden costs, such as the deadweight loss attributable to government financing of programs and policies, could be included in the cost and marginal benefit calculation.

COST OF ILLNESS VS. EXPECTED MARGINAL BENEFITS

Staggering figures on the economic cost of a particular disease or disorder are frequently reported to generate and justify interest in a disease. These numbers are helpful in estimating the scope of the problem to society and seem to influence governmental spending, at least in the case of the National institutes of Health (Mushkin 1979).

The cost-of-illness argument (implicitly or explicitly) goes as follows: The more costly a disease, the more resources that society should commit to preventing and treating the disease. Although seemingly reasonable, the relative magnitude of the economic losses of one disease vis-a-vis another is not the best guide to the allocation of resources. Consequently, economic studies and political debates that use COI studies may be focusing on the wrong issues. Political debates should not focus on estimates of how much the disease costs society but on how much of society's scarce resources would be saved by additional spending on the disorder. Only if we could instantly and

costlessly rid ourselves of the disease and all its consequences would estimates from COI studies represent society's savings.

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. Savings here are interpreted broadly to include all accumulated savings to society (e.g., savings on treatment, opportunity costs of time, lives saved); that is, savings should include all those factors that typically enter a COI study and even some that typically do not, as discussed below.

Effectiveness

The effectiveness of a policy or program in terms of costs saved is a key element in deciding how to allocate resources. It is obvious, but worth stating, that although some diseases are costly to society, additional expenditures on treatment or prevention will not necessarily be productive.[1] First, we may not know how to treat a problem (e.g., crack), or we may not know how to change behavior (e.g., prevent use of drugs by pregnant women or teenage experimentation with drugs). 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, Thus, one should know the effectiveness or benefit of costs saved by a program rather than the overall cost of a problem. For example, although the costs of cocaine abuse may be larger than the cost of heroin addiction, the treatment of cocaine addiction often is considered to be less effective than the treatment of opiates. In the case of drug use, this means that society needs information on the effectiveness of such related topics as further drug interdiction, research on specific drugs, education and other prevention policies, and treatment for drug addiction. Sometimes the effectiveness of a program is not completely predictable. One must thus develop informed expectations about the potential productivity of expenditures.

On the Margin

One should examine not only the effectiveness of programs and policies (and thus the expected benefits) but also the marginal benefits and costs of proposed policies. Marginal benefits are the gains that accrue to small changes in programs or policies. Good policy decisions should incorporate the concept and insights of marginalism.[2] What, for example, is the effectiveness of drug prevention on the margin? Suicides of teenagers may pose higher economic costs than cocaine use by employed adults, but on the margin, a dollar spent on adult drug education may save more than a dollar spent on teenage suicide prevention, because we may not know how to prevent the suicides. However,

after a certain level of resources has been allocated to a particular productive program, the effectiveness on the margin probably will diminish such that resources would be better spent in another way.

Although marginaiism is important, one must be cognizant of the properties of the production process and take into consideration such properties as threshold effects, learning by doing, and/or interactions of programs. For example, supply interdiction programs may be effective only if implemented at a substantial scale and only in concert with other policies such as demand reduction, Other programs, such as research on preventing acquired immunodeficiency syndrome (AIDS) in drug-abusing populations, may produce results only after a threshold level of research expenditures.

Circularity

The implication of using COI studies as indicators of how to allocate money has built-in circularity. 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. Similarly, the more money the government pours into government-funded treatment centers, the greater the apparent costs of drugs to society. Research costs pose the same issues: The more dollars spent on research, the larger the problem looms. Obviously, it is hoped that ail these types of expenditures will reduce the adverse effects of drugs, albeit through different avenues, and ultimately reduce the economic costs. However, these benefits may occur with a time lag and, depending on the effectiveness of each, they may not occur at all, or not to any great extent. The argument of circularity may be more compelling if turned around; if the government spends less money on the drug problem, the costs of illness, at least in the short run, could appear to be reduced, therefore implying that fewer funds should be devoted to drugs.

The Alternative Focus

Instead of, or in addition to, focusing on the magnitude of the costs of illness, one should focus on determining the optimal expenditure level and the optimal types of programs and policies through calculating the expected marginal benefits compared with the marginal costs. Cost-benefit analyses should be conducted for treatment and prevention policies and research agendas. Furthermore, one would want these analyses conducted on subgroups of the

population and/or subgroups of drugs, being sure to focus on the effectiveness and cost savings of programs on the margin. No one would say that these analyses are easy to conduct, yet neither are COI studies.

The shift in the emphasis of studies toward analyzing payoffs to interventions should be reflected in a concomitant shift in policy circles. Politicians and government officials should argue over the allocation of government funds based on the potential payoff instead of the magnitude of the cost of illness.

COMORBIDITY

The issue of comorbidity in COI calculations generally and in the case of drugs particularly is a serious and complicated problem. How does one attribute costs of suicide or crime to a specific disorder when individuals have multiple disorders? Several studies have made adjustments to account for comorbidity (Rice et al. 1990). However, no study has truly and satisfactorily addressed the issue. The information needed to address it far exceeds the current knowledge base. Nonetheless, a conceptualization of how one should treat the issue would help in directing research toward providing the relevant information. This section provides some insights into the role of causation in assigning costs to specific disorders, but first an alternative is suggested that analyzes types of individuals based on their set of comorbidities instead of analyzing the costs of a single disorder.

Comorbidity Types

The traditional approach in dealing with comorbidity is to try to determine which costs should be parceled out to a specific disease (e.g., drug dependence). An alternative approach is to recognize that many individuals suffer from multiple disorders (e.g., polysubstance abuse and depression). Rather than attempting to disentangle essentially intertwined costs in a co-occurring set of disorders, one would analyze the costs by "types," which are defined by the combinations of disorders and addictions occurring in individuals, Types such as polysubstance abusers or depressed alcoholics would be the unit of analysis. One then would analyze the costs of or potential gains to treatment of polysubstance abuse separately from the costs or treatment of a depressed alcoholic

The advantage of this method is that it corresponds to clinical reality: Comorbidities are common. The usefulness of defining new types would be that individuals would be grouped together on the basis that they respond similarly to treatment within types but differently across types. Moreover, the validity of these types could be tested empirically. For example, one could test

whether coefficients in earnings regressions and treatment studies are similar within types but different across types.

To develop the types, statistical methods such as cluster analyses or the newer method of grade-of-membership analyses could be employed. See Woodbury and coworkers (1978) for an early example and Berkman and colleagues (1989) for a more recent example.[3] Groups would be defined by individuals being homogeneous within groups but heterogeneous across groups. One would want to define a parsimonious set of groups to keep the set tractable.

Such a redefining of types may not be politically appealing because in the Federal Government the lines of authority and interest are delineated into three categories: alcoholism and alcohol abuse, drug abuse, and mental disorders. Nonetheless, the artificial separation of these divisions does not reflect the current state of co-occurring disorders and polysubstance abuse.

Comorbidities and Causation

In the traditional single-disorder approach, one would attribute costs to a specific illness. To avoid arbitrarily parceling costs by disease, one needs information on causation. For example, was a hospitalization caused by alcohol-impaired driving or was the drug problem caused by attempts at self-medication for another problem?[4]

Although it may be appropriate to think of causation in terms of the initiating event when discussing prevention, it will not be useful in discussing treatment and other programs that start from a point with an individual who already is suffering from comorbidities. In these cases, one would not necessarily care about the origin of the problems but about how to proceed from the current state to a more desirable state (e.g., a cure for or management of the addiction). For example, an individual may start by drinking occasionally, then begin abusing alcohol, then turn to using stimulant drugs along with alcohol, but he or she also may eventually use alcohol as a way to come down from a prolonged high. Did the alcohol abuse cause the drug abuse, and if so, should ail costs be attributed to alcohol? If the initial use of alcohol is the gateway into a life of poiysubstance abuse, then a program to prevent this chain of events might use estimates from cost-of-drug studies to get an indication of the gains to effective prevention. However, COI estimates do not approximate the lifetime goals of preventing a problem, but they do approximate the costs in a particular year or a mixture of lifetime and current-year costs. If treatment is the primary issue, the COI numbers generally are less useful as a guide to the expected benefits. The issue is even more complicated with comorbidities.

In analyzing the benefits of treatment of a specific disorder, one would estimate the expected benefits. However, calculations of the expected benefit are more complicated in the case of comorbidities. With multiple disorders, even if one disorder could be treated effectively the other disorder might emerge as more of a problem. (For example, if one reduced drug dependence, would alcohol abuse become more of a problem?) Alternatively, a 28-day alcohol inpatient program may simultaneously ameliorate or "cure" both alcohol and drug addictions. Accordingly, the true economic benefits of the treatment would include the effects of the treatment of one disorder on the existence and severity of the co-occurring disorders. Omission of the comorbidities could bias the estimated results, and the direction of the bias cannot be predicted *a priori.* Thus, further research is needed to address these issues.

Diagnoses vs. Symptoms

In the discussions of comorbidities above, the implication of the term is that one is dealing with diagnosed disorders. However, symptoms, subclinical disorders, hazardous use of substances, and clinically diagnosed disorders can occur together in a variety of constellations. [5] Their interactions could affect estimates of the cost of illness, and the co-occurrence of all these could be factored into the analyses of types. The interaction or co-occurrence, for example, could make treatment or prevention more difficult. The suggestion here is to incorporate several measures of data together (e.g., both diagnoses and symptom data). Although data sets with diagnoses and symptoms are rare, they do exist (e.g., the Epidemiologic Catchment Area [ECA] survey; see Reiger and colleagues [1984] for a description of the ECA data and Muliahy and Sindelar [1989] and Rice and coworkers [1990] for use of the ECA data), and more data of this type could be gathered. As another example, the 1988 National Health interview Survey alcohol supplement has alcohol use and alcohol symptom data together in one survey. Similar surveys could be implemented for drug use.

The issues of subclinical disorders and/or of symptoms vs. diagnoses are of broad concern but may be even more relevant in the cases of comorbidity-regardless of how one deals with the comorbidity. For example, if two subclinical disorders co-occur, they may have as big an impact as a single diagnosed disorder.

HIDDEN COSTS

Several types of costs associated with drug abuse that are not directly measurable yet are imposed on society. These costs should be factored into the expected savings due to preventing and/or treating illnesses. Although

these costs are not necessarily of great magnitude generally, in specific situations they may be of importance.

Deadweight Loss of Raising Revenue

One such cost is the loss associated with taxing individuals and corporations to raise revenue for government-funded activities. In the case of drug abuse, government-subsidized and -funded activities include research, training, treatment, prevention, supply interdiction, transfer payments (e.g., unemployment and disability insurance), Medicaid payments associated with drug use, and other programs. Not only do most of these government expenditures reflect a cost to society per se, but they also engender a deadweight loss. In the case of government transfer payments, the payment is properly ignored as a cost to society because it is moved from one individual to another: however, raising the funds for the transfer produces deadweight losses.[6]

Because of the tax system, individuals and corporations change their behavior and act in a suboptimal way, which is an opportunity cost to society. In the case of an individual, he or she may choose to supply less labor to the market than he or she would have in the absence of the tax.[7] The individual would have preferred to work more hours or retire relatively later and, thus, ultimately consume more goods. However, the imposition of the tax changes the effective renumeration per hour, thus eliciting a change in labor supply. The same argument applies to revenues raised via corporate taxes, sales taxes, real estate taxes, etc., but the magnitude of the deadweight loss depends on the elasticity of the response to the tax.

The magnitude of the deadweight loss is difficult to measure. However, a body of literature is devoted to estimating such losses (see Harberger [1964] for the seminal piece on the welfare loss), and these numbers can be used to proxy the magnitude. Estimates of the percentage of deadweight loss due to personal income tax range from 5 cents per dollar of revenue (Browning 1976, 1985) to about 29 cents (Hausman 1981, 1983a, 1983b).

These studies clearly give a range of estimates and, thus, do not provide guidance as to the precise numbers to use. However, ignoring the issue is not the solution, Ignoring the deadweight loss underestimates the associated costs and the potential benefits of prevention and treatment, Alternative approaches might include stating the direction of the bias, taking the midpoint of the range as an estimate of the percentage of deadweight loss or performing sensitivity analyses by estimating the deadweight loss at both the maximum and minimum of the estimated range.

The administrative costs of raising revenue and operating the government programs are also hidden costs that should be incorporated into estimates of COI or the calculation of the expected marginal benefits of treatment or prevention.

Moral Hazard or Not

Another hidden cost is that of moral hazard, which causes losses to society to the extent that Insurance coverage reduces the out-of-pocket price of medical care, and consequently, individuals consume more medical care than they would have in the absence of insurance and more than is justified on social grounds. The loss occurs because individuals use treatment to the point that the marginal costs to society exceed the marginal benefits. Thus, on the margin, each additional unit of care consumed yields net costs to society; however, because the individual's out-of-pocket price is low, use of medical care still yields private benefits. For example, a person with coverage may stay for 28 days in an inpatient program because 28 days are covered, even though the marginal benefit of the last days may be nearly nil. The moral hazard costs accrue not only to drug treatment but also to drug-associated medical care costs.

Although moral hazard costs presumably do apply to those with private coverage and may even apply to those in government-funded treatment programs (where the marginal pecuniary cost to the individual is zero), the situation may be reversed for those who have a drug problem but do not seek sufficient care to prevent negative externalities to society.[8] That is, the negative externalities that accrue to society from drug use (e.g., crime or transmission of AIDS) make it such that the society would like individuals to seek more treatment than they do. In this case, the problem is how to encourage individuals to seek care rather than to discourage use, as in the moral hazard problem. The benefits to society of individuals seeking care rest on the presumed effectiveness of care. Thus, important issues to explore, What is the optimal amount of care to cover? How does the optimal vary with characteristics of the person or of the environment? and How to encourage use by those for whom society would like greater use?

Psychosocial Costs

The psychosocial costs are not hidden in that they are felt by society, families, and individuals. However, they are hidden to the analyst because they are so difficult to measure. Nonetheless, they should be considered because the alternative of omitting them biases the costs of drug use downward.

The psychosocial costs of drug abuse would include society's worry about crime, families' concern with children's drug use, and the drug user's stresses and worries. The drug user may be concerned about loss of job, loss of friends, arrest if detected, and long-term health consequences. The worry and stresses to the family are losses in themselves but also may cause other losses. For example, stress has been shown to relate to declines in health, which in turn could result in such problems as lost productivity and additional medical care expenses. Furthermore, individuals may change their behavior as a consequence of drug use in society (e.g., not go out at night or move out of the city).

CONCLUSIONS

Although COI studies can be useful in indicating the scope of the costs to society associated with a disease or disorder, they do not provide a guide as to how to allocate resources. To plan and prioritize for government programs, one should look at the expected marginal benefit (i.e., those costs averted) of research, prevention, and treatment. To arrive at an optimal allocation of resources, one should analyze which type of treatment would be most cost-effective, which subgroup of individuals (characterized by age, race, sex, drug utilization, and comorbidities) should be targeted for prevention programs, which policies would prevent the negative externalities from drug abuse, and which policies would best deter the spread of AIDS. Policy debates should focus not on the underlying costs of disease but on which government expenditures would yield the greatest savings.

Comorbidities are an important and confounding issue in COI studies as well as in cost-benefit analyses. The suggested approach is to redefine new types based on the constellation of comorbidities observed to co-occur in sets of individuals. This method is consistent with the ideas that (1) many individuals have polysubstance abuse and/or have comorbidities and (2) w-occurring diseases are so intertwined that it is not productive to try to disentangle them. Instead, one would try to develop a parsimonious set of types that would group homogenous individuals together. A benefit of this over the traditional single-disorder approach would be that empirically these groups should respond differently across programs (e.g., prevention and treatment). Redefining types would focus policy development on explicitly dealing with comorbidities when designing prevention and treatment programs. The suggestion of redefining disease groups may not be appealing politically because of the delineation of responsibilities among the three agencies (the National Institute on Drug Abuse, the National Institute on Alcohol Abuse and Alcoholism, and the Alcohol, Drug Abuse, and Mental Health Administration). However, closer interaction and alignment are warranted.

The last suggestion is to include costs that could be considered hidden costs. Although possibly of relatively small magnitude, generally they may be of considerable importance in specific incidences. The deadweight loss of raising revenue for government expenditures and transaction costs or administrative costs of operating government programs are potentially important hidden costs in the case of drugs. Another area of potential hidden costs is the moral hazard of insurance coverage, at least for those who enter treatment programs. However, for those who do not seek treatment, the opposite problem may be more relevant. Assuming that treatment is effective, society would like drug abusers to seek more care to reduce the negative externalities to society (e.g., crime, crack babies, and transmission of AIDS). Another hidden, or at least hard-to-measure, cost would be the associated psychosocial costs of drug abuse. Individuals may be afraid to go out at night, parents may be worried that their children will use drugs, and drug abusers will have extra stress and worry. All these are costs to society.

NOTES

1. The theme of Louise Russell's book *Is Prevention Better Than Cure?* (1986) suggests that one cannot merely invoke the palliative powers of prevention, but rather one must look closely at the costs and benefits to determine if prevention is cost-beneficial. Although the idea of prevention is appealing, it is not necessarily cost-effective.

2. See Rhoads (1985) for a discussion of the importance of marginalism in policy decisions.

3. Grade-of-membership analysis is a statistical method of assigning individuals to groups or types based on characteristics of the individuals. Instead of belonging to only one group (as in cluster analyses), individuals can be assigned on a percentage basis to groups. For instance, an individual could be assigned 80 percent to a polysubstance abuser group and 20 percent to a depressive alcoholic group.

4. This suggested treatment of hospital costs with comorbidities is a different method than others have used to assign medical care costs when comorbidities exist. An alternative is to compare the costs of hospitalization when there is only one disorder to the extra costs when there are two disorders and then to assign the extra cost to the secondary disorder.

5. Diagnosed individuals are a subset of those with symptoms. But diagnoses entail more stringent criteria for inclusion and presumably have more severe associated costs. Use of diagnoses or symptoms should yield

different results, and either could yield bigger magnitudes. Furthermore, the differences could vary by disorder under analyses. Using symptoms as the basis for analyses, more people would be included in the assessment of and affected population, yet the costs per capita would be smaller. Using diagnoses, the population included would be smaller but the costs per person would be greater. See Mullahy and Sindelar (1989) and Rice and colleagues (1990) for use of diagnoses and Harwood and coworkers (1984) for use of symptoms.

6. Private transfers (e.g., transfers within a family) similarly should not be counted as a cost, but private transfer payments do not have associated deadweight losses because they are voluntary transfers and are not caused by a change in price.

7. In the case of a backward bending supply, the individual would work more, but the labor supply elicited still would be suboptimal for the individual.

8. An argument often made is that only the externalities imposed on individuals should be considered in allocating government funds. The private costs should be borne by the individual who chooses to behave in such a way as to incur the costs (such as abusing drugs) and who makes his or her own decisions about the net costs, and such costs should not be considered in the public domain. This approach is taken in Manning and coworkers (1989) to calculate the net costs to society. Several issues arise, however, such as what is the definition of "private" (Does it include family members)? Are these decisions really "rational"? Are individuals knowledgeable about the long-term consequences of some addictions when they start as casual users?

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Economics and Drugs: Promises, Problems, and Prospects

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INTRODUCTION

There are numerous intertwined economic facets of the drug problem: the Federal budget for drug control of $10.5 billion in fiscal year (FY) 1991, with 71 percent allocated for domestic and international efforts to reduce the supply of drugs and 29 percent allocated for treatment, education, and prevention; the recent seizure of 40 metric tons of cocaine worth more than $4 billion on the street; the recent estimate that alcohol and drugs cost the Nation $144 billion in 1988 for health services, criminal justice, losses to crime victims, premature mortality, losses of workplace productivity, and criminal careers; the crimes committed by addicts to pay for their drugs: the employers that sent substance-abusing employees for rehabilitation instead of firing them (their reward was a notice from their health insurance carrier that their premium would be increased by 70 percent); and the parents who cared so much about their drug-using adolescent that they exhausted their health insurance benefits, drained their college fund, and spent their retirement savings in repeated attempts to treat their child's addiction.

All these dimensions of the drug problem involve economics. But it is not clear which of these are useful for policy formulation; in fact, all of them are highly meaningful in the policy arena.

This chapter reviews what is known about some major economic aspects of the drug problem; discusses the nature and problems with studies of the cost to society of substance abuse; examines the potential of economic theory and practice to inform national drug policy decisions: and discusses aspects of the current national drug control policy.

[1]The views expressed in this article are the author's own and do not necessarily reflect the position of the Federal Government or the Office of National Drug Control Policy (ONDCP).

ECONOMIC COSTS

The economic cost of a disease or a social problem is a concept that attempts to summarize many disparate impacts using a single measure-dollars. Money is a useful metric because it allows radically different commodities or services to be compared using the standards of the market economy to set relative values. Is an apple equal to an orange? Is a nurse equal to a policeman? Is alcoholism equal to cancer? Market prices and cost-of-illness studies offer insights into these questions even if they do not provide definitive answers.

Cost-of-illness studies are more and less than meets the eye: More than meets the eye because In the case of diseases or problems such as alcohol and drug abuse a cost estimate attempts to summarize the consequences of problems such as cocaine babies, alcoholic cirrhosis of the liver, alcohol and drug detoxification episodes, motor vehicle crashes due to excessive drinking, alcohol-induced trauma and violence associated with drug trafficking, and alcohol- and other drug-related impairment in the work force. It then tallies the value of hospital, physicians, and other health services; destruction of motor vehicles and other property; lost productive time due to sickness and injury; impaired productivity while on the job: and premature mortality due to alcohol problems. This effort produces a series of cost estimates that can be summed to a single total. It is usually the single total value that is used most frequently when observers refer to the economic impact of drug or alcohol problems and when sight is lost of the disparate impacts of drug problems.

Cost-of-illness studies are less than meets the eye because, by themselves, they never justify actions or policies, Public programs should be justified in the first instance by their effectiveness. Next, do the benefits of undertaking the intervention justify the costs of implementation? Cost-of-illness studies justify giving more attention to the effectiveness of social and private instruments for addressing the disease or social problem and resemble, but indeed are neither cost-benefit or cost-effectiveness studies,

Cost-of-illness studies often are understatements because so much is left unsaid about the intangible effects of drug and alcohol problems, which include lives of addicts, problem drinkers, and innocent victims alike being cut short; problem drinkers and their innocent victims often being left with physical and mental disabilities; families, friends, and strangers being subject to violence perpetrated by substance abusers; and the fear and uncertainty of those living with substance abusers. Pain, suffering, fear, and bereavement are all too real among the households, families, friends, neighbors, and even strangers victimized by substance abusers. These intangible costs are excluded from the majority of cost-of-illness studies, whether for drug or alcohol problems or for

any other health problem. It is debatable whether such costs are any greater or less for drug problems than illnesses such as heart disease or cancer.

COSTS AND BENEFITS

Economic criteria have never been rigorously applied in managing the Nation's drug policy. However, economic arguments without rigorous analytic data frequently 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.

The absence of appropriate cost-benefit and cost-effectiveness studies has meant resorting to national scope studies of the impact of drug abuse on the economy. The various national studies have estimated economic costs at approximately $10 billion from 1973 to 1975 (A.D. Little Corporation 1974; Lemkau et al. 1974; Rufener et al. 1977); $18.4 billion in 1977 (Cruze et al. 1981); 948.9 billion in 1980 (Harwood et al. 1984); and $59.7 billion in 1983 (Harwood et al. 1984). The most recent study has estimated costs of $44.1 billion in 1985 and $58.3 billion in 1988 (Rice et al. 1990). The vast majority of costs before the 1980 estimate were associated with drug-related crime.

The increases in the cost estimates made between 1974 and 1980 primarily were due to increased and improved knowledge about the nature of impacts of drug abuse on society and to differences in estimation methodology. The most fundamental change was due to examining the effect of drug abuse problems on persons employed in the workforce, which accounted for $25.7 billion in the 1980 estimate and $33.3 billion in the 1983 estimate (Harwood et al. 1984), but values of only $1 billion to $2 billion in prior studies.

The strongest conclusion that can be justified from aggregate cost-of-illness studies is that there are large potential benefits to society from reducing the extent of drug problems through enforcement, prevention, or treatment. Whether the interventions are cost-effective or cost-beneficial cannot be judged without rigorous studies of their effectiveness.

Few studies have attempted detailed examinations of the cost-effectiveness or costs and benefits of drug policies. Interestingly, most studies that have examined drug treatment are nearly unanimous in concluding that drug treatment is a worthwhile investment, Some studies have produced astonishingly high benefit-cost ratios of 30 to 1, while others have found benefits roughly equal to costs.

However, the quality of these studies varies enormously (Gerstein and Harwood 1990), and it is apparent in retrospect that the early and most favorable studies depended on assumptions about retention of clients in treatment and the success of treatment that have not stood the test of time. Many studies clearly were too optimistic in their conclusions, yet even the more rigorous and conservative studies produce positive results.

As little cost-benefit information is available on treatment, much less is known about the economic valuation of the benefits of education, prevention, and workplace policies and enforcement on the drug problem. If cost-benefit concepts are to be used to direct Federal policy, then much more must be known about the relative effectiveness of these tactics before their cost-benefit ratios can be compared. The knowledge base for implementing such a planning process currently is being built through aggressive research initiatives,

There have been promising school-based prevention studies such as Project ALERT (Adolescent Learning Experiences in Resistance Training) in California and Oregon (Ellickson and Bell 1990) and project STAR (Students Taught Awareness and Resistance) in Kansas City (Pentz et al. 1989) that seem to yield at least short-term delays in initiation of exploratory drug use. The Federal Government is spending about $1 billion per year on school-based prevention and drug education (Office of National Drug Control Policy 1990). These and future studies will address several sophisticated questions: How many youths will different programs save from lives of addiction or abuse? How many youth will be entirely prevented from having drug problems? and How many will have briefer or less severe problems? Putting a societal value on these effects will be difficult and controversial.

Workplace policies can deter and detect drug abusers, yielding reduced workplace problems and improved productivity. Strategies include explicit policies about drug use, training of supervisors to detect problems, provision of employee assistance programs and insurance coverage for treatment, and drug testing. The Navy has estimated that rehabilitating identified drug users instead of firing them can pay for itself several times over because replacement of highly trained personnel is expensive (Caliber Associates 1989).

Three percent of the Nation's 14 million employers are testing at least some workers (US. Department of Labor 1989). There are various approaches to implementing workplace policies with or without drug testing. Testing may be performed only with job applicants or may be directed at current workers on a random or "cause" basis. Preemployment testing has been found to be successful at detecting drug users among applicants (Gust and Walsh 1989). When the military services started random tests of active military personnel, the

self-reported and testing-detected incidence of drug use declined dramatically (Bray et al. 1989). These impacts are real benefits to the Nation, and further work must be performed to assign economic values to these benefits.

Whatever the state of knowledge of the costs and benefits of prevention, workplace, and treatment programs, probably less is known about these aspects than about the economic valuation of the results of law enforcement efforts. A great deal is known about tangible results of law enforcement such as arrests, persons incarcerated or under community supervision, and seizures of drugs. Police arrested nearly 1.4 million persons on drug charges In 1989 (U.S. Department of Justice 1990), and illicit drugs were seized with street values of billions of dollars. One recent survey of local and State enforcement agencies (Godshaw et al. 1987) estimated that they were spending nearly $4 billion (20 percent of their total budgets) on drug law enforcement alone. The Federal Government was spending almost $4 billion on law enforcement in 1990. The Armed Forces are now engaged in the effort to stop the flow of drugs into the United States, with estimated expenditures of $780 million in 1990. However, at this early date very little is known about the effectiveness of using the military for this purpose (Reuter et al. 1988). With U.S. economic assistance of $400 million in 1990, foreign nations are seizing and destroying large volumes of drugs at the urging of the United States (Office of National Drug Control Policy 1990).

To justify the law enforcement expenditures primarily on economic grounds, numerous questions will be addressed regarding the effectiveness of the many different tactics employed in this fight. These start with near-term productivity measures such as arrests and seizures, but broader, more subtle impacts also must be measured: the general deterrence effects on other users and pushers, the specific deterrence of future behaviors of those caught and punished, and the effect of the severity of punishment.

Ultimately, the economic model should be refined to where it could address sophisticated policy and research questions such as the balance of enforcement between users and pushers of drugs, the levels of the drug distribution systems that should be targeted, how convicted users and pushers should be punished, and how much of an investment should be made in treating their drug problems.

This discussion about alternative policies and their costs and benefits is not merely academic. In fact, ONDCP has initiated a study by the Federal Government to develop and use such a tool to manage the national effort against drugs. To quote the Research Agenda from the *National Drug Control Strategy* (Office of National Drug Control Policy 1990).

> A multi-year research project involving numerous drug reduction agencies and departments will develop the capacity to simulate alternative policy approaches in each area of our National Drug Control Strategy and compare these approaches (and combinations of approaches) in terms of their costs and potential effectiveness. With this knowledge, we can make more precise decisions about the contribution of any set of drug policies and determine which policies best complement one another.

To economists and social policy researchers, this aspect of the national drug strategy is intellectually appealing, even if, realistically, it will take more than a few years to develop and validate this tool.

THE NATIONAL STRATEGY

A national strategy against drugs has three interrelated issues to address: What should be the roles of Federal, State and local governments (and private citizens) in the strategy? What should be the balance of efforts dedicated to domestic law enforcement? Treatment and prevention initiatives, and international supply reduction? and How much should be dedicated to these efforts from the Federal budget. Each is the subject of intense debate, although usually in a different order.

The 1991 *National Drug Control Strategy* calls for the Federal Government to spend $10.5 billion to fight drug problems. The total enacted expenditure for 1991 represents a 66-percent increase over 1989 and a 10-percent increase over 1990, even though Congress has been fighting historically high Federal budget deficits over this period. This is the most rapid rate of growth of any major initiative in the Federal budget over these 2 years.

The Federal effort is dedicated primarily to law enforcement (supply reduction). Enforcement-both domestic and international efforts-is proposed to receive about 71 percent of the total budget allocation in 1991, whereas treatment and prevention (demand reduction) is proposed to receive 29 percent, or $3 billion. The relative shares of the drug control budget are unchanged from 1989 and 1990. Thus, the relative roles of supply and demand reduction efforts have not changed in the past 2 years.

This balance between supply and demand reduction in the Federal budget has generated debate about a “lack of balance” between the two components of the strategy. Balance, when so simplistically used, is taken to mean that roughly equal amounts “should” be spent on supply and demand reduction, respectively. Although this definition may constitute “balance” on a child’s see-saw, it is far from the mark in the economic sense.

By economic or cost-benefit criteria, the optimal balance between supply and demand reduction is achieved when the expenditure of an additional dollar on either alternative yields an equal benefit (in more technical terms, when the ratios of marginal benefit to marginal costs are equal). By economic criteria, there is no more reason for this balance to be reached at a ratio of one to one than at seven to three or three to seven, The optimal balance is determined by how effectively resources can be used in each of the alternatives and the value of those effects. There is no grand synthesis cost-benefit model that has determined the optimal balance between supply and demand reduction. However, as discussed above, there is a commitment on the part of the Federal Government to ensure that funds are allocated rationally and used effectively and to incorporate more cost-effectiveness and cost-benefit analysis into resource allocation decisions.

Demand reduction activities-both treatment and prevention-have vital roles in the national strategy. About $3 are being spent on demand reduction for every $7 spent on supply reduction, and unprecedented amounts are being spent by the Federal Government on demand reduction activities-$3 billion in 1991.

Probably the most controversial element of the National Strategy is the amount of Federal funds dedicated to drug treatment. William J. Bennett, the first Director of ONDCP stated unequivocally in his Introduction to the *National Drug Control Strategy* published in January 1990: “Making sure treatment is available so that people seeking help won’t be turned away is a priority” (Office of National Drug Control Policy 1990). The Federal Government has moved aggressively to address this priority.

Public discussions often ignore the final issue of this section-the respective roles of the Federal, State, and local governments and private individuals in financing various drug control activities-and assume that the Federal Government should take “leadership” in paying for drug interventions, Public, as opposed to private, financing of most drug control initiatives clearly is warranted because there are “externality” effects or multiperson spillover effects of drug problems and therefore from drug control.

In an economic sense there are several rationales for financing drug control activities from the Federal level, as opposed to State and local governments, or even from individuals. Primary Federal responsibilities would include activities of national or multistate impact (essentially an externality argument) and programs to redistribute national wealth.

National impact drug control activities comprise (among others) supply reduction efforts at the international and “high levels” of the distribution system,

where individuals in many States and localities are likely to benefit from the activity, however localized. By this theory, the lower down the drug distribution system that a particular enforcement effort is directed, the less rationale there is for Federal financing. Similarly, the whole Nation benefits from research into treatment, prevention, and law enforcement strategies.

Treatment and prevention services primarily benefit the individual recipient in the first instance; however, there are also benefits that spill over into local communities and then Into other areas due to the mobility of drug abusers. In theory, financing for treatment and prevention should be shared between the individual and Federal, State, and local governments.

Redistribution programs redirect national income or resources to or from areas most afflicted by drugs and from areas making large Federal tax contributions relative to the extent of their drug problem. The redistribution effects from the Federal financing of various drug control programs are most obvious when funding allocation formulas are written into laws such as the Federal Block Grants for law enforcement, education, and substance abuse services.

A clear policy statement in the *National Drug Control Strategy* recognizes

> the crucial role that State and local governments have to play. Drugs have placed an unprecedented burden on their schools, hospitals, criminal justice systems, and above all, their residents. These problems are chiefly a State and local responsibility, augmented in certain areas by Federal funds. For fiscal year 1991 nearly $2.8 billion will be sent to the states for law enforcement, treatment, and drug prevention activities (Office of National Drug Control Policy 1990).

The Federal-State partnership in financing drug control services is perhaps most explicit in the Medicaid program, arguably the least appreciated and utilized Federal resource for addressing the need for increased and improved treatment services. Medicaid has an explicit Federal-State matching formula for selected health care services. The Federal match is about one to one for relatively high-income States and up to three to one for low-income States. This joint Federal-State public health insurance program for low-income populations is an important avenue for increasing access to quality treatment for select populations such as low-income women, newborns, and adolescents.

Under Medicaid, States have great discretion within Federal guidelines in deciding who will be eligible for Medicaid and what services will be reimbursable by Medicaid. In the publicly subsidized treatment system, nearly 50 percent of

clients in 1988 were women or adolescent males. An appreciable proportion of these might already meet State-established Medicaid eligibility standards that would qualify them to have their drug treatment wholly or partially reimbursed by Medicaid.

Equally important, virtually all types of drug treatment services in most kinds of facilities may be covered by States based on existing Federal Medicaid statutes. The notable exception is for psychiatric hospitals or distinct units of residential facilities larger than 15 beds for adults ages 22 to 64 years. Virtually all other types of services can be paid for by Medicaid if States elect to do so. In fact, several States do make significant use of Medicaid for reimbursement of drug treatment services.

CONCLUSION

Economics provides invaluable insights into the current drug problem. Economics and the money metric make it possible in some sense to add together or summarize many of the disparate negative consequences of drug and alcohol problems. It fails to do justice to many of the more poignant aspects of drug and alcohol problems.

There are economic theories that can inform decisions such as how much to dedicate to drug control, how to allocate funds, and how much should be contributed by various levels of government as well as individuals. The concepts certainly are acknowledged in the *National Drug Control Strategy,* and cost-benefit analysis has been proposed as a grand synthesis tool for policy analysis and formulation. Cost-benefit analysis would be ideal to use in shaping a national strategy that includes as many different tactical and strategic options as does the drug problem. We now have modest knowledge about the economic value of major parts of the system we use to fight drugs. The current national strategy has set the goal of rigorously assessing the effectiveness of the menu of tactics to improve the cost-effectiveness of the national effort,

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Evaluating the Cost-Effectiveness of Drug Abuse Treatment Services

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Are today's drug abuse treatment programs cost-effective? What can be done to increase the cost-effectiveness of drug abuse treatment? The need to answer these questions is becoming more critical as calls for additional treatment capacity confront scarce resources and as some individuals advocate placing greater emphasis on treatment as a major solution to the Nation's drug problem.

EXAMPLES OF DRUG TREATMENT THAT ARE PROBABLY NOT COST-EFFECTIVE

At present, there are several reasons to question whether drug abuse treatment, in general, is cost-effective. There is some evidence that once drug abusers choose to stop or moderate their drug use, they do so whether or not treatment is available. Brown and colleagues (1988) report large declines in drug use among individuals waiting 1 to 6 months to enter a residential treatment center for cocaine abuse. Similarly, Cohen and colleagues (1889) report that smokers trying to quit on their own have roughly the same rate of success as smokers attending treatment programs. Providing treatment for drug abusers who can quit as easily on their own as they can with treatment is not cost-effective.

Other evidence raises questions about the cost-effectiveness of typical (as opposed to model) drug abuse programs. For example, Shikles (1889) found that 15 methadone maintenance programs surveyed in 5 States for the General Accounting Office (1) failed to eliminate clients' opiate use, (2) reported high levels of alcohol abuse among clients, (3) offered few comprehensive services to clients, and (4) did not know if clients utilized services to which they were referred. High levels of alcohol use among clients in narcotics programs are not new. For instance, Simpson and Sells (1983) and Lehman and coworkers (1980) showed that many clients in the Drug Abuse Reporting Program increased their use of alcohol and marijuana while reducing their use of opiates. Treatment that results in the substitution of alcohol abuse for opiate abuse is

hardly cost-effective. Furthermore, some investigators contend that alcohol abuse is a greater obstacle to rehabilitation than the abuse of opiates (Riordan et al. 1976).

Certain common treatment strategies are known to be cost-ineffective. For example, many methadone maintenance programs administer doses of methadone that are too small to eliminate successfully clients' desire for opiates (unpublished National Institute on Drug Abuse report). Similarly, numerous programs provide costly inpatient treatment to clients even though there is no evidence that inpatient treatment is more effective than relatively inexpensive outpatient treatment. In fact, alcoholism research shows that outpatient treatment is as effective for most clients as inpatient treatment (Miller and Hester 1986; Hayashida et al. 1989).

Finally, research by McGlothlin and Anglin (1981) raises questions about the cost-effectiveness of long-term drug abuse treatment when clients are kept in treatment longer than necessary. More than 25 percent of the clients in a methadone maintenance program reported that their involuntary discharge, resulting from the program's forced closing, helped them stop using methadone and end their dependence on narcotics.

COST-EFFECTIVE DEVELOPMENTS IN DRUG ABUSE TREATMENT

Several promising developments in the drug field could increase markedly the cost-effectiveness of drug abuse treatment. Perhaps the most dramatic is the possibility of slowing the spread of acquired immunodeficiency syndrome by reducing intravenous (IV) drug use and needle sharing. Ball and coworkers (1998), for example, studied methadone programs in 3 cities and found that 71 percent of the patients who remained in treatment 1 year or more ceased IV drug use, while 82 percent of those who left treatment quickly renewed IV drug use. Similarly, McAuliffe (personal communication, 1990) reports preliminary results showing large reductions in the incidence of human immunodeficiency virus among drug users in a community-wide, comprehensive treatment program.

There are other positive developments. For instance, McLellan and colleagues (1983) demonstrated that effective matching of clients to treatment can improve outcomes, McAuliffe and coworkers (1985) showed that successfully treated opiate addicts who received aftercare had better 12-month followup outcomes than clients who were not offered aftercare. Wider utilization of these two strategies alone, patient matching and the provision of aftercare, might improve significantly the cost-effectiveness of drug abuse treatment.

Finally, Anglin and Hser (1990) explored the potential impact of significantly expanding treatment programs for incarcerated drug abusers. Prison drug programs have access to large numbers of drug users, and they can require drug users to participate in treatment. Anglin and Hser responded to concerns about the value of coerced treatment in two ways: They noted that clients in many existing drug programs are there only because of threats of fines and imprisonment, and they presented examples in which involuntary drug abuse treatment produced results similar to those from voluntary treatment.

ABSENCE OF RIGOROUS COST-EFFECTIVENESS STUDIES

Unfortunately, estimates of the current and future cost-effectiveness of drug abuse treatment are highly speculative-no rigorous cost-effectiveness analysis of drug abuse treatment has been conducted. In fact, only a few studies even have addressed the issue of the cost-effectiveness of drug abuse treatment (Apsler and Harding 1991; Hubbard et al. 1989).

The most ambitious effort to assess the cost-effectiveness of drug abuse treatment was conducted by Hubbard and colleagues (1989), who analyzed the costs and crime-reducing effects of 41 drug abuse programs. Unfortunately, their claim that the programs were cost-effective is clouded by several factors: (1) No control groups of untreated drug abusers were included in the design; (2) the validity of the results depends heavily on unverified self-reports of illicit drug use and criminal behavior; and (3) key measures of impact, such as costs to victims, criminal justice system costs, and lost productivity costs, were estimated from national surveys-measurements were not made of the actual costs attributed to clients.

Reasons for the Absence of Cost-Effectiveness Studies

There are many reasons for the surprising lack of cost-effectiveness studies of drug abuse treatment. Recently, Apsler and Harding (1991) discussed the following explanations.

Conceptual Problems. Numerous conceptual problems exist due to the absence of satisfactory definitions for key terms such as “drug abuse,” “dependence,” and “addiction.”

DIsagreement About Treatment Goals. Strongly held beliefs about treatment goals divide the treatment community. At one extreme Is a focus on abstinence, while at the other is the belief that drug abuse is only one aspect of a constellation of problems that must be dealt with to improve an individuals’ overall functioning and reduce drug use.

Disagreement About Outcomes. The problem of selecting outcome measures is integrally related to questions about treatment goals. Is it enough to measure drug abuse? Or should abuse of all substances be examined? Which other areas, if any, of the client's functioning should be measured, such as interpersonal relations, job performance, illegal activities, and physical and mental health?

How Long Should Treatment Last? One of the least discussed variables in the treatment outcome literature is length of treatment. Often the time spent in treatment is employed as a dependent measure, such that the more time spent in treatment, the higher the outcome score. However, at some point, spending additional time in treatment might be unproductive for clients and might even become counterproductive if continued too long.

Variability Among Treatment Programs. In addition to the major differences among the few basic types of programs, there is extensive variability among programs espousing the same model. For example, methadone programs differ in the size of methadone dose, in whether methadone can be taken home, in the provision of ancillary services, and in the degree to which program regulations are enforced. This variability severely limits the generalizations that can be drawn from research conducted on only a few programs.

High Dropout Rates. The high dropout rates typical of many drug abuse treatment programs pose another set of interpretation problems for researchers. For example, which clients should be counted as having been treated? If only those who remain in treatment for several months are counted, positive outcomes could be an artifact of a self-selection process. Perhaps only those clients who would have improved even without treatment stay several months. On the other hand, if all clients who enter a particular program are counted, then the program is penalized unfairly for being unable to help clients who received only a minimal exposure to treatment.

Reliance on Self-Reports. Finally, a host of technical problems continues to plague efforts to conduct cost-effectiveness analyses of drug abuse treatment. The most troublesome is the difficulty of obtaining objective measures of outcomes. The field continues to depend almost entirely on clients' self-reports. Even worse, clients typically are asked to report the details of events that occurred many months and even many years ago. Respondents' cooperation can be increased by using known and trusted interviewers, and their recall can be stimulated by referring to memorable events in their lives. Nevertheless, investigators typically have no way of measuring drug users' level of cooperation, and they cannot detect unintentional forgetting and distortion. Unfortunately, occasional descriptions of underreporting (Harrell 1985) and

overreporting (Aiken 1986) seriously undermine the conclusions of studies based entirely on self-reports.

CONDITIONS CONDUCIVE TO COST-EFFECTIVENESS RESEARCH

Several interrelated developments need to occur for rigorous cost-effectiveness analyses of drug abuse treatment to be conducted. Funding agencies must play multiple, key roles, and researchers must solve critical conceptual and technical problems.

The Role of Funding Agencies

Funding agencies must provide broad and strong support if cost-effectiveness studies of drug abuse treatment are to be initiated.

Long Project Periods. As in most treatment outcome research, sufficient time must be provided to collect followup measures after clients leave treatment. Posttreatment followup is especially important for cost-effectiveness research, because most outcome research shows that treatment works only as long as clients remain in treatment-those who leave treatment quickly relapse. Nevertheless, it long has been known that some drug users "mature" out of their abuse of drugs (Anglin et al. 1986; Wineck 1962). Also, work on relapse prevention (McAuliffe et al. 1985) suggests that there may be alternatives to unending treatment. Cost-effectiveness studies must monitor closely clients who are terminated from treatment to learn if time-limited treatment is a cost-effective alternative to unlimited treatment.

Objectlve Outcome Measures. Funding agencies also must support the high cost of incorporating objective outcome measures in cost-effectiveness research. Self-report measures dominate the treatment outcome literature because they are so much less expensive than the alternatives. Yet, in the face of continuing challenges to their validity, self-reports are a short-sighted economy. Even the most elegant study is unlikely to have a powerful impact as long as its conclusions depend on the unsubstantiated claims of former drug addicts involving illicit drug use and other illegal activities.

Unfortunately, satisfactory alternatives to self-reports are expensive and difficult, especially when the measures are collected at regular and relatively frequent intervals. For instance, the impact of drug abuse treatment on illicit drug use by clients who leave treatment should be measured by obtaining and testing bodily specimens, such as urine and blood, every few months. The cost of tracking clients every few months and obtaining valid bodily specimens will be considerable. Yet there appears to be no alternative to obtaining convincing

evidence of clients' drug use following treatment. If the results of testing bodily specimens confirm the results of self-reports, then future research can reduce the collection of bodily specimens, reserving them for occasional verification checks.

Funding agencies also should support the cost of obtaining and checking institutional records necessary for validating many aspects of client functioning. Employment, educational, criminal justice system, health, and mental health records all can play an important role in creating a profile of client functioning that is much more convincing than one that relies entirely on client interviews.

Funding agencies also need to support the use of participant observers and collateral contacts. Given the limitations of institutional records and that many client actions, such as criminal behavior, often go undetected by institutions, investigators must obtain information from people who know the clients well. If detailed reports about subjects' behaviors from several individuals are consistent, then the reports are likely to be valid. Once again, the cost and effort of developing participant observers and/or collateral contacts are high.

Cooperation of Treatment Programs. A different avenue of essential funding agency support is the need to "encourage" drug programs to cooperate fully in cost-effectiveness research. Without the full cooperation of drug programs, it will be difficult, and perhaps impossible, to conduct cost-effectiveness studies. Some service providers have little interest in research, and some actively resist research. Drug abuse programs must open themselves to the scrutiny of researchers for cost-effectiveness research to succeed. Researchers must have the opportunity to determine what takes place in the program, as opposed to what was planned or desired. They need to describe the nature of clients' interactions with the program to make progress in identifying the factors that are associated with client improvement. In adaition, programs must open their financial books so that investigators can make a complete accounting of the costs of operating the program.

Large Samples of Treatment Programs. Another costly aspect of conducting cost-effectiveness analyses of drug abuse treatment is the need to study many programs. As described above, the lack of uniformity among treatment programs translates into a requirement for drawing relatively large samples of programs to ensure that the results of the study are representative and not restricted to a few, unique programs. This latter point raises again the distinction made earlier between model and typical drug abuse treatment programs. Model programs may score high on effectiveness, although usually at great cost, whereas less costly, typical programs are likely to have a much more modest impact. It may make sense to begin with model programs to

maximize the chances of obtaining positive client outcomes, even though the costs might be high. Then, attention can turn to less costly programs in the search for ways to maximize the cost-effectiveness of drug abuse treatment.

Until evidence shows otherwise, there seems to be no point in studying programs with high dropout rates. As mentioned above, research has shown that clients must remain in a program for at least several months to be affected positively by the program; therefore, programs that devote substantial portions of their resources to clients that quickly drop out have so little chance of proving to be cost-effective that they do not warrant study at this time. Of course, future research might show that the impact on drug abusers of multiple, brief encounters with treatment programs is cumulative and beneficial.

The Role of Investigators

For progress to occur In conducting cost-effectiveness studies of drug abuse treatment, investigators must, at a minimum, (1) establish working definitions of treatment goals, (2) derive appropriate outcome measures from the treatment goals, (3) work with programs to implement experimental designs that are acceptable, practical, and still rigorous, and (4) develop a comprehensive set of objective measures for assessing outcomes,

Although definitive solutions to these problems are unlikely in the near future, interim or "working" solutions are needed to enable research to begin. As with any new area of research, cost-effectiveness analyses of drug abuse treatment must pass through a learning period during which many details and problems of conducting the research must be addressed. This time-consuming phase can proceed while work on the conceptual problems continues.

Multiple Models of Drug Abuse. Investigators must confront incompatible views about the goals of drug abuse treatment that result from multiple models of drug abuse (Anglin and Hser 1990). Ideally, a working consensus should be forged among the many constituencies that have a stake in drug abuse treatment. However, it would be naive to count on an early resolution to some of the controversies, such as the abstinence vs. "responsible use" debate. The most likely solution is that investigators will have to incorporate within their designs multiple treatment goals representing all major points of view. Then, at the analysis stage the data can be analyzed separately for each set of treatment goals.

By incorporating a broad range of treatment goals in their designs, investigators would simplify the problem of selecting outcome measures-they would have to include an equally broad range of dependent measures. Such an approach is

necessary until consensus about what should be measured is reached. Otherwise, if researchers pick measures representing only one treatment philosophy, they risk the criticism from adherents of other points of view that the results would have been different if only the correct variables had been studied.

Multiple Outcome Measures. Researchers also must solve one of the unpleasant side effects of using multiple outcome measures-namely, how to combine the results from different measures. One example of this problem was mentioned previously. Outcome measures employed by narcotics programs have shown that some clients increase their use of alcohol at the same time that they reduce their use of opiates. How then does one judge the effectiveness of these programs? The difficulties are even greater when it becomes necessary to combine measures of different areas of functioning, such as substance use, emotional well-being, and criminality.

Objective Measures of Outcomes. Major conceptual and technical advances are necessary in developing objective measures of outcome variables. For example, strategies must be developed for obtaining valid specimens from subjects at regular intervals. Methods for working with collaterals and participant observers must be studied and integrated into cost-effectiveness research. In addition, techniques must be developed for integrating data once it is collected from institutional records, participant observers, collaterals, and self-reports.

CONCLUSION

Assessing the cost-effectiveness of drug abuse treatment is a massive undertaking. The conceptual issues are complex, and the technical solutions will be expensive. Nevertheless, the key ingredient for progress is a commitment to undertaking cost-effectiveness research. The main problem is that of neglect. Once a commitment is made to assessing the cost-effectiveness of drug abuse treatment, progress is likely to be rapid.

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Cost-Effectiveness of Drug Abuse Treatment: Relevant Issues and Alternative Longitudinal Modeling Approaches

Yih-Ing Hser and M. Douglas Anglin

INTRODUCTION

A comprehensive literature review on the effectiveness of drug abuse treatment (Anglin and Hser 1990a) concluded that, although many evaluation studies are Individually limited by methodological considerations, when taken together, their findings consistently support the general effectiveness of treatment. A corollary, and critical, public policy question is whether resources devoted to treatment yield benefits in excess of treatment costs in the short and long terms. Further questions concern the comparative assessment of treatment programs, modalities, and components that are most cost-effective. A more general concern at the highest policy level is whether the treatment system overall has met the diverse personal needs of drug-abusing individuals and whether it effectively reduces social costs in short- and long-term perspectives, and if not, how the system can be improved to achieve an optimal return for society's investment.

Only limited studies analyzing the cost-effectiveness or the cost-benefits of drug treatment have been conducted. Of these studies, most have used conventional methodologies that typically focus on the inclusion and categorization of various costs of drug abuse that are attenuated by treatment. Although inclusion of relevant sources of costs and assignment of appropriate monetary values to such cost categories are important decisions and often involve sophisticated philosophical considerations, calculation methods are usually simple arithmetic. Although they provide important information, such approaches only provide static descriptions within limited timeframes. Overlooked are cost-effectiveness analyses that consider the time dynamic aspects of the phenomena so as to allow prediction of the future course of alternative policy plans. The major focus of this chapter is exploring the

applicability of several potential methods for longitudinal cost-effectiveness analysis that may contribute to a better policy decision process.

Common procedures in conducting cost-benefit analysis include defining relevant concepts, identifying cost-benefit categories, and determining associated monetary values for the identified program modality and outcome measures. We maintain that the time dynamic nature of the treatment system has to be incorporated if projection to the future is desired. Therefore, new methods are needed to extend conventional methods and allow several levels of analytic units (i.e., treatment system, modality, program, or individual addicts) to be examined from a longitudinal perspective. This chapter is organized in the following manner: The next section defines several key terms, describes in detail the conceptual framework, and discusses some relevant issues in longitudinal cost-benefit analysis. We then illustrate exemplary conventional approaches to cost-benefit analysis and present several innovative statistical methodologies to illustrate how these methods can be applied to answer some relevant cost-benefit policy questions. Next, we suggest several future research directions and end with our conclusions.

DEFINITIONAL AND CONCEPTUAL FRAMEWORK

Definitions

Cost-effectiveness and cost-benefit analysis of drug treatment programs provide information necessary for policy decisions. These analyses often are used to determine program efficiency or whether resources devoted to programs yield benefits in excess of their cost. However, the idea of overall treatment system efficacy must be considered as a separate concept to emphasize the flow of population (both treated and untreated individuals) to reflect a holistic view of system efficiency in reaching, retaining, and intervening in the behaviors of these treatment-in-need individuals. We define these terms as follows.

Treatment effectiveness is defined as the reduction of adverse behaviors and consequences of drug abuse as well as the increase in desired positive behaviors, regardless of cost.

Cost-effectiveness and cost-benefit are comparisons between treatment benefits and the associated costs to determine if resources expended for the treatment modality, program, or component are warranted. Cost-effectiveness analysis evaluates these intervention units by some outcomes that are not necessarily expressed In monetary values (e.g., moral hazard, safe communities). When effectiveness can be quantified and expressed in dollars,

such intervention benefits can be used for cost-benefit analysis. Because some interventions may be costly relative to the benefits received, not all effective programs are efficient. A program is efficient only if the benefits exceed the costs. This concept is usually applied to single programs or modalities but also can be applied to multiple programs or modalities for comparison purposes.

Treatment system efficacy is an extension of cost-benefit methodology to an aggregate system level, taking into consideration the number of people served and duration times in treatment for those processed by the treatment system, while also considering the necessity to meet diverse needs of individual abusers. In addition, from a system's view, to meet the diverse needs of individual addicts, and in the absence of better alternatives, some programs or modalities will have to be maintained even if they individually may not be evaluated as efficient. Efficacy is determined not only by clinically successful matching between clients and treatment but also by management morale, physical layout of program, and policies and protocols that meet client needs. Efficacy also may involve analyzing the aggregate benefits of bringing, by various means (e.g., legal coercion), increasing fractions of untreated or unserved populations into treatment as well as how the level of overall treatment system effectiveness can be improved with better and more efficiently delivered services.

A Conceptual Framework

As trained and experienced evaluators/methodologists, we feel our contribution to improving cost-benefit analysis is best built on our evaluation knowledge and experiences. As opposed to other types of training and approaches, the tasks of cost-benefit analysis are essentially converting evaluation results into dollar amounts. Thus, our conceptual framework for cost-benefit analysis parallels that for treatment evaluation discussed In our review paper (Anglin and Hser 1990a) and extends to cost-benefit analysis by calculating associated cost-benefit values in a relatively straightforward way.

A comprehensive cost-effectiveness and cost-benefit analysis requires attendance to a framework of the following three dimensions: analysis units, timeframes, and categories of cost-benefit measures. These elements are described below.

Analysis Units. System, program modality, and individual addiction career comprise the various levels or analysis units for which cost-benefits can be assessed. Analyses addressing each level's effectiveness are essential because each provides information necessary for different types of policy decisions. Cost-benefit analysis for system or program modality usually is

based on a selected unit of time (e.g., year) or unit of service, and such analyses are applicable to questions dealing with the production, delivery, and financing of services. Measures of individual career refer to the cost-benefits of treatment over a person's lifetime and are important for answering questions dealing with meeting the needs of a specific population as well as the long-term social and personal return from resources applied to treatment.

System. Treatment system processes and functions involve assessing, assigning, and "mixing" treatment modalities, programs, and components for those individuals who need treatment intervention. Figure 1 illustrates potential flows of drug users through different pathways of the system. An efficient system should be able to meet the various needs of clients and achieve optimal distribution of individuals, services, and programs and maximal return on dollars invested. System efficacy also should consider failure to detect and intervene with untreated drug-dependent persons or to provide sufficiently intense treatment of sufficient duration to achieve change. That is, in addition to specific cost-benefits obtained for those served, the system also should consider diverse needs of those avoiding treatment and make intervention resources available to reach them until the demonstrated point of diminishing returns for the social resources Invested. Improvements introduced or other actions, either taken by society or possibly taken to elevate the treatment system to a more cost-effective functioning level, also should be considered. A successful treatment system should operate with an adequate "dispersal" of available resources across components, with interconnection among its various elements and a rational "flow" of clients through the system until a "criteria" level of behavioral control is achieved and maintained so that clients may choose or be allowed to exit the system. However, an efficient system depends on efficient components that make up the system.

Program Modality. In practice, demonstrated cost-effectiveness of a specific program or modality is often a critical consideration for justifying its existence and for obtaining public support. Comparative effectiveness is also Important when allocation choices need to be made among alternative programs. Within one treatment modality, there can be significant variation among different programs, and such variations should be considered in the cost-effectiveness analysis. For example, one significant variation among program modalities is the length of a planned treatment episode. Therefore, in comparing program modalities we need to consider not only the effectiveness shown by outcome measures but also the number of people served per unit resources. Figure 2 illustrates treatment retention and other outcome variables using survival time analysis to compare three Southern California counties' multiple-site methadone maintenance programs. The operating costs for these three programs were approximately equal, but the observed differences in outcomes are all statistically significant (Anglin and Fisher 1987; Fisher and Anglin 1987).

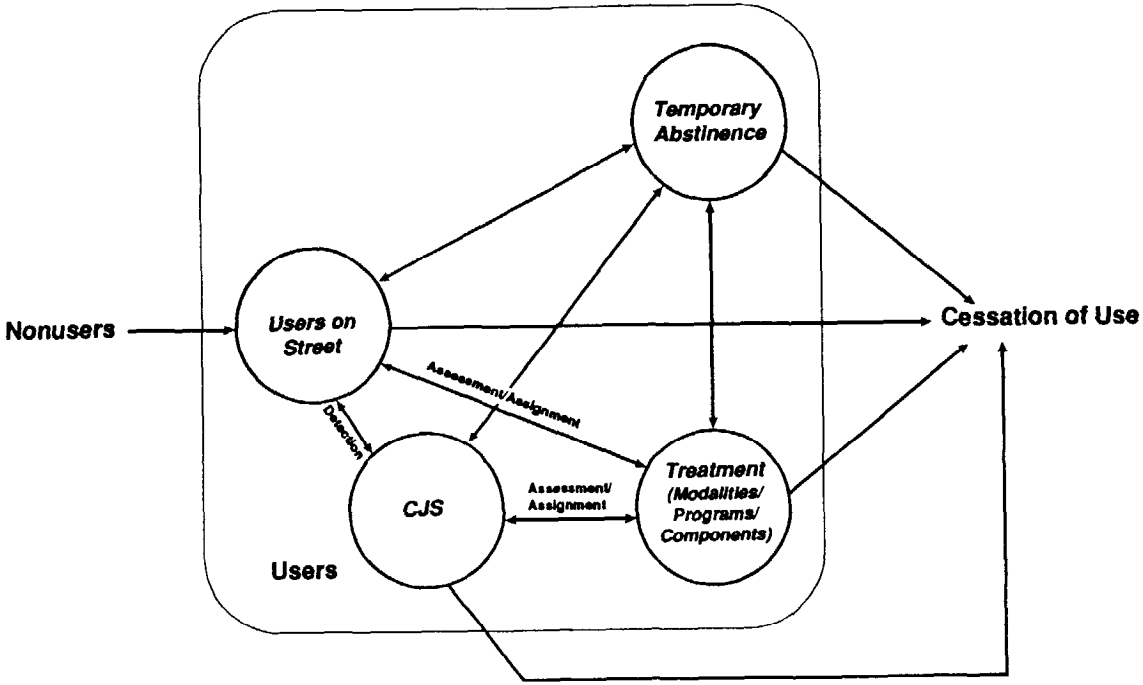

FIGURE 1. *Systematic view of user flow*

FIGURE 2. *Differential program outcomes*

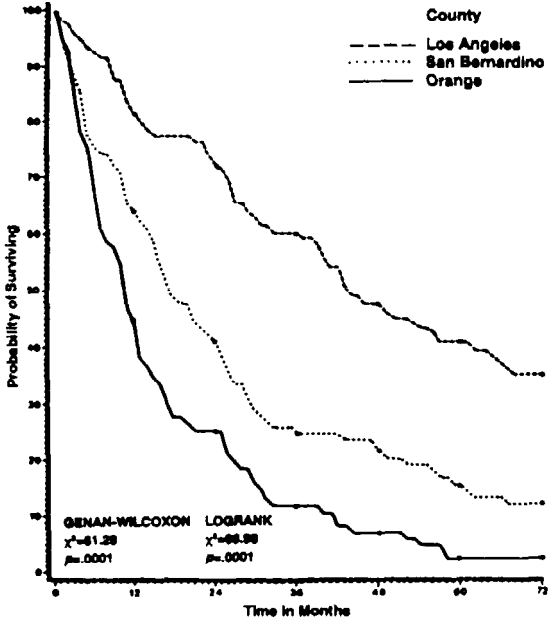

FIGURE 2a. *Survival curves of time to discharge (conditional sample)*

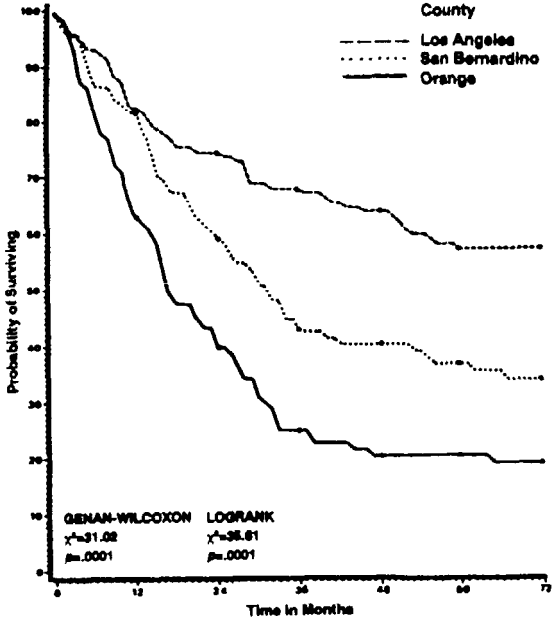

FIGURE 2b. *Survival curves of time to incarceration (conditional sample)*

FIGURE 2. *Differential program outcomes (continued)*

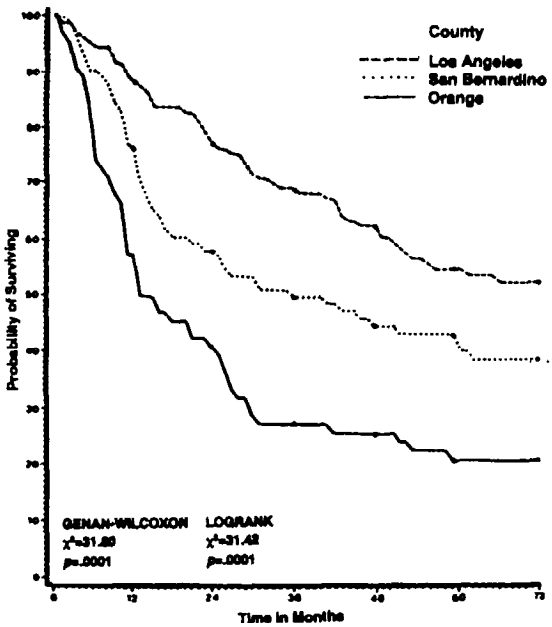

FIGURE 2c. *Survival curves of time to readdiction (conditional sample)*

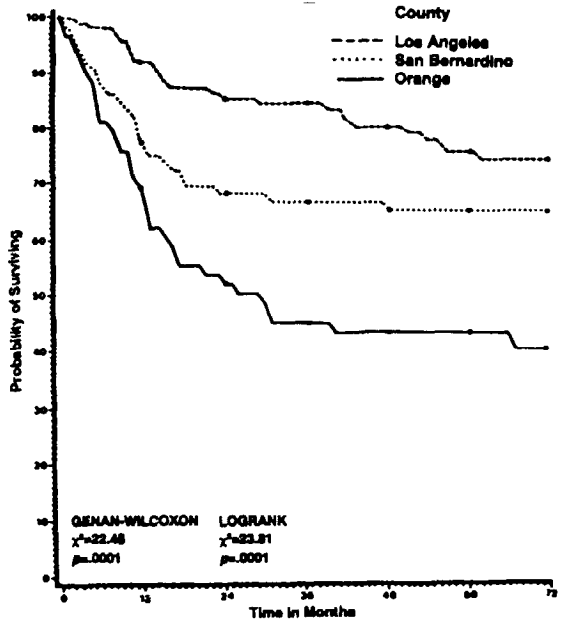

FIGURE 2d. *Survival curves of time to commission of crime (conditional sample)*

Individual Addiction Career. *Once* drug dependence is developed, drug use tends to persist with intermittent abstinent periods and frequent relapses, a process often characterized as an addiction career. For some people, treatment may have rehabilitative effects so that treatment benefits last beyond time in treatment, whereas for others, amelioration of adverse behaviors occurs only when receiving treatment. Recycling through new or repeated treatment episodes is a common pattern and may be necessary for some clients to accumulate significant treatment effects, These 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 et al. 1988).

Figure 3 illustrates how cost-benefit analysis can be accomplished within this perspective. Time-related costs imposed on society by an untreated drug user are shown by the height of the top line. It is assumed that as users "naturally" recover annual costs diminish over time (although at slower rates than treatment-accelerated recovery) and eventually vanish at the point of "maturing out," which occurs at the end of the addiction career. Lifetime costs are indicated by the area under the curve. The treatment profile indicates that during treatment social costs are positive but lower than without treatment. Although treatment may not be 100 percent successful at curbing drug use and the associated social costs, it can achieve a substantial savings.

After treatment, costs rise as relapse and other negative behaviors occur, but costs typically do not attain the level they would have without intervention. The gross gains from treatment are measured by the difference between the total lifetime social costs of an untreated drug user less those costs for one who is treated. The costs of treatment are indicated by the area of the shaded rectangle, and the net benefit from treatment is equal to the gross gains less the treatment program expense.

The profile depicted in figure 3 is meant to be conceptual only and needs to be examined empirically. Furthermore, this type of perspective allows a framework for differential cost-benefit assessments that are associated with individual addict characteristics (e.g., women of childbearing age), when such characteristics need to be taken into consideration. Thus, for the unit of interest in the cost-benefit analysis, a "family" of profiles characterizing different addict groups may best represent the efficacy of a particular intervention.

Cross-Sectional and Longitudinal Timeframes. Cross-sectional and longitudinal analysis provide useful cost-benefit information. Cross-sectional data are usually easier and cheaper to obtain, are more likely to be comprehensive, and have adequate quality control. Longitudinal analysis is

necessary because the treatment system and addiction career both require time-related changes to be considered. Considerable evaluation research has demonstrated that treatment benefits last beyond the time spent in treatment (Anglin and Hser 1990a). Such posttreatment performance measures are important indications of treatment effectiveness and should be incorporated in long-term, cost-benefit considerations. In addition, especially in the area of policy planning, being able to project to the future is an important feature that may be obtainable only by examining longitudinal trends.

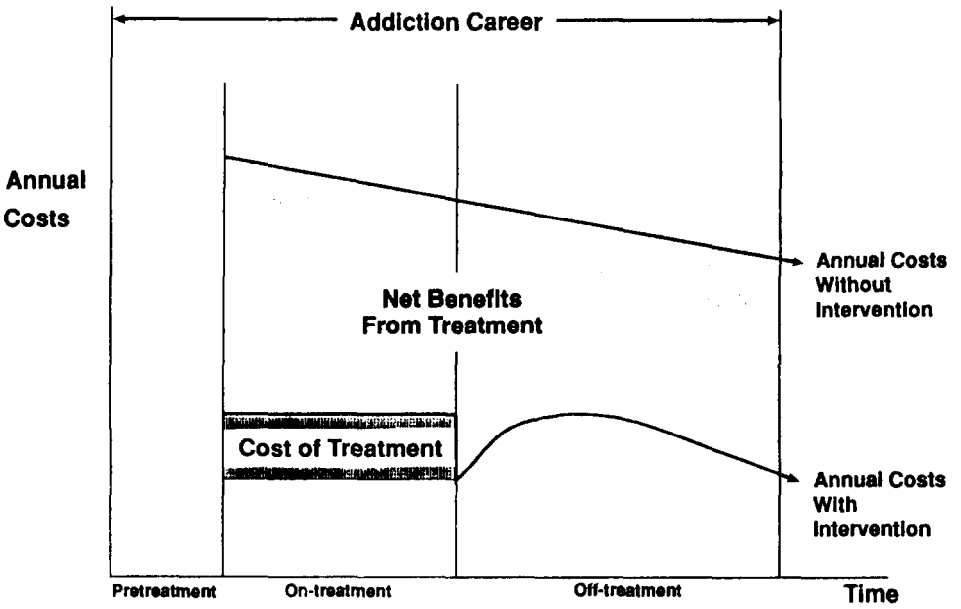

FIGURE 3. *Addiction career perspective*

Categories of Cost and Benefit Measures. Analogous to evaluation research, variations in study design, sample representativeness, and outcome measures often lead to inconsistent estimates of treatment effectiveness. These considerations also apply to cost-benefit analysis, even though the prominent considerations of most studies primarily have been determining the categories of cost and benefit measures that should be considered and the magnitude of associated costs.

Treatment Benefits. The simplest treatment goal traditionally has been abstinence. From a public policy perspective, however, drug abuse reduction is associated with a variety of other treatment goals directed to social problems such as crime reduction, prison management, and the spread of acquired immunodeficiency syndrome (AIDS). In our review article (Anglin and Hser 1990a) we argued that in examining the effectiveness of treatment, evaluations should employ outcome measures that encompass a variety of behaviors. Several specific outcome categories are important: cessation or decreased use of the primary drug of dependence and other drugs; decreased levels of illegal activities such as drug trafficking, property crime, or prostitution; increased employment and decreased reliance on social service agencies; improved social and family functioning; improved psychological functioning; and decreased mortality and improved physical health. Additional criteria might need to be considered when targeting different levels of analysis units within the treatment system. For example, some treatment modalities, such as detoxification, are not considered effective in achieving the above goals on any long-term basis. However, from a system's point of view, such programs are necessary to control drug withdrawal symptoms temporarily and perhaps as an opportunity to engage clients in other modalities for long-term rehabilitation. Finally, for a truly effective system, some components (e.g., programs) may never be cost-effective. For example, programs for the dually diagnosed may need to provide lifetime services at considerable investment for some clients, but alternatives (mental hospitals or prisons) are too costly.

Most cost-benefit analyses have considered these multiple categories by translating these behaviors into economic cost terms. Implicit in this approach is that cost-benefit analysis considers the overall effectiveness of treatment for those served and applies cost factors as "weights" that "revalue" effectiveness in terms of social "return on investment."

Detailed categories of drug abuse costs attenuated by treatment may include reduced medical expenditures on drug-related illness; increased school or labor productivity; reduced amounts of property stolen by drug abusers to support their habits; reduced private costs of crime-prevention measures to deter and detect such thefts (e.g., alarms, locks, security services, etc.); reduced anxiety and fears stemming from the possibility of victimization; reduced levels of abuse and other emotional and physical harm imposed on the children, parents, and spouses of drug abusers; reduced public expenditures for police, courts, and corrections to detect and process drug violations and property crimes committed by drug users; reduced public expenditures to treat drug-related illness, including overdoses, hepatitis, and AIDS; reduced welfare payments made to drug users and their families; and reduced loss of tax revenues because of lower productivity and reduced labor-market participation by drug

users. The reduction in these costs constitutes a large measure of the benefit of drug abuse treatment and other intervention programs and provides the rationale for their support by public funds (Anglin and Hser 1990b). For example, Harwood and colleagues (1984) estimated the economic cost to society of drug abuse in 1983 to be close to $57 billion. A substantial part of the total cost was attributed to crime and reduced productivity. A later study reported that the annual cost of illicit drugs to American society has risen to $58.3 million in 1988 (Rice et al., this volume, p. 22). Increased medical costs for crack addicts and their infants and drug-related AIDS cases seem to be causing a significant portion of the rising expense.

However, some major costs of drug abuse are almost impossible to quantify. For example, it is difficult to place a dollar value on the benefit to society of reducing the public fear of being victimized by drug users who have turned to robbery and burglary to finance their dependence. Consequently, only those costs that can be quantified are estimated, and the resulting estimates conservatively understate the true costs associated with treatment effectiveness.

Treatment Program Cost. In measuring the costs of a specific treatment program, the appropriate perspective considers the higher of (1) the monetary expenses of the program and (2) the value of these resources for the next best use, for example, what the benefits would have been in using the resources in an alternative type of drug treatment program. This latter perspective represents the opportunity cost of the investment. For a program to be comparatively efficient, resources that it utilizes should not be able to be better employed elsewhere.

In practice, measuring opportunity costs is rarely attempted. It requires not only an examination of the program's effectiveness but also an examination of the effectiveness of all other programs with which it competes for resources. Consequently, monetary costs are examined instead. Treatment costs vary across cities and programs due to differences in local treatment policies, salaries, cost-of-living, specific services provided, the age and type of facilities, and other related factors (National Association of State Alcohol and Drug Abuse Directors 1988). There are also several ways these monetary program costs can be measured, depending on whether the perspective derives from operational, societal, or client considerations (Yates 1985). A method that has been commonly used is to seek an estimate of the average cost to treat a drug user in a specific program for a specific period, that is, a week, year, or possibly the length of time typically taken for a treatment episode.[1] Program overhead costs as well as operating costs must be measured; in addition, the opportunity costs of resources used by the program should be counted, even if the

resources utilized do not represent direct costs. This consideration conceivably could affect the cost estimate for a program that utilizes a large volunteer staff that would otherwise be likely to provide free services to another socially worthwhile cause.

On the whole, other than at a relatively primitive level, surprisingly little is known about the costs of providing drug treatment to people in need (Wallack 1990). Some crude estimates of direct costs, without amortization for improved outcomes after discharge, suggest that, per person, the cost of residential treatment is about three times the cost of outpatient methadone or outpatient drug-free treatment (Harwood et al. 1988; Wallack 1990).

Adjusting Costs for Temporal Treatment Dynamics. When comparing programs that require resources over several years, several distortions need to be adjusted to monetary data, and these adjustments are applicable for both cost and benefit calculations. Cost adjustments are needed for temporal distortions such as inflation and present value. If monetary costs have been assessed over several years, data collected later may be distorted by inflation. A common method for adjusting costs for different years is to divide the cost for a year by an inflation factor available from government offices for that year and region. This way, cost data can be standardized in the same "base year" units,

Combining Cost and Benefit Estimates. There are several ways in which to analyze cost, benefit, and effectiveness data once they are obtained (Yates 1985). A commonly used method is to form a benefit-to-cost ratio. In this way, efficiency can be quantified. For example, if $8,000 was required to care for a heroin addict for 1 year in a therapeutic community and this resulted in benefits of $24,090 in present-value terms, then the benefit-to-cost ratio would be equal to three. A ratio in excess of unity would indicate efficiency and be required to rationalize continuation of the program. However, it may not be a sufficient condition to the extent that alternative programs that vie for scarce dollars exhibit even larger ratios.

An analysis that examined economic benefits to society of drug abuse treatment utilized data from the 1980 Treatment Outcome Prospective Study (TOPS) (Hubbard et al. 1989; Harwood et al. 1988). This analysis focused on the economic benefits derived from a decrease in criminal activity during treatment and 1 year after treatment discharge. The cost-benefit of treatment was compared across three treatment modalities based on average length of stay. The benefit-to-cost ratio was larger than unity for residential, methadone maintenance, and outpatient drug-free programs. This finding suggests that the benefits from reducing crime that are derived from these treatment modalities outweigh the cost of providing treatment. At a more aggregate level, treatment

costs are a small percentage of the total cost of drug abuse to society-approximately 3 percent (Wallack 1990).

Although ratios simplify findings, they discard important information such as absolute net benefits that prove the investment worthwhile or caseload and scale-of-service provisions. In addition, ratios do not allow prediction of how the cost and outcome relationship would change as relevant policy changes (i.e., client load was altered within a program). A more complete model of the relationship among costs, outcomes, and other relevant variables is needed-one that can be provided only by mathematical models. These models may be considerably more generalizable than single ratios.

METHODOLOGICAL APPROACHES TO COST-BENEFIT ANALYSIS

Numerous statistical methods are available for analyzing many different but relevant cost-benefit questions. Methodologies involved with cross-sectional analysis are usually straightforward, have been applied frequently, and are discussed in detail by other authors elsewhere in this monograph. This section concerns mainly those methods applied or applicable to longitudinal cost-benefit analysis. We first review conventional methods and their results when applied to longitudinal data. Several selected methodologies that may potentially produce more useful information then are described. Applications of these models are illustrated by at least one level or unit outlined in the conceptual framework; generalizability or adaptation to other levels of analysis units also may be possible.

Conventional Methods

Several cost-benefit analysis studies of a longitudinal nature are available in the literature. Approaches typically establish “critical periods” of interest, determine behavior of clients during these periods, and assign cost values. Perhaps the most common approach is to “cost-out” periods before, during, and after treatment to examine relative changes, This approach corresponds to a level of analysis at the individual addiction career (Hser et al. 1988). A variation on this approach is a during- and after-treatment design when circumstances allow a “natural” experimental design, such as the involuntary termination of a treatment program to meet funding or policy requirements. Another approach also takes a critical date, usually treatment admission, and compares subsequent cost-benefits among groups, programs, or modalities. In summary, these studies examine cost-benefits associated with (1) pretreatment, during treatment, and posttreatment; (2) Involuntary termination of treatment; and (3) programs with different dose and retention policies.

Cost-benefit analysis of drug treatment seldom is based strictly on an addiction career approach. Several pretreatment and posttreatment analyses have been described in the previous section (Harwood et al. 1988). McGlothlin and Anglin (1981 a) investigated the effects of involuntary termination of methadone maintenance when a Bakersfield, CA, clinic was closed by local officials. A 2-year followup compared behavior of the 94 methadone clients discharged from the Bakersfield clinic with a matched comparison group of 83 clients obtained from the Tulare, CA, clinic where no such policy change was enforced. Of the terminated clients, 55 percent became readdicted to heroin compared with 31 percent of the Tulare sample, and the arrest and incarceration rates were approximately double for the comparison sample. The economic costs preclosure, during closure, and postclosure for the Bakersfield clinic at annual per person cost were about $12,000, $8,100, and $5,200, respectively; for the Tulare group the respective figures were $17,600, $6,200, and $5,600. Although the postclosure costs are similar, when the benefits resulting from new admissions are considered, the clinic closing represented a net economic loss in addition to the detrimental effects experienced by the clients.

A similar policy change occurred in San Diego County, although, unlike the Bakersfield clinic closure where no alternative programs were established, San Diego allowed private methadone maintenance providers to open clinics. For those who transferred to private methadone maintenance after the closure of a clinic, few differences were observed compared with a matched sample of clients in continuing public clinics in nearby counties (Anglin et al. 1989). Major adverse effects, however, were found for clients unable or unwilling to transfer to private programs: high crime and drug-dealing rates, more contact with the criminal justice system, and higher rates of illicit drug use. The mean annual cost for those male clients who transferred was $4,031, and for those who did not transfer it was $10,982; for female clients, the respective figures were $3,881 and $9,889. Savings resulting from a reduction of publicly funded methadone maintenance program costs were offset by increased costs for incarceration, legal supervision, and other government-funded drug treatment.

Comparisons among three multiple-site methadone maintenance programs in three Southern California counties were conducted by McGlothlin and Anglin (1981 b). Programs in Los Angeles and San Bernardino Counties used high doses (a mean stabilization dose of 95 and 82 mg, respectively) and flexible program policies with respect to client management, discharge for program infractions, and degree of supportive counseling. The Orange County program used low doses (i.e., a mean of 43 mg) and a relatively strict policy with respect to involuntary termination for program violations.

For the two high-dose and flexible programs, retention was much longer than for the low-dose program (figure 2a). During the 6- to 7-year period from program entry to interview, the clients from these two programs had significantly fewer arrests and less incarceration, narcotic addiction, and self-reported criminal behavior than clients in the low-dose program. These benefits persisted until the time of interview and were present whether the client was on or off methadone. The social cost analysis among these programs calculated arrest, trial, incarceration, legal supervision, property crime losses, and welfare costs per year for the years from first daily narcotics use to program admission; then these same costs plus treatment costs were calculated per year for the years from treatment to followup. The estimated annual costs of subjects in these programs, as a percentage of pretreatment costs, were 47, 62, and 85 percent for Los Angeles, San Bernardino, and Orange Counties, respectively. The Los Angeles program is the most expensive because of its long retention time and was also the most cost-effective, netting a 53-percent saving in social cost compared with only a 15-percent saving for the Orange County program.

The above analysis deals only with the costs associated with the patients who were treated, raising the question as to whether a program should have a shorter retention time so that more patients per slot could be treated, perhaps making it more efficient in this aspect. Hargreaves (1983) took this slot-fraction factor into account and extended the above social cost estimates to derive benefit-to-cost ratio rates for the three programs. The high-dose, long-duration programs still showed superior benefit-to-cost ratios (6.1, 4.5, and 2.7 for Los Angeles, San Bernardino, and Orange Counties, respectively).

The importance of these studies is that treatment outcomes, especially when used for cost-benefit analysis, have several social goals, not simply abstinence from drug use. In addition, estimates of the subject performance categories or domains were considered for each of the periods of interest, including those extending beyond the time in treatment. The shortcomings of these studies are that, although longitudinal data are analyzed, the description of the variables or processes involved remains essentially static. Failure to incorporate dynamic relationships limits research potential for projection or simulation purposes.

Time Series Analysis-The Addiction Career Perspective

Time series analysis examines detailed patterns of change in variables over time (Box and Jenkins 1970). A lengthy series of observation is required; the repeated observations in the series may represent a single case or the aggregation of many individuals' observations on a specified variable or system of variables at each sequential time point. Typically, time intervals are consistent units, for example, months or years. A sufficiently large number of

time points (typically 60 or more) are considered critical for reliable statistical estimation of time-related relationships. Time series analysis often allows prediction of future aggregate behavior based on the statistically estimated relationships. That is, the parameterized model based on real data can be used for forecasting purposes. Simulation models also can be constructed to evaluate hypothetical policy changes by artificially changing one variable (such as treatment) and assessing effects on other variables In the set under examination. Analysis based on group aggregate data is particularly useful in policy decisions that involve overall system-wide cost-benefits.

Time series analysis applied to the addiction career perspective for policy analysis has been illustrated by Powers and coworkers (Powers 1990; Powers et al. 1991). A set of procedures has been specified in these papers for policy analysis involving model development, forecasting and simulation, and cost analysis. In Powers and colleagues' (1991) work, the addiction career histories (averaging 12 years in length) of 627 narcotics addicts were analyzed to assess the intervention effects of methadone maintenance treatment and legal supervision (i.e., parole and probation) on the level of narcotics use and property crime involvement. A multivariate time series model or, specifically, the cointegration and error correction approach (Engle and Granger 1987), was developed as an adequate description of the interrelationships among five variables: methadone maintenance, legal supervision, narcotics abstinence, narcotics daily use, and property crime. A unique characteristic of the model was the separation of long-term from short-term relationships within the dynamic system represented by these five variables' interacting effects. In the context of time series analysis, long-term relationships refer to how stochastic trends of separate time series are related to each other, and short-term relationships are measured by how chronologically proximal changes in one variable relate to changes in other variables. The error correction model allows the examination of short-term relationships within the system in conjunction with partial adjustment for long-term behavior among the variables within the system.

The overall model development results showed that the system dynamics among the five variables formed a cointegrated system where relationships among variables were characterized predominantly by long-term rather than short-term relationships, Although each variable could individually move up or down over time without mean reversion, a dynamic equilibrium state existed toward which all other variables adjusted.

Methadone maintenance treatment demonstrated long-term benefits in terms of reduced narcotics use and reduced criminal activities; on the other hand, legal supervision was not shown to reduce either narcotics use or crime involvement

in the long run. Instead, a positive long-term relationship existed when a higher amount of legal supervision was related to a higher amount of narcotics use involvement and criminal activity. Addict involvement in either methadone maintenance or legal supervision increased the likelihood of involvement In the other. These latter findings are consistent with the observation that either drug use or criminal activity is likely to bring addicts to the attention of the legal system for prolonged periods. However, as a group, these addicts were not directly responding to legal supervision by changing their drug use or crime involvement, except perhaps through coerced treatment. The study also suggested that legal supervision may increase long-term methadone maintenance involvement, both in motivating entry and in prolonging retention. These results provide strong evidence of methadone maintenance treatment effectiveness and suggest the importance of legal coercion in linking chronic narcotics addicts convicted of crimes to treatment.

The forecasting capability of this long-term relationship model also was examined In contrast to a model considering only short-term dynamics, and comparisons between the two models demonstrated the superiority of the long-term model. Predicted values of the outcome variables based on the long-term model can be used in cost-benefit analysis, particularly for planning purposes. Simulation of policy alternatives, such as increased methadone maintenance capacity and the resultant potential effects on narcotics use and crime, also are important for policy planning. Forecasting and simulation provide a quantitative description of predicted relationships between the intervention and the outcome variables. Cost-benefit analysis based on these approaches involves the cost estimates for the variable per unit of person and time, and the summations across persons and time for the desired level of aggregation (e.g., population size or time coverage) are simple multiplications.

An illustration of how to perform cost estimation of hypothetical situations was provided by Powers (1990). For example, one simulation examined the effect of decreasing methadone maintenance cost by $2,565 per person for the 19 bimonthly periods examined ($68 per month per person). The results showed a corresponding monthly average decrease of 5 percent for time of abstinence and increases of 2 and 3 percent for time in daily narcotics use and property crime involvement, respectively. Although small when expressed as percentages, these increases resulted in costs exceeding the savings in reduced methadone maintenance costs.

Survival Analysis-The Program Modality Perspective

Survival analysis not only allows comparisons of long-term outcome measures among programs or groups but also tests the time-dependent nature of

outcome differences. When longitudinal data are available that can be expressed as measures of duration of behavior or effects, survival analysis can utilize these data as a function of time and can fully explicate their temporal patterns. In addition, survival analysis statistically corrects biases that can be caused by the types of censored observations that are common in followup studies because subjects usually are followed for periods of different length. A further advantage of survival analysis is that explanatory variables, or covariates, can be considered simultaneously for their influences on the survival time function (Cox and Oakes 1984; Tuma and Hannan 1984).

Covariates either can be fixed measures or measures that change with time. Fixed or time-independent covariates are usually specific individual demographic characteristics such as sex or race. Time-dependent variables usually reflect individual behavior changes over time, such as employment, treatment, or legal status, that evolve simultaneously with the dependent variable survival curve. Hazard rate models can be fitted to examine the effects of these covariates on survival rates. These hazard rate estimates are useful in determining individuals who may need additional treatment support services and when an individual is most likely to fail.

Applications of survival analysis for drug treatment evaluation are illustrated by Fisher and Anglin (1987), Anglin and Fisher (1987), and Hser and colleagues (1991). Fisher and Anglin's studies compared outcome data from multiple-site methadone maintenance programs in three California counties and has been previously discussed (figures 2a-d). The Hser and coworkers' study focused on the differential responsiveness to methadone maintenance treatment among male and female white and Mexican-American addicts. This latter study also examined several covariates for their ability to predict treatment retention, The likelihood of treatment discharge was higher among young male addicts who were using narcotics daily during treatment and who were unemployed and unmarried.

Extension of these survival analyses to cost-benefit analysis, especially cost-benefits based on conditional aspects such as sex or race, involves setting the timeframe of the analysis, which can be flexibly determined by policy interest and data availability. Cost-benefit calculation is straightforward with the number of people, duration, and associated costs per unit being available. Projections beyond the observation period are possible because parameterized survival rates allow expected durations to be estimated beyond the censored observations.

Markov and Semi-Markov Modeling-The System Perspective

At any given time interval, the addict population can be categorized for policy analysis purposes into a small set of discrete states that characterizes whether these addicts are actively addicted and whether they are being captured by social intervention systems (e.g., treatment, incarceration, legal supervision) in some identifiable manner. An individual's status among these states will change over time, thus a dynamic method such as a Markov model Is useful to provide a more precise description of the population distribution as it varies over time (Wickens 1982). Longitudinal information from a defined population (such as the addict career histories) allows an empirical testing of this dynamic model. If the appraisal of the model's performance measured against the known population distribution over time proves satisfactory, confidence can be gained for its application to larger populations, Furthermore, the accuracy of the estimates can be improved by incorporating explanatory variables shown to affect the model, such as race, sex, or other variables that are associated with the individual. This type of adjustment can be accomplished in the manner of the proportional hazard rates function described by Cox and Oakes (1984). The dynamic nature of the model thus not only provides a description of the past patterns of change over time but also should allow predictions of future patterns in a precise manner.

To illustrate the applicability of a Markov or semi-Markov model to cost-benefit analysis, the construction of such a model involves the operational specification of several aspects.

Status Representation. The status specification can be altered as necessary to provide alternative assumptions about the underlying phenomenon or questions of interest. For example, the members of the addict population might be classified into six states: S_N, using but not addicted yet; S_A, currently addicted; S_T, in treatment; S_I,, incarcerated; S_U, no longer using drugs (unaddicted); and S_L, lost from population (died, left country).

The system of interest can be one particular treatment program or modality or some aggregation, and treatment states can be constructed as such. If interest is in several program modalities and their differential effects within the overall system, distinction can be made by inclusion of several states, each corresponding to a different program modality of interest.

Transition Probabilities and Rates. The movement, or transition, of the individuals among these states over time can be represented either with transition probabilities or transition rates. If the transitions are independent of time, the process is known as a Markov process. If they depend on time, then a

semi-Markov process results. If the population size at any given time is known, multiplying by the transition matrix gives the number of people in each of these states.

Population Closure. When new members move into the process or old members move out, an open population model would be necessary to provide an accurate description of the true phenomenon and more exact estimates. When evaluating system efficacy, such movements are important to consider, because individuals start or move into their addiction careers at different time points, and some eventually reach a state of maintained abstinence, or die, and thus move out of the population at later times.

Populatlon Heterogeneity. Variables such as sex and race, which are expected to influence transition rates, can be incorporated as explanatory variables in a manner similar to the proportional hazard rate model (Cox and Oakes 1984). The establishment of relationships between explanatory variables and the transition rates also allows the comparisons of relative risks among subpopulations defined by these variables.

Cost-Benefit Analysis and Projection. Once the model is developed, multiplication of population size, transition rate, duration in the state, and cost-benefit values per unit of time and people for each state can be calculated straightforwardly to obtain the cost-benefit estimates over time. If assumptions about the past on which the model development is based are accepted to be true for the future, projection for limited future cost-benefit estimates can be performed through the same process. Simulation studies also can be performed. For example, one can artificially increase treatment effectiveness by increasing transition rates from treatment to an unaddicted state and then observe associated consequences produced by such change.

System Dynamics Modeling-The System Perspective

A system dynamics model analyzes dynamic phenomenon through feedback-oriented computer modeling and is used to model systems-level relationships among constituent components or variables. A system dynamics model consists of an interconnected set of difference equations representing continuous time flows and accumulations of people, materials (e.g., resources), and information. An adequate system dynamics model allows for the explicit interlinking of a variety of causal factors that drive each other iteratively over time. Through the appropriate manipulation of input parameters, it also can be used to project outcomes under different assumed scenarios related to policy interventions. Attaching costs to the “stocks” and “flows” of people and

resources throughout the system allows a dynamic estimation of the cost-benefits of the constituent components of the model.

System dynamics has been used to study a broad spectrum of issues arising in corporate, socioeconomic, psychosocial, biomedical, and ecological systems. For example, several system dynamics simulation models were developed for technology assessment used to evaluate the social impact of medical practices (e.g., the diffusion of evolving medical technologies) (Homer 1987; Finkelstein et al. 1984). Recently, a dynamic model of cocaine use prevalence in the United States was developed to depict the relationships among various drug use indicators (Homer 1990). This model also produces prevalence estimates and near-future projections for several population categories, including recreational and compulsive cocaine users, Although none of these models produces direct cost-benefit figures, such application is an appropriate extension of this work.

SUMMARY

Choices of appropriate methodologies depend on the research or policy questions being asked, the design of the study, and the type of data that is available. Most of the models described above can be adapted for different applications. Time series analysis requires evenly spaced sequential data over lengthy periods. Aggregations across time or people allow flexibility for answering questions at different levels of policy concern. Both survival analysis and Markov models are based on linear probability theory. Information about number of people, timing, and sequences of change is best utilized by these types of models. System dynamics models integrate more varieties of sources of information and encompass a larger scope of the system. Time series analysis and system dynamics modeling are useful tools for making projections and for answering "what-if," or policy simulation, questions. These longitudinal modeling approaches add to the traditional cost-benefit analyses by relating cost and benefit in mathematical models, taking into consideration time changes and other related changes. Such modeling approaches not only deepen our understanding of the phenomenon under study but also allow projection and simulation to be carried out in a precise, quantitative fashion.

SUGGESTIONS FOR RESEARCH DIRECTIONS

Quality of Data Collection

Modeling approaches provide a simplified representation of an often complicated underlying phenomenon and could help to identify important relationships that are responsible for driving the system. Knowledge of the

past dynamics then can be used to project to the future, if the future resembles the past-a situation that is often the best guess that researchers can rely on. However, quality of the model's estimates only can be as good as the input data. One cannot overemphasize the importance of the effort to collect quality data at the initial evaluation level and at the cost-benefit level.

Considerations of Addict Heterogeneity

Addict populations are heterogeneous groups for which constituent subgroups may have different needs and demands for drug treatment. Cost-benefit analyses that consider such diverse addicts' characteristics are likely to provide more accurate information for resource allocation. For example, women addicts generally are involved less often in criminal justice systems, but for those who have children or are of childbearing age, drug use can produce damage to children that results in considerable cost to society. Cost-benefit analysis that also can identify the areas that are most costly and suggest improvement, for least cost and maximal return, of the treatment services is valuable.

Modeling Approaches

Drug treatment evaluations have become more sophisticated in recent years in appreciation of the strengths and weaknesses of alternate research designs and in the application of statistical modeling approaches for analysis (Anglin and Hser 1990a; Brecht et al. 1991). However, cost-benefit analysis has not kept up with such progress. Time series analysis and survival analysis have made major advances over past practice in evaluation research. Markov modeling and system dynamics modeling represent potentially important tools for integrating various aspecta of the system. We believe that extension of these applications to cost-benefit analysis will provide useful and important information for policymakers.

Generalizability to Untreated Populations

According to the National Institute on Drug Abuse (NIDA), only 1 in 10 injecting drug users was in treatment during 1989 in the United States. As many as 45 percent of intravenous heroin users located in community settings have never entered drug abuse treatment, and even larger percentages of intravenous cocaine users have not obtained any treatment services. The number of drug users in need of treatment among the homeless, pregnant women, or minority groups such as Asian and Pacific Islanders, is largely unknown.

Considerable information gaps exist in the extent and consequences of drug use for those who avoid treatment. Given an increased national policy focus on

treatment improvement and expansion (Office of National Drug Control Policy 1989, 1990), a proactive effort toward control of drug demand is necessary to ensure an effective treatment system.

Drug users not in treatment are generally thought to be especially difficult to reach and perhaps difficult to treat. Because current treatment populations may not adequately represent the full range of drug-dependent individuals, evaluation results that are based only on treatment populations may not be applicable to those who have avoided treatment and may have resulted in inflated estimates of the potential aggregate benefits of treatment. However, the costs of failure to attract drug-dependent users into treatment can be much higher, especially among those who, instead of seeking long-term solutions to their drug problems, have been using emergency room services, committing crimes, or contracting sexually transmitted diseases, including human immunodeficiency virus, as a "revolving door" among health, social, and legal networks (Harwood et al. 1988).

CONCLUSIONS

Expressed public concern about drug dependence and the resources requested for devotion to ameliorating its consequences are evidence that the social costs of drug abuse or dependence are substantial. Meanwhile, converging results from evaluation research and cost-benefit analyses justify, on purely economic grounds, a larger investment in drug treatment programs.

This chapter maintains that cost-benefit estimates can be Improved by applying new methodologies to provide more valid descriptions of the underlying phenomenon. To the extent that representative models provide accurate representation of the phenomenon, better policy decisions can be made. This chapter has not discussed extensively the issues of determining cost-benefit categories and the associated monetary values except for listing those commonly used and pointing out their importance and difficulties. The magnitude of these costs sometimes implicitly reflects the value that society assigns to the different categories, Data are available for those costs that lend themselves to quantification, but considerable disagreement exists for those "fuzzy" costs that cannot be easily translated to dollar values. The inconsistency in determining cost categories/values across studies often produces inconsistent results. For these reasons, we caution that cost-benefit analysis results be interpreted within their specific context and, in most cases, in relative rather than absolute terms.

Further development of statistical methods and their appropriate application to diverse data also can improve cost-benefit estimates. Interventions could be

mathematically simulated to provide a basis for forecasting and policy analysis; when there is no consensus on particular relationships, alternative parameter estimates can allow sensitivity analysis and the development of an envelope of possible results (Thompson 1980; Brecht et al. 1991).

Better understanding of the underlying structure of the phenomena, better quality data, and applications of valid and appropriate modeling techniques will improve estimates of cost-benefits. Advancements in all these areas will contribute to more reasonable budgeting decisions that must be made within overall drug abuse treatment policies and priorities.

NOTE

1. If we are examining the efficiency of an overall program of a given size rather than estimating what that optimal size ought to be, average and not incremental cost is the relevant concept to estimate. Note that in an examination of the optimal or most efficient program size, the incremental benefit and not the average also must be considered. It is plausible that an expansion in program size would imply that the incremental benefit will be less than the average as more and more intractable drug users were dealt with and as effectiveness diminishes. The optimal scale for the program is where incremental cost just equals incremental benefit.

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New Perspectives on the Benefit-Cost and Cost-Effectiveness of Drug Abuse Treatment

Robert L. Hubbard and Michael T. French

INTRODUCTION

Questions continue to be raised about the effectiveness of drug abuse treatment. The overwhelming weight of evidence from clinical trials and carefully designed epidemiological outcome studies is that treatment contributes significantly to change in client behavior during and after treatment. A more limited number of studies indicate that the benefits of these changes considerably outweigh the costs of the treatment (Anglin et al. 1989; Harwood et al. 1988; French et al., in press). However, due to the lack of studies of elements of treatment or alternative demand-and-supply reduction strategies, the comparative cost-effectiveness of different treatment components or treatment vs. prevention or enforcement is not known.

While awaiting initial cost-effectiveness and benefit-cost studies of other approaches, policymakers and program administrators can have confidence that treatment is an effective and cost-beneficial strategy. However, fundamental questions need to be addressed in economic analyses of treatment. Although various treatments have been shown to produce positive outcomes and favorable benefit-cost ratios, many factors limit the effectiveness of treatment. Many drug abusers do not enter treatment, and many do not stay a sufficient amount of time to receive the full benefits of treatment. Services to deal with increasingly complex problems of clients need to be expanded in quantity and enhanced in quality. Even after extensive treatment experience, many clients relapse and renew their treatment careers.

Clearly, the full potential of treatment is not being realized. Questioning the aggregate effectiveness of treatment diverts research from the fundamental issue, which is how to maximize the return on each dollar invested in treatment. To address this question, three new perspectives and their potential contribution

to a more comprehensive assessment of benefit-cost and cost-effectiveness of treatment need to be considered. These perspectives are:

- Concept of treatment career vs. individual treatment episodes
- Model of treatment structure and process components vs. program-level descriptors
- Definitions of client subgroups with differing types of impairments vs. general characteristics of client populations

To ground these new approaches in an overall framework, a brief synopsis of the conclusions of Hubbard and colleagues (1989) and French and colleagues (in press, 1990) is presented on effectiveness and cost-effectiveness analyses of the data obtained in the Treatment Outcome Prospective Study (TOPS) coordinated in the late 1970s and early 1980s.

EFFECTIVENESS AND COST-EFFECTIVENESS

Data collected from a national sample of 10,000 clients (Hubbard et al. 1989) established that publicly funded methadone, residential, therapeutic community, and outpatient counseling treatment programs are effective in reducing levels of drug use and criminal behavior and that long-term treatment helps addicts become more productive members of society. These benefits of reduced drug use and criminal behavior combined with increased productivity justify the tax dollars expended on outpatient methadone, residential, and outpatient drug-free programs. The costs of drug abuse treatment are substantially recovered during the time a client is in treatment, and the savings to society after a client has left treatment represent further returns on the investment (Hubbard et al. 1989, p. 163).

Substantial decreases in heroin abuse, reductions in cocaine abuse, less nonmedical use of psychotherapeutic drugs, and diminished overall severity of drug abuse were apparent during and after treatment for clients treated for at least 3 months. The prevalence of regular heroin use for methadone clients in the first year after treatment (17 percent) was one-fourth of the pretreatment rate; the prevalence of regular cocaine use was cut in half; and regular nonmedical psychotherapeutic use was cut by one-third. With respect to residential clients, the posttreatment prevalences of regular heroin (12 percent) was one-third of the rate before treatment; nonmedical psychotherapeutic drug use (9 percent) was one-fifth of the rate before treatment; and regular use of cocaine declined by half to 16 percent in the posttreatment period. With respect to outpatient drug-free clients, reductions in prevalence of regular use were

one-half for heroin and nonmedical psychotherapeutic use and one-third for cocaine. Although relapse was not uncommon within the 5 years after treatment, in any given year less than 20 percent of former clients in any modality were regular users of any drug other than marijuana or alcohol. The pretreatment proportions of clients involved with criminal activity were reduced by at least 50 percent after treatment in all modalities. For criminal behaviors, a pattern similar to that for drug abuse was evident: dramatic improvement during treatment, some deterioration immediately after leaving a program, and a leveling that was maintained for as much as 5 years after treatment (Hubbard et al. 1989, p. 164).

A variety of multivariate analyses considering many competing hypotheses confirmed that the time spent in the program was the single most important factor contributing to the observed improvement after treatment (table 1). Residential clients staying in treatment more than 1 year were significantly less likely than other clients to report regular use of heroin, marijuana, or psychotherapeutics. In addition, the likelihood of their being employed full time and not engaging in crime was almost three times greater than for clients remaining in treatment less than 3 months. The results for outpatient drug-free clients staying in programs for at least 6 months showed a similar pattern. Compared with those methadone clients staying in treatment less than a year, maintained clients were four times less likely to use heroin regularly, three times less likely to commit predatory crimes, and two times less likely to use alcohol heavily. There was also a significantly decreased likelihood of regular heroin use for clients who stayed in methadone treatment at least 1 year compared with those leaving after less than 1 year; however, this reduced likelihood was not as great as for clients maintained in methadone (Hubbard et al. 1989, p. 165). Analyses of labor market behavior after treatment show that time in treatment has a statistically significant positive effect on legal employment earnings in ail modalities and a negative effect on illegal income (French and Zarkin, in press).

Combined with results from other research, these findings provide comprehensive and convincing evidence that long-term treatment is effective. Several studies, however, including experiments with random assignment (Newman and Whitehill 1979) and evaluation of abrupt closures of methadone programs (McGlothlin and Anglin 1981), provide evidence that programs produce effects independent of client motivation to remain in treatment. Furthermore, the multivariate analyses and the research design used by Hubbard and colleagues (1989, pp. 165-166) carefully considered alternative assumptions about measurement validity and took into account potential indicators of client motivation, including previous treatment and reasons for entering treatment.

TABLE 1. *Odds ratios* for treatment duration for posttreatment outcomes in the first year after treatment*

Outcomes	Comparison Group Less than 1 Week	Time in Treatment 1-13 Weeks	14-26 Weeks	26-52 Weeks	More than 52 Weeks	Long-Term Maintenance
			Methodone (n=835)			
Regular heroin use	(1.00)	1.16	(← .83 →)+		.47[a]	.23[c]
Involvement in predatory illegal acts	(1.00)	.81	(← .81 →)+		.59	.36[c]
			Residential (n=731)			
Regular heroin use	(1.00)	.69	.43	.52	.28[a]	N/A
Involvement in predatory illegal acts	(1.00)	1.07	.61	.43[a]	.29[c]	N/A
			Outpatient Drug Free (n=854)			
Regular nonmedical psychotherapeutic use	(1.00)	.83	.69	(← .44[a] →)+		N/A
Involvement in predatory illegal acts	(1.00)	.73	.63[a]	(← .47[b] →)+		N/A

*Results of logistical regression models considered age, race, sex, source of referral, prior treatment, and pretreatment drug use pattern and controlled for posttreatment recidivism to treatment.

+Because of small sample sizes, two categories of time In treatment are combined for the logistical regression model.

[a]p<.05
[b]p<.01
[c]p<.001

SOURCE: Hubbard et al. 1969

Analyses of the costs and benefits of each modality found that there was a substantial return on investment in terms of reducing crime. Using a cost-of-illness framework, the crime-related economic costs of drug abuse before, during, and after treatment were estimated. Regardless of the summary measure used or the modality, the benefits matched or exceeded the costs of treatment within the first year after a typical client terminated a program. By this time, there was a four-to-one return on the investment of tax dollars for law-

abiding citizens for both methadone and residential programs (table 2). However, the crime-reduction impact estimated here represents only a portion of the potential savings attributable to drug abuse treatment. Significant returns also are gained by changes in employment, productivity, and illegal earnings independent of criminal activity (French et al., in press; French and Zarkin, in press) and in terms of the contributions of treatment to reducing the health care costs related to drug abuse (Hubbard et al. 1989, p. 166).

TABLE 2. *Crime reduction in the first year after treatment:* ratio *of benefits to costs of treatment*

	Modality		
Impact Category	Outpatient Methadone	Residential	Outpatient Drug Free
Costs to law-abiding citizens	4.04	3.84	1.28
Costs to society	0.92	2.10	4.28

SOURCE: Hubbard et al. 1989

TREATMENT CAREERS

Drug abuse and its treatment is a recurring phenomenon for many. The history of drug abusers often is marked by numerous episodes of drug abuse and treatment. However, there is little research that documents the nature of treatment histories or their role in the effectiveness of any specific treatment episode, the long-term prognosis of recovery from drug abuse, or the cumulative costs and benefits of the treatment career (Marsden et al. 1988).

Much of what is known about the treatment histories of drug abusers comes from the Drug Abuse Reporting Program (DARP). Joe and Gent (1978) found, for instance, that 39 percent of those entering the programs participating in DARP had been admitted previously to drug abuse treatment, and in the 6 years after leaving the program, about 61 percent had a subsequent treatment experience. The percentage of clients in drug abuse treatment during each of the posttreatment years ranged from 39 to 40 percent in years 1, 2, 3, and 6 and was 31 percent 12 years after admission to treatment (Simpson et al. 1986).

Comparing the average age of those entering treatment in the TOPS with those in the DARP studies suggests that the average age of beginning regular drug use and then entering treatment for the first time decreased between 1970 and 1960. Younger clients born in 1960 or later began regular drug use on average at age 14 and first entered treatment at age 17. Older clients born in previous decades began drug abuse and first entered treatment at progressively older ages. Although these groups of clients may not be representative of all drug abuse treatment clients, these trends are indicative of an increasingly younger client at treatment entry and a younger drug abuse treatment population.

About two of five clients had a drug abuse treatment episode before entering the program included in the study; 21.5 percent had received treatment for alcohol abuse; and about 24.1 percent had received treatment for a mental health or emotional problem.

The drug abuse treatment histories of many clients in TOPS are lengthy, characterized by multiple episodes in several modalities and perhaps years spent in treatment. Excluding detoxification and including only the three major modalities, there were an average of 2.4 episodes of drug abuse treatment. If we consider the experience of clients ages 30 and older to represent the experience of a drug abuser who may be near completion of the drug abuse and its treatment history, drug abusers may in their lifetimes expect to have three episodes of treatment, and 63 weeks are likely to be spent in treatment.

These lifetime measures of drug abuse treatment histories suggest that drug abuse and its treatment are recurrent phenomena for many. Although any specific treatment episode may result in lengthy periods of abstinence, for many the episode results only in improvement, not cure. There is a possibility of relapse to drug use and a subsequent return to treatment. These findings suggest that substantial public expenditures may be necessary over the life of a typical drug abuser to provide treatment for recurrent problems.

Weighing the costs and benefits for a specific treatment episode has been a typical approach for benefit-cost models. Average lengths of stay in the TOPS data are 159 days for residential treatment, 267 for outpatient methadone treatment, and 101 for outpatient drug-free treatment, yielding total average treatment costs for a single treatment episode of $2,942 for residential, $1,602 for outpatient methadone, and $606 for outpatient drug-free clients. Summing the intreatment and posttreatment 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.

If we include the total treatment career, an average of $2,153 (based on 21 weeks of methadone, 8 weeks of residential, and 4 weeks of outpatient drug free) had been spent on treatment for a typical client before clients entered the programs studied in TOPS. If one adds this career cost, the benefit-cost ratios for a single episode are substantially reduced.

Furthermore, treatment received after termination from a program needs to be considered. Approximately 20 to 30 percent of clients in each modality return to some form of treatment within 1 year. About 25 percent of methadone clients are maintained on methadone for extended periods, and about one in five residential and outpatient clients reports readmission in the 5 years after treatment. Appropriate calculation of these subsequent treatment costs also needs to be factored into a comprehensive benefit-cost model.

Two alternative approaches are suggested: one focusing on the individual program as the cost element and the other on the treatment system as the cost element. 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. A more refined approach would consider the marginal benefits of each succeeding episode.

COMPONENTS OF TREATMENT

A comprehensive cost framework of drug abuse treatment programs assumes that there is an agreed-upon definition of treatment, that the dimensions of treatment have been identified, and that there is a fair degree of consistency within treatment types. However, there is no consensus on what constitutes treatment. Similarly, treatment process is poorly defined. However, it is useful to regard treatment as a specific set of procedures, approaches, therapies, or services that are designed to achieve certain goals. Treatment process, which can be thought of as the steps or the dynamic movement from addiction to recovery, also is defined poorly. In the context of drug abuse, this typically involves changes in one or more areas of a client's life. Formal specifications and descriptions of drug abuse treatment and treatment process lag behind the work generally present in the literature on treatment outcomes. Thus, Sells noted that "in view of the general development of the field of drug abuse treatment, no standard and generally accepted 'treatments' . . . exist" (1974, p. 256). Economic research on drug abuse treatment will have serious limitations until these problems are resolved.

Several researchers have examined elements of drug abuse treatment and treatment process. Ball and coworkers (1986) and Simpson and colleagues (1986) have analyzed data at the aggregate program level. Price (1986) examined the organizational environment of drug abuse treatment but included no client-level data on treatment process. Magura and coworkers (1988) assessed participative decisionmaking by clients in methadone clinics and its effects on process and outcomes. De Leon (1986) outlined the levels of the therapeutic approach as structure, elements, and process. Holland (1986) included organizational, client, and process variables as predictors of planned duration. Allison and colleagues (1985) focused on service for clients in the programs. LoSciuto and colleagues (1984) and Aiken and coworkers (1984) concentrated on the counselor characteristics and the progress of clients in terms of behavioral change, as have McLellan and colleagues (1988). Biase and coworkers (1986) and Wheeler and colleagues (1986) focused more on the progress of the client through treatment in terms of cognitive development of self-concept. Joe and coworkers (1991) conducted a secondary analysis of TOPS to examine the process of services received and tenure in methadone.

None of these studies has fully integrated the many elements of treatment structure and treatment process. To develop a cost framework, we must attempt to integrate the complex array of elements. A first step is the development of a conceptual model that organizes the various components and suggests how the effects of the individual components and their interactions can be identified.

A proposed framework drawn in part from psychotherapy models is illustrated in figure 1. This framework suggests that five levels of variables and the factors influencing each level need to be considered:

- The environment
- The program
- The counseling and services available to clients in the program
- The treatment plan specifying the service for individual clients
- The client

At the client level, the process of individual change during the course of treatment needs to be considered. This dynamic element of treatment process often has been neglected. Each level and the linkages among the levels must be examined systematically, and cost implications for each need to be developed. At the program level, interest should focus on the administrative structures, policies and procedures, staff-to-client ratios, staff training, and other objective, clearly identifiable characteristics of the program environment. At the program level, structure refers to such factors as modality, stated admissions

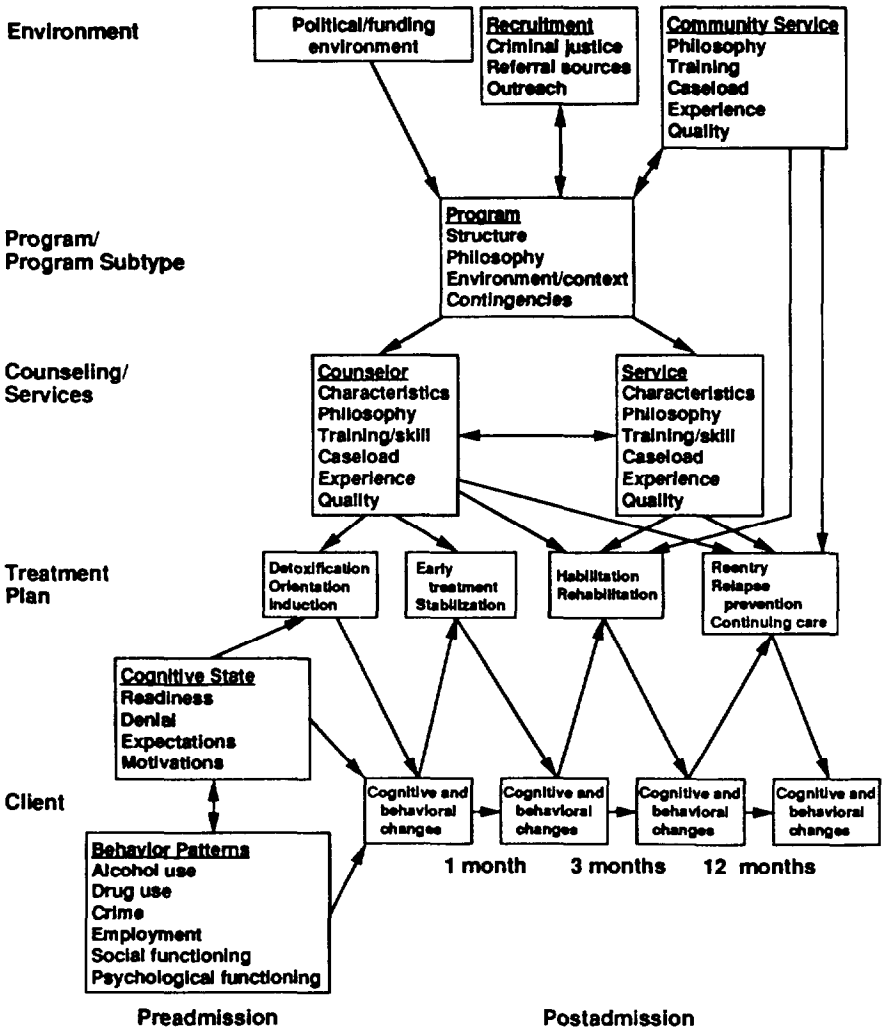

FIGURE 1. *Conceptual model of treatment process*

policy, organization, staff training level and experience, and staff-to-client ratio. Philosophy concerns the program's stated theoretical orientation, treatment rationale, and goals. Function relates to how well the program's operation conforms with its stated philosophy.

At the counseling and service level the focus is on the functional aspects of different program components, including the more qualitative aspects of availability, nature, and quality of services, Service is more specific and refers to identifiable services a program offers and their quality; examples are vocational and educational training, insight-oriented group psychotherapy, family therapy, and biofeedback training. A key element of counseling and service is the provider (McLellan et al. 1988). Characteristics of counselors and service providers include objective features such as years of training and experience and personal qualities such as warmth, sensitivity, and empathy.

The final primary dimension is the client. Treatment at the client level comprises variables such as the receipt of, satisfaction with, and perceived need for services. Perhaps more important at the client level is the dynamic of change experienced by the client. Most programs implicitly or explicitly plan progression through treatment, either as a 12-step model, a methadone-to-abstinence or maintenance regimen, or stages in a therapeutic community. Research has seldom, if ever, examined the nature and rate of this progression as either a dependent or predictor variable.

A major limitation of past drug abuse treatment research is a failure to examine fully changes in attitudes, motivation, knowledge, and skills associated with participation in treatment. These include changes in beliefs, attitudes, and knowledge about dependence and recovery and behavioral changes during treatment. These cognitive and behavioral changes need to be related to the major types of treatment considered here as well as, where possible, to specific components of treatment. Comparisons of treatment outcomes, posttreatment and in-treatment among programs with different components of treatment should provide valuable information about those components of multimodal programs (McCrady and Sher 1985) that are either useful or superfluous, The application of psychological learning theory to the study of relapse (Marlatt and George 1984) has led to the development of specific treatment techniques designed to prevent relapse and minimize the effects of brief lapses (Sorensen et al. 1987; McAuliffe and Chien 1986).

The key concept is that clients may receive essentially the same treatment but progress at different rates. To fully understand treatment process and link process to cost and outcome, it is necessary to understand client change and describe the program and service/counseling-level components, including the

characteristics of therapist and service provider. As an example of the component approach, a model of methadone treatment based on a resource allocation and consistent with clinical experience is described.

If methadone treatment is to achieve its objectives, ways to further enhance its efficacy must be developed and demonstrated in typical community-based programs. The efficacy must be established within reasonable cost constraints and with replicable (and disseminable) clinical protocols that can be implemented in other community-based programs, In the example shown in figure 2, a multifaceted protocol for methadone treatment is presented, and four key components built on a standard base on effective counseling are identical. These elements have been shown to be critical outcomes through reviews of the literature, current experience with clinical trials to improve counseling in methadone treatment, and consultation with program directors and staff.

The model shown in figure 2 indicates the need for treatment to consider both the reduction of drug use and the improvement of productive functioning. The achievement of both goals requires an integration of services focusing on medical/drug management to reduce drug use and the provision of psychological/social services to restore productivity. Peer support groups can encourage treatment integration and retention in treatment to maximize the opportunity to benefit from the available services. To maintain the benefits, a program of aftercare or continuing care with a strong peer component is necessary to prevent relapse. The basic hypothesis is that there is an interactive or additive effect of each component on outcomes.

From a benefit-cost perspective, it Is necessary to assess the marginal benefits of the incremental services compared to the marginal costs. To investigate this issue, the budget allocation for each component is specified, and the incremental benefits are compared to the costs. The most expensive services for assessment, stabilization, and treatment planning and integration are required in the first 6 months of treatment. Most clients stabilized in treatment for more than 1 year typically will need less intensive and expensive services such as relapse prevention and crisis intervention. Our assumption is that effective service could be delivered for $5,000 in the first year of treatment and then for less than $1,500 in subsequent years.

Although many clients need long-term prescriptions of methadone, they often reach a point after which they are employed and lead stable, functional, and socially acceptable lives, and their service needs are no longer as great as they were. Some researchers (Novick et al. 1988) have argued that traditional treatment places increasing demands on clients and that long-term clients should be able to get methadone with less restriction. Wesson (1988) pointed

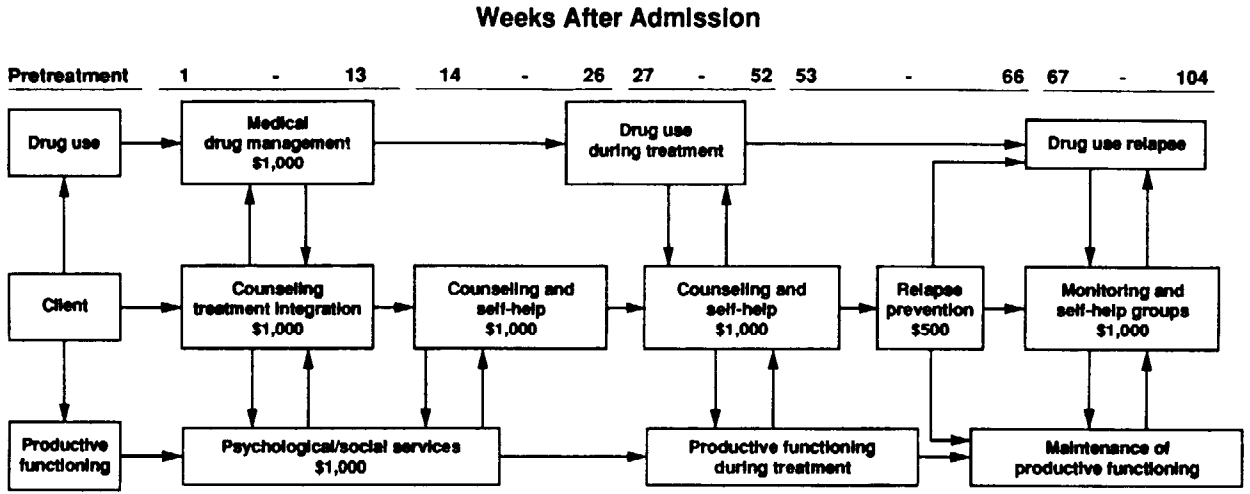

FIGURE 2. *A resource allocation model for methadone treatment*

out that, although some level of reduced services may be appropriate, 8 of the 40 clients (20 percent) in the medical maintenance experiment (Novick et al. 1988) relapsed, even after several years of stability before the trial. Based on a review of the literature, Brown and Ashery (1979) found that aftercare focused on relapse prevention and the development of self-help groups may be the most appropriate for an addict population. This approach not only reduces treatment demands for stable clients but also includes intensive early monitoring and education to prevent relapse. The benefits of an effective aftercare relapse prevention program can result in a reallocation of resources to clients entering treatment and to those who relapse despite maintenance on methadone.

IMPAIRMENT AMONG DRUG ABUSERS ENTERING TREATMENT

Drug abuse treatment programs traditionally have been expected to accomplish three main objectives: reduce drug use, eliminate criminal behaviors, and help clients get and hold jobs. Drug abusers currently entering treatment suffer from a greater variety and severity of problems in addition to their drug abuse than previously has been the case. An accumulating array of studies reveals multiple psychiatric, physical, vocational, social, and other problems among drug abusers. Many treatment programs also must deal with more numerous and more complex problems such as pregnant addicts and their prenatal care, human immunodeficiency virus risk behaviors, and co-occurring psychiatric disorders. To address the traditional and new issues it is necessary to develop a more comprehensive understanding of the range and severity of the problems presented by clients/patients entering treatment, the role of these problems in treatment, and the potential costs and benefits of drug abuse treatment alone and in combination with comprehensive services.

Studies of the relationship between drug abuse and criminal behavior, employment, and severity of psychiatric problems have been the only research available on the types and levels of problems of clients/patients entering drug abuse treatment. Research based on assessment of multiple problems, such as that with the Addiction Severity Index (ASI) (McLellan et al. 1985), has identified a range of problems presented by clients. The investigation of their role in service allocation and treatment outcome is expanding. Such research is important because outcomes of treatment could be affected as strongly by co-occurring problems as by the treatment, especially if those problems are not addressed with tailored treatment plans and/or adjunct services.

Some client problems may predate drug abuse. An antisocial personality disorder may, in fact, precipitate involvement with drugs. In addition, other problems may develop along with drug abuse. A subset of these co-occurring

problems may be, at least in part, the result of external circumstances that also are causally related to drug abuse. A severe loss, for example, may bring on depression and drug or alcohol abuse, and socioeconomic and environmental factors may increase the risk of unemployment and exposure to illegal drugs. Finally, concomitant problems may be the direct result of drug abuse, for example, organically based cognitive and health problems attributable to the use of certain types and amounts of alcohol and/or other drugs. Some clients entering treatment will have none of these other problems; some may have a few moderate problems; and some may have multiple serious problems, Table 3 presents the prevalence of the problems reported by clients entering the three major treatment modalities in the years 1979 to 1981.

TABLE 3. *Concomitant behaviors in the years before admission, by modality*

Behavior	Outpatient Methadone (N=4,184) (%)	Residential (N=2,891) (%)	Outpatient Drug Free (N=2,914) (%)
Predatory criminal activity	33.4	59.8	36.5
Illegal activity as primary source of income	23.2	33.9	12.0
Fully employed (40 weeks or more)	23.6	14.7	25.4
Heavy alcohol	25.0	41.7	35.7
Suicidal thoughts or attempts	28.9	43.8	47.6
Multiple (3 or more) drug-related problems	40.9	63.3	50.1

NOTE: Clients may report more than one type of behavior. Because the number of respondents differs slightly for each of the behaviors, only total population sizes for the three modalities are presented here.

SOURCE: Hubbard et al. 1989

Limited information is available about the nature and extent of problems that might be characterized as “impairments or dysfunctions,” and we know even less about how they may affect treatment and outcomes. Comprehensive and standard assessment of the variety of problems presented by clients is needed. Furthermore, how these problems are related to the treatment plan in general, the appropriateness of specific types of treatment, and the need for adjunct

services must be examined. The pattern of drug use and the extent of drug dependence have been found in previous research to be related to the effectiveness of treatment in general, the effectiveness of specific types of treatment, and a variety of treatment outcomes. To categorize client patterns of drug use and the severity of dependence, assessment must consider the types and amounts of substances used, the frequency of use of substances, and the degree of dependence on those substances. The other domains of impairment/ dysfunction that should be assessed include:

- Co-occurring psychiatric problems and their severity
- Neurological or other cognitive impairment
- Basic functioning problems

  -Physical health problems
  -Social functioning problems
  -Vocational and educational deficits

- Crime and criminal justice involvement

The nature and extent of the multiple problems can have important implications for service needs for clients and potential outcomes. Summary measures of impairment and dysfunction would therefore have great utility for the purposes of client evaluation. The results from the TOPS and the ASI suggest that a quantitative composite measure of severity does not summarize effectively the nature and extent of multiple problems. The dimensions of the ASI essentially are unrelated (McLellan et al. 1985), a result that was replicated with the TOPS data. Table 4 shows one typology developed from the TOPS data that considers drug use, psychiatric, criminal, and multiple impairments. This table also illustrates the differing prevalence of impairments across the major types of programs. Such a typology may be a more appropriate and clinically useful method of describing and summarizing multiple problems.

This classification suggests that some types of clients likely will require more extensive resources. From a cost-effectiveness perspective, it is critical to assess the potential benefits from various allocations of resources. Minimally impaired clients should require the fewest resources. Severely impaired clients may require extensive resources whose costs far outweigh the benefits. The matching of therapies to clients offers the most potential to moderately impaired clients (McLellan et al. 1983). A conceptual model of impairment could provide important data to inform clinical practice and the optimal allocation of resources, Minimally impaired clients may need only basic drug abuse counseling,

TABLE 4. *Typology of multiple problems in the year before admission*

Problem	Methadone (%)	Outpatient Residential (%)	Drug Free (%)
Drug abuse only	35.9	13.6	24.3
Drug abuse plus:			
Three or more drug-related problems	13.4	11.2	11.6
Suicidal indicators	7.6	5.6	11.6
Predatory crime	12.1	12.4	8.5
Multiple problems (combinations of the above)	30.6	57.6	44.7
Suicidal and 3+ drug problems	(9.2)	(10.2)	(16.4)
Crime and 3+ drug problems	(9.7)	(19.4)	(8.3)
Crime and suicidal	(3.8)	(5.5)	(6.1)
Crime, suicidal, and 3+ drug problems	(7.9)	(22.5)	(13.9)
	(n=4,184)	(n=2,891)	(n=2,914)

SOURCE: Special analysis for TOPS

whereas severely impaired clients may need long-term basic care and may not benefit from habilitative or rehabilitative services. The major resource allocation and matching decisions will involve those who can benefit most from specific types of services.

CONCLUSION

The major types of publicly funded drug abuse treatment have been shown to be effective, and benefit-cost ratios greater than 1 have been obtained for outpatient methadone, long-term residential, and outpatient drug-free modalities. Such results justify the overall investment in treatment but provide little insight into ways to improve effectiveness and increase benefit-cost ratios. New perspectives are necessary to move beyond this basic information.

If the investment in treatment is to produce a maximum return, multiple approaches and improvements need to be considered in resource allocation. Broader recruitment, more comprehensive assessment, improved services, matching clients to services, increased retention, and an expanded continuum of care need to be considered in terms of their contribution to outcomes. A refined benefit-cost framework of clients and treatment should help provide more precise estimates of these contributions. New frameworks need to include consideration of the following:

- Stage in the treatment career of clients
- Components of treatment structure and process
- Typology of client impairment

Such disaggregation of the entity of "treatment" and its appropriate application to clients of different types is essential. The specific elements and client-treatment matches then can be allocated costs and benefits that should suggest ways to prudently invest new monies for demand reduction. With these expanded frameworks, alternative benefit-cost and cost-effectiveness calculations can be made, and decisions about resource allocation can be better specified.

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Cost-Effectiveness of Drug Abuse Treatment for Primary Prevention of Acquired Immunodeficiency Syndrome: Epidemiologic Considerations

Thomas M. Lampinen

INTRODUCTION

Since the first clinical reports of acquired immunodeficiency syndrome (AIDS) among intravenous drug users (IVDUs) were published and confirmed (Masur et al. 1981; Small et al. 1983), there has been Increasing recognition that IVDUs represent a "second wave" of the human immunodeficiency virus type-l (HIV-l) epidemic in the United States. Nationally, 226,000 (Hahn et al. 1989) to 335,000 (Booth 1968) IVDUs are estimated to be infected with HIV-1 already, and more than 1 million are thought to be at risk (Schuster 1988). Approximately 50 percent of the heterosexually acquired AIDS cases and 75 percent of AIDS cases among children are attributed to the intravenous (IV) use of drugs by a sexual partner or parent, respectively (Hahn et al. 1989). In the South Bronx, where the prevalence of IV drug use is high and heterosexual spread of the virus has been documented, levels of HIV-1 infection among young adults already approach those observed in central Africa (Drucker and Vermund 1989).

Lifetime direct medical costs associated with AIDS currently average $40,000 to $75,000 (Hellinger 1990; Seage et al. 1990), with an increasing trend in Medicaid financing of HIV-related medical care (Green and Arno 1990). The therapeutic use of antiviral agents to slow the progression of disease may increase these costs modestly (Hellinger 1990; Scitovsky et al. 1990). Few studies have compared the costs incurred by IVDUs with those incurred by other groups diagnosed with AIDS. One recent report suggests that such costs may indeed differ, reflecting IVDUs' significantly decreased access to health care services (Hidalgo et al. 1990).

In the absence of any medical interventions (e.g., vaccines), primary prevention of HIV-1 infection among IVDUs through behavioral change is essential. Toward this end, rapid expansion of drug treatment capacity has been recommended by the Public Health Service (Coolfont Report 1988), the National Academy of Sciences/Institute of Medicine (Institute of Medicine 1986), the National Research Council (Turner et al. 1969), and the Presidential Commission on the Human Immunodeficiency Virus Epidemic (1988).

This chapter explores some of the epidemiologic and public health issues involved in evaluating the cost-effectiveness of substance abuse treatment as an AIDS prevention strategy. As a viral disease that is not uniformly distributed among IVDUs in the United States and among subpopulations of IVDUs within urban communities, what data should be used to allocate limited prevention resources both nationally and locally? What outcome measures are appropriate when comparing the cost-effectiveness of two treatment programs or modalities in preventing HIV-1 infection? Finally, what proportion of AIDS prevention monies are best allocated to drug treatment and in which circumstances? That is, are there opportunity costs associated with funding drug treatment expansion instead of alternative prevention strategies that target IVDUs (e.g., outreach education, bleach distribution programs, and syringe exchange programs)?

RESOURCE ALLOCATION

Considerable geographic variation exists in the prevalence of HIV-1 among IVDUs in the United States, ranging from 0 to 65 percent among entrants to drug treatment facilities (Hahn et al. 1989). This suggests that certain geographic areas might benefit from Federal AIDS prevention dollars more than others. Drug treatment resources might be better spent in areas where infection levels are still relatively low but the risk for acquiring HIV-1 infection is high; less money might be spent in areas where HIV-1 infection apparently has not yet been introduced among IVDUs. Are Federal AIDS prevention monies (including those designated for expanded drug treatment capacity) currently allocated to areas where they have the greatest potential for reducing the numbers of new infections among IVDUs?

Typically, most Federal AIDS prevention dollars are designated for only those Standard Metropolitan Statistical Areas with the highest cumulative incidence rates of diagnosed AIDS cases. With regard to prevention of HIV-1 infection among IVDUs, this is unfortunate for two reasons. First, the spectrum of mortality attributable to HIV-1 infection among IVDUs is much greater than that which meets the stringent diagnostic criteria for AIDS (Stoneburner et al. 1988; Selwyn et al. 1989). In effect then, much of HIV-related disease among IVDUs is not considered when resources are allocated nationally. Second, the latency

period between initial HIV-1 infection and the development of AIDS has been estimated to be 10 or more years (Bacchetti and Moss 1969; Greatbatch and Holmes 1989).

Because trends in the diagnosis of the end-stage disease cannot be used to measure reliably current trends In new HIV-1 infections, it is inappropriate to use them as the principal criteria for allocating limited drug treatment resources. More appropriate criteria are needed, such as the results of serologic surveys that assess the prevalence of HIV-1 Infection among IVDUs.

On a national scale, the current HIV-l surveillance effort among IVDUs needs to be expanded significantly and modified to contribute to resource planning efforts. The Centers for Disease Control conducts treatment-based HIV-1 serosurveys of IVDUs in fewer than 50 sites nationwide (Dondero et al. 1988; Hahn et al. 1989). In contrast, no serosurveys are conducted in hundreds of other towns with methadone programs and sizeable numbers of IVDUs.

In Illinois, for example, HIV-1 seroprevalence among IVDUs outside Chicago is not assessed. No surveillance is conducted in smaller communities, including those with methadone programs and sizeable numbers of IVDUs (e.g., Springfield, Peoria, Rockford, and Waukegan, IL, and East St. Louis, MO). In these smaller communities, voluntary antibody testing sites are the sole source for seroprevalence information, despite their known inadequacy for estimating community infection rates (Dondero et al. 1988; Hull et al. 1988; Raymond 1988). Initiation of serologic surveillance is essential In these smaller communities, because the spread of HIV-1 among IVDUs can be rapid once introduced (DesJarlals and Friedman 1988).

In addition to expanded treatment-based sampling, sampling sites will have to be added to the serologic surveillance system to monitor important subpopulations of IVDUs and appropriately direct prevention resources. For example, younger IVDUs with a shorter history of injectable drug use appear to be underrepresented in Chicago treatment-based HIV-1 serosurveys (Lampinen et al. 1989a). Specifically, IVDUs younger than 25 numbered so few in the first 1 P-month sample of treatment program entrants (25 out of 795) that stable estimates of HIV-1 seroprevalence and an assessment of annual trends in this younger group of IVDUs could not be calculated. In contrast, 17.1 percent (155 out of 906) of injectable drug users surveyed in the Cook County jail were younger than 25.

Future serologic surveys will need to sample younger IVDUs, perhaps in jail or prison, to direct AIDS prevention initiatives that target this subpopulation (Vlahov et al. 1991). Additional recommendations for modifying the HIV-1

serologic surveillance system have been proposed by the National Academy of Sciences: agencies considering the use of such data to make informed resource allocation decisions would benefit from their review (Turner et al. 1989).

OUTCOME MEASURES FOR EVALUATING THE COST-EFFECTIVENESS OF DRUG TREATMENT FOR AIDS PREVENTION

Several authors have noted a decreased risk for HIV-1 Infection among IVDUs participating in methadone maintenance programs (Blix and Gronbladh 1988; Brown et al. 1988, 1989; Hartell et al. 1988; Novick et al. 1986, 1986, 1989). Can serologic testing of program participants be used to evaluate which treatment programs or modalities are most cost-effective in preventing AIDS among IVDUs?

It seems intuitively obvious that more successful drug treatment programs should demonstrate lower rates of new HIV-1 infections among their clients than programs that are less successful. Serologic evaluation of program clients is objective, reliable, and inexpensive, and counseling guidelines have been established. In theory, one could test clients serially and compare the risk for becoming infected in different model programs or in different treatment modalities.

Upon closer examination, however, the HIV-l serologic status of clients may not be associated sufficiently with behavioral change to serve as a sensitive outcome measure in cost-effectiveness evaluations. Some IVDUs enrolled in methadone maintenance programs continue to inject drugs intermittently (Ball et al. 1988; Chaisson et al. 1989; Ruben et al. 1989), and the risk for remission and relapse between episodes of treatment is high (Lampinen et al. 1989b; Robertson et al. 1989). Clients who continue to inject have the potential for seriously confounding the cost-effectiveness evaluation of competing drug abuse treatment programs or models.

An important factor that may confound the association between intermittent needle sharing among IVDUs enrolled in a treatment program and their personal risk for acquiring HIV-1 is the infectivity of their needle-sharing partners. Clearly, one IVDU is at higher risk for acquiring HIV-1 from a single needle-sharing episode with a highly infectious partner than another IVDU in a competing program (or city) who frequently continues to share contaminated equipment with individuals not yet infected with HIV-1.

The infectivity of a potential needle-sharing partner can be related to that partners stage of HIV-1 disease or to antiviral therapy. During the course of

HIV-1 infection, the amount of infectious virus in the blood appears to be much higher during two periods: the first few months after acquiring an infection and, years later, in the late stages of disease (Baltimore and Feinberg 1989). In contrast, needle-sharing partners who take antiviral medications may have relatively low infectivity, because such medications appear to initially inhibit the reproduction of the virus (Chaisson et al. 1988).

Periods of high and low infectivity have been shown repeatedly to have very important Implications when modeling the spread of HIV-1 (Anderson et al. 1967; Ahlgren et al. 1990; May and Anderson 1987). Weinstein and colleagues (1989) recently have extended these implications, suggesting that varying levels of partner infectivity can seriously confound cost-effectiveness evaluations of AIDS prevention programs.

The inability to draw clear causal associations between behavioral risk reduction and serologic status underscores the importance of supplementing HIV-1 serologic testing with valid and reliable measures of risk-taking behavior. Considerable attention already has been paid to developing valid measures of self-reported drug use, with and without drug screening (Rouse et al. 1985), but few studies assessing the validity and reliability of more specific needle-sharing surveys have been published (Kipke and Drucker 1989). Professional refinement of survey instruments and interviewer techniques is indicated if cost-effectiveness evaluations are to proceed. From an epidemiologic point of view the comparison of programs or modalities by serologic testing alone appears inappropriate; a combination of self-reported behavior, serologic testing, and perhaps drug screening is preferable when conducting cost-effectiveness evaluations.

ALTERNATIVE AIDS PREVENTION STRATEGIES AND THE OPPORTUNITY COSTS ASSOCIATED WITH DRUG ABUSE TREATMENT APPROACHES

The prevention of AIDS among IVDUs is a public health issue. Drug treatment is one approach to reducing new HIV-1 infections among IVDUs, but alternative strategies also exist. These alternative strategies may be effective and comparatively inexpensive: as such, any discussion of the cost-effectiveness of drug treatment for AIDS prevention must address the possibility of opportunity costs associated with a drug abuse treatment approach. Are there occasions when drug abuse treatment has limited efficacy as an AIDS prevention measure? What is the evidence that alternative strategies also may be effective? What are the comparative costs of alternative strategies?

Limitations of Drug Treatment as an AIDS Prevention Measure

Despite the efficacy of methadone in reducing AIDS-related behaviors among opiate addicts, it is important to acknowledge its significant limitations as an AIDS control measure. As previously discussed, methadone treatment modalities are opiate specific and do not eliminate the injection of other drugs (e.g., cocaine and cyclizine) among clients of treatment programs: the risk of relapse among program entrants is high; and methadone modalities do not reduce the risk of HIV-1 infection among those subpopulations of IVDUs who are unable or unwilling to enter treatment programs, especially recent initiates to drug injection practices. Finally, the creation of new treatment facilities and the expansion of existing programs is a process that typically requires a few years to accomplish (Newmeyer 1989). For cities with intermediate rates of HIV-1 seroprevalence, the time requirements for treatment expansion may result in lost battles against HIV-1 contagion.

Chicago provides a useful case study. Only an estimated 2,045 formal drug treatment slots are available to the estimated 70,000 to 90,000 IVDUs (Chicago Department of Health 1989). A 25-percent increase in capacity using new Federal and State dollars has begun, but in many cases, facilities are experiencing difficulties with municipal zoning regulations and staff shortages that limit their expansion (Chicago Department of Health 1989). Clearly, additional approaches are required to reduce the risk of infection among the estimated 96 percent of IVDUs who are unable to enter treatment.

A similar experience was reported in San Francisco. Moss and Chaisson (1988) have described an attempt to screen large numbers of IVDUs early in the course of an HIV-1 epidemic with the express aim of directing seropositive IVDUs into drug treatment and moderating the epidemic's impact. During the 3 years required to establish and expand programs, however, the number of infected IVDUs doubled.

In those areas where the demand for publicly funded drug treatment slots greatly exceeds the supply (or where only a small minority of IVDUs are enrolled in treatment programs), alternative prevention strategies may be more cost-effective than expansion of treatment facilities, keeping in mind the public health goal of minimizing the numbers of new HIV-1 infections in the community.

Some groups of IVDUs are unlikely to benefit at all from expanded treatment program capacity. Recent initiates into injectable drug use-unlikely to enter treatment for several years and at high risk for HIV-1 infection-are an important example. Previous reports have noted that IVDUs typically become

infected with hepatitis B virus shortly after initiating injectable drug use (Alter et al. 1990). More recently, a Baltimore study (Vlahov et al. 1990) found that 15.1 percent of IVDUs who had begun injecting drugs in the 18 months before serologic evaluation were already infected with HIV-I. These data strongly suggest that other AIDS prevention strategies must complement drug treatment, both to control the epidemic among IVDUs not currently in treatment and to protect IVDUs in treatment programs from HIV-1 infection in the event of intermittent injection or relapse.

Alternative Risk-Reduction Strategies for IVDUe

For those IVDUs unable or unwilling to enter drug abuse treatment programs, AIDS risk-reduction counselors emphasize that the best way to avoid getting AIDS is to stop injecting drugs completely. They recommend the elimination of needle sharing and provide explicit instructions for disinfecting contaminated injection equipment.

To Increase the likelihood of behavior change, many AIDS prevention programs include the distribution of bleach, which has been shown to be relatively nontoxic (Froner et al. 1987) and an effective disinfectant in the laboratory (Resnick et al. 1986) and in syringe disinfection simulations (Newmeyer et al. 1990). The distribution of bleach (in contrast to information dissemination alone) is essential to increase levels of its use among IVDUs (Abdul-Quader et al. 1990; M. Iguchi, personal communication, 1989).

Community-based outreach educators are effective in reaching IVDUs who have no history of enrollment in drug abuse treatment programs. In Chicago, more than 30 percent of IVDUs recruited into the AIDS Outreach Intervention Project study reported no prior drug treatment. This has been observed nationally as well: About 40 percent of the National AIDS Demonstration Research IVDU sample, also recruited out of treatment settings, report no prior history of drug abuse treatment (B. Brown, personal communication, 1990).

Outreach projects promote AIDS risk reduction among the considerable proportion (Ball et al. 1988) of IVDUs who relapse following enrollment in methadone treatment programs (table 1).

Many participants in education and bleach distribution programs have reported reductions In the frequency of their drug injection and needle sharing, entry into drug treatment programs, and Increases in their disinfection of shared injection equipment (Centers for Disease Control 1989, 1990; Turner et al. 1989; Watters et al. 1988). Evaluations of program effectiveness are still in progress (Centers for Disease Control 1990); table 2 summarizes preliminary findings of

intervention programs in Miami, Chicago, Philadelphia, Houston, and San Francisco.

TABLE 1. *Percentage of current IV drug users self-reporting prior methadone maintenance treatment*

City	Sample Size	Prior Treatment (%)
Chicago	661	50.8
Baltimore	115	35.7
Denver	139	36.0
El Paso	92	54.3
San Francisco	741	28.2
Total	1,748	39.2

SOURCE: Lampinen et al. 1989b

Outreach education and bleach distribution have potential for preventing new HIV-1 infections among IVDUs. In view of the lower direct costs of such programs, drug treatment may contribute to the control of community-wide AIDS epidemics, but when employed as the principal AIDS prevention strategy, it may have associated opportunity costs.

This issue has been briefly addressed by Newmeyer (1989) in his discussion of the cost-effectiveness of two alternative prevention strategies. Table 3 suggests that, even if a much smaller proportion than 25 percent of injectable drug users adopt needle disinfection as a result of outreach educational efforts, the cost-effectiveness of such an approach may be considerably greater than methadone maintenance.

Newmeyer (1989) does not question the essential role of drug treatment in controlling AIDS but whether AIDS prevention dollars for IVDUs are being used most cost-effectively. Funding treatment program expansions at the expense of significant outreach education initiatives is unlikely to be cost-effective whenever the number of publicly funded drug treatment slots cannot meet current demand or whenever only a small minority of current injecting drug users are enrolled in treatment programs. In such instances the possible opportunity costs associated with drug treatment strategies should be considered.

TABLE 2. *AIDS outreach education projects reporting IV drug use behaviors at initial and first 6-month followup interviews*

	Baseline (%)	6-Month Reinterview (%)
Entered drug treatment		
Miami (n=376)	14	
Chicago (n=561)	25	
Philadelphia (n=100)	32	
Houston (n=415)	22	
San Francisco (n=132)	35	
Reported *not* sharing drug injection equipment with friends		
Miami	53	74
Chicago	18	47
Philadelphia	30	62
Houston	47	88
San Francisco	39	88
Reported always using bleach for cleaning shared injection equipment		
Miami	3	11
Chicago	10	23
Philadelphia	6	16
Houston	4	19
San Francisco	36	43

SOURCE: Centers for Disease Control 1990

SUMMARY

The prevention of AIDS has justified recent increases in drug abuse treatment expenditures. Three of the epidemiologic considerations involved in assessing the cost-effectiveness of drug treatment for primary prevention of AIDS among IV drug users were discussed. First, the considerable geographic variation in the prevalence of the virus that causes AIDS suggests that areas with relatively

TABLE 3. *Estimated costs of two AIDS prevention strategies*

Prevention Strategy	
Methadone maintenance	
Cost per year per client	$1,600-$2,800
"Efficacy"	75%
Cost per prevented HIV-1 infection	$2,130-$3,730
Community-based outreach education	
Cost per year per client	$50
"Efficacy"	25-50%
Cost per prevented HIV-1 infection	$100-$200

SOURCE: Newmeyer 1989

low infection levels may be more cost-effective targets when allocating limited drug abuse treatment resources. Expansions and modifications in the current national HIV-1 serologic surveillance system will be needed to make informed resource allocation decisions.

Second, when comparing the cost-effectiveness of two alternative treatment modalities or programs, the number of new HIV-1 infections does not appear to be an appropriate outcome measure. Serologic testing should be supplemented with self-reported drug use behaviors, with or without drug testing.

Finally, significant opportunity costs may be associated with employing drug abuse treatment as the principal approach to primary prevention of HIV-1 infection among IVDUs, when alternative and complementary approaches are also effective. Specifically, treatment expansion is unlikely to be cost-effective when the demand for publicly funded treatment slots exceeds the number available and in communities where only a small minority of IVDUs are enrolled in treatment.

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Policy-Relevant Research on Drug Treatment

Dean R. Gerstein

INTRODUCTION

Over the past decade, much of the federally sponsored research portfolio directed toward drug treatment has been driven by questions such as, What brain structures and functions are compromised when cocaine, heroin, or marijuana is consumed? What new and better technologies for addiction treatment, particularly new medicines, can be discovered and tested in the laboratory or research clinic? The results of such research ultimately may be invaluable to public decisionmakers responsible for setting and implementing policy in the treatment system. Currently, however, these lines of research tend to have little bearing on questions faced by public policymakers; however, this is not necessarily a sign of poor management. Science is inherently unpredictable, and much knowledge that is useful to public policy has resulted from research that followed its own path. The impossibility of predicting which paths will end where makes it foolish to inhibit scientific dynamism by leashing it too tightly to a detailed policy agenda.

Nevertheless, much useful knowledge has resulted from research that is grounded in explicit policy questions, This chapter lays out the framework of policy questions about drug treatment and outlines an agenda of research issues and initiatives that appear most pertinent to help answer those questions.

The following discussions have antecedents in a recent Institute of Medicine (IOM) report on the evolution, effectiveness, and financing of drug treatment (Gerstein and Harwood 1990a). The intention here is not to summarize the IOM report (for a summary, see Gerstein and Harwood 1990b or Gerstein and Lewin 1990). Rather, this chapter begins with fundamental policy questions and recommendations about drug treatment that are presented in the IOM report (chapter 7, “Public Coverage,” pp. 220-272) and proceeds to consider some of their research implications,

All the research implications of the specified policy questions are not treated in-depth. First, research recommendations appropriate to each question are outlined briefly. In subsequent sections more detailed points are chosen for selective discussion, namely, studies of the societal cost of illness, treatment-seeking behavior, cost-effectiveness and cost-benefits of treatment, priority populations, Federal and State roles, and financial mechanisms.

POLICY QUESTIONS: AN OUTLINE OF RELEVANT RESEARCH

Policy consists mostly of two elements: ends and means. The principal questions about the ends of drug treatment policy in the United States, according to the IOM report, are as follows:

- What are the fundamental principles that justify continuing public financial support of drug treatment?
- What specific priorities should guide spending for public programs?
- What is the optimal level of public spending to implement these priorities?

Although questions about the ends that guide policy tend to be general in form, questions about the means tend to be particular to current circumstances. Currently, these questions are as follows:

- How should responsibilities be allocated among the different levels of government and especially between the two levels that have the major responsibilities for financing public treatment, the Federal Government and the States?
- Which financial mechanisms should be used to support treatment services? The fundamental choice lies between two models: the insurance approach and the direct service approach.
- What kinds of controls, disciplines, and incentives should be used to ensure appropriate and effective expenditure decisions?

Principles Underlying Public Support

According to the IOM report, three basic principles justify public support of drug treatment, all deriving from long-established political traditions, The first principle is that public policies should seek to reduce external social costs-in particular those relating to crime, family role dysfunctions, and welfare dependency. The second is that public policies should remove access barriers

arising from inadequate income. The third is that there should be a minimum or greater probability of a positive response to treatment.

Sensitivity to the first principle, reducing the external costs borne by society, motivates cost-of-illness (COI) studies, which have been helpful in legitimizing action on drug problems. More attention needs to be paid to partitioning the social cost elements that are linked specifically to treatment needs and issues. There also should be greater exploitation of the methodological opportunities inherent in such comprehensive studies. Finally, the "real-time" value of COI studies for policy would be augmented greatly If a cost-sensitive, cost-interpretable set of leading COI indicators could be assessed on an annual basis.

The second principle is removing financial barriers to treatment. The significance of such barriers in terms of treatment-seeking behavior is still unclear. A research program to illuminate the role of purely financial constraints in limiting access to treatment is needed, beginning with case studies and focus group methods and leading to incorporation of key items into several relevant large-scale surveys.

The third principle is that treatment should be limited to those individuals who probably will respond positively to treatment. In practice, because prognosis is subject to much uncertainty and because the final cost of treatment and the outcome of treatment are so closely related to retention, this principle has not received much attention. Individuals with firmer social supports at intake are likely to be doing better at followup and also tend to draw proportionately less on treatment resources; however, these individuals also probably generate the least external social costs. Studies of treatment effectiveness, costs, and benefits would give life to the principle of treating only those who can benefit, even though only a relative handful of chronic nonbenefiters is likely to be clearly identifiable.

Priorities for Public Support

Four priorities for public support are Identified by the IOM report. The first priority is timely access to treatment. Program applicant waiting lists, the best existing measure, are too heterogeneous to be meaningful. Research is needed on the time course of treatment-seeking behavior, on the influence of coercive factors and family history in affecting that course, and on which program actions or other forms of public agency behavior are most important.

The second priority is treatment improvement. The major research need in this area is to better understand caregiver behavior. What qualities make some

counseling professionals more (or less) successful than others? Can these qualities be taught or untaught? What organizational arrangements and incentives generate better caregiving? More generally, a layered system of services research is needed to understand performance variation among programs.

The third priority is services to maternal populations-women who are pregnant or raising children. Because there Is generally a clustering of service needs in these populations, what is the most effective way to package these services? Should there be a focus on putting different agencies in the same location, on tightening referral networks by providing interfacility transportation services to clients, on central case assignment, or on putting all service responsibilities in a specialized drug treatment agency?

The final priority is criminal justice populations. Research needs to be coordinated between the National Institute on Drug Abuse (NIDA) and criminal justice research and service agencies such as the Bureau of Justice Statistics, Bureau of Justice Assistance, National Institute of Justice, National Institute of Corrections, and Bureau of Prisons, Major research designs should use common definitions and items. Criminal justice institutions also provide good possibilities for enhanced sample followup and full or quasi-experimental control,

Optimal Levels of Expenditure

In theory, it is possible to define the right level of drug treatment expenditures by analyzing the specific preferences of the population and the costs and benefits of various policy options in terms of these preferences. However, data requirements to estimate the theoretical coefficients exceed current capabilities, and such econometric calculations do not correspond to the realities of collective decision processes, In practice, the optimal approach can be estimated only by surveying treatment needs in light of the previously reviewed principles and priorities and then matching these needs against competing budget initiatives in the political process,

Other health care and criminal justice expenditures are climbing steadily, and they seem immune to cost-benefit considerations. The only explanation for this disparity relative to drug treatment expenditures is the peculiar moral interpretation of drug problems as an uncomfortable mixture of crime and illness. A morally neutral calculus appears to be an attractive way to avoid this discomfort, but avoiding it is not possible. Research should focus on questions of improving effectiveness and managing costs, because these questions provide the major bases for discussions of the treatment contribution to broader policy goals.

Federal and State Roles

The relationship between Federal and State Governments in developing the treatment system and the way it has affected the development of the system has not been given adequate research attention, Intergovernmental relationships within the Federal system are too important to be left to a few experienced hands as arcane knowledge. Documentation and analytical projects should focus on how accountability is best preserved and encouraged in this complex, hierarchical system.

Mechanismo of Finance

There are two main ways for a third-party payer to finance services: (1) provide grants or contracts to providers who will observe appropriate eligibility standards for supported clients or (2) provide vouchers or certificates to clients and let them choose freely among providers meeting appropriate licensing standards, Most public drug treatment services are supported by grant or contract awards. The differential effects of the two systems are uncertain. More precisely, what effects would occur if fee-for-service Medicaid were more widely used, as recommended by the IOM report?

Incentives

How can regulatory and funding environments reward good program performance and punish poor program performance without rewarding programs for excluding difficult cases and punishing them for taking their share of such cases? An accounting function must be researched, analyzed, built into the system, and continuously studied and upgraded to yield the best combination of routine data collection, periodic independent inspection, reporting, and feedback.

THE FUNCTIONS OF COST-OF-ILLNESS STUDIES

Individuals who meet diagnostic criteria for drug treatment (whether or not they are interested in entering treatment) generally impose serious burdens on other members of society. The harm to victims of violent crime, the damage to the well-being and future prospects of the individual's family, the risk of transmitting hepatitis or human immunodeficiency virus infection, and other burdens are called external costs. As a rule, programs to deal with specific social problems are established when the sum of the social costs is demonstrably high enough to warrant attention.

COI studies fill this demonstrative role. The purpose of COI studies is to determine the value that illness subtracts from the productive potential of a large social unit, such as a nation. However, the uses of COI studies extend to four categories: political legitimation, research budget formation, substantive research review, and problem surveillance.

Political Legitimation

Political legitimation reflects the fact that any demand for public services on a broad scale must be translated into a recognized form of political discourse to receive a response. COI studies translate a variety of statistical elements and research findings, which vary in precision and lie in diverse realms of cost accounting, Into money, the most common unit of national political discussion. By expressing problems in financial terms, COI studies help to stimulate public supply or purchase of those services.

Money is not the only term of political discussion. National decisionmakers also count violent deaths, sometimes one at a time. A few shocking fatalities, adequately publicized, may be worth billions of dollars in cost accounting. Although COI studies are thus not the only factor in drawing political attention to the drug problem, it would be a mistake to think that the focus on drug-related deaths in recent years renders superfluous the COI legitimizing mechanism.

COI studies do have a serious defect as a legitimation mechanism for treatment services: They assimilate all drug problems into the paradigm of illness. As the IOM report documents (see chapter 2, pp. 40-57; also Courtwright 1991), drug problems are viewed as criminal and medical in nature. A methodology is badly needed that could begin to disaggregate the cost of drug use from the cost of abuse and dependence. An estimate of how total drug consumption distributes across these categories could be accomplished by appropriate analysis of survey data. A further step would be to estimate how much greater the total COI would be if no treatment were available, instead of the 1 million annual admissions, and how much less the COI might be if more and better treatment were delivered.

Research Budget Formation

The second area of application of COI estimation is research budget formation. A research budget is a portfolio of investments. Intelligent portfolio managers recognize that every investment bears some degree of risk, and this certainly applies to scientific research projects. The principle of diversification-spreading the eggs across different baskets-is the method of choice to protect against such risk. For national investment purposes, the major baskets of

health research are the various institutes of the Public Health Service with their specific disease categories, including cancer, dental, heart/lung/blood, neurological and communicative disorders and stroke, aging, and drug abuse. (The Centers for Disease Control, National Center for Health Statistics, Agency for Health Care Policy Research, etc., represent a different calculus.) The question is: How many eggs-dollars-does each institutional basket deserve?

In the annual cycle of Federal appropriations, the institutes and their constituent interests develop claims for future resources by employing two types of expansionary arguments: the quantity of high-quality research that realistically can be conducted and the relative importance of the illnesses on which each institute conducts research. The first element generally is measured by the number of qualified grant proposals left unfunded in the previous budget cycle (especially disappointed are proposers who were senior, established contributors or young, promising assistant professors). The second element is measured by COI studies, Indeed, according to Rice and colleagues (this volume), the first COI studies were constituted specifically to document that certain diseases were chronically shortchanged in Public Health Service budget requests.

This competitive use of COI numbers has gone virtually unremarked in the science policy literature. There is a need to consider both the theoretical and historical underpinnings for the use of COI analyses as strategic planning instruments. Comparative review of COI studies is needed to standardize the method of allocating research investments against the different cost accounts, including the problem of chronic overaccounting for total illness costs, to which the COI approach, in service to budget-expansion goals, lends itself.

Substantive Research Review

The third role of COI studies, substantive research review, is more directly methodological. The first task of a COI study is to assess the literature on the social and economic consequences of the illness and to assemble and assess the statistical data systems that provide quantitative estimates of these consequences. Moreover, because consequences such as job loss, disability, or criminal activity are not exclusively the result of a specific illness but of comorbid, collateral, or entirely unrelated processes, this review must consider the broader literatures on such consequences and the etiologic role of the illness in all these connections.

Those charged to perform COI studies are therefore in an excellent position, if they do their work thoroughly, to identify deficiencies in health statistics and other statistical data systems and to consider how these deficiencies might be

remedied. The explicit use of COI study processes as leverage for methodological improvements, such as standardization of items, calibration of scaling procedures, or correlation of sampling frames in data collection efforts, should be made a cardinal consideration in designing future COI studies.

Problem Surveillance

In none of the functions just mentioned is it essential that COI studies be highly accurate, For purposes of legitimizing political concern, it does not matter whether the drug problem involves $20 billion, $30 billion, or $60 billion; it is more a question of the order of magnitude-less than $1 billion, $1 to $9 billion, $10 to $99 billion, and so on. Precision is somewhat more important for the purpose of research budget formation; in most cases the contrasts between different diseases are in half-orders of magnitude or more. Finally, as an exercise in scientific review, the contribution of COI studies is greater the less precise the result, that is, the less accurate the result, the greater the value in identifying where and how the data need to be improved.

The fourth task, ongoing problem surveillance, entails the possibility that COI studies may be moderately precise, at least in terms of the stability of their assumptions and errors over time. If this is the case, such studies would help answer what is often the most critical and contentious policy question: Is the problem getting worse or better? To do this, however, COI studies need to be performed more often than once every 5 years and with a reporting lag considerably less than the 4 to 5 years that has existed in the alcohol, drug, and mental health field. An ongoing surveillance effort cannot and need not routinely cover every item used in a comprehensive national COI study. It should select leading indicators that correspond closely with major COI elements. The occasional comprehensive studies can be used to recalibrate and revise the indicator set. The “real-time” policy value of COI would be augmented greatly if cost-sensitive, cost-interpretable leading indicator sets could be assessed on an annual or more frequent basis,

RESEARCH ON TREATMENT-SEEKING BEHAVIOR

Many individuals who are interested in obtaining treatment seem to be restrained from doing so by two factors: their own financial limitations and the limited capacity of publicly supported programs. These are not the only factors that affect treatment-seeking behavior; there are indications in the literature about the significance of coercive factors and the short- and long-term role of family history. But these indications are from an earlier generation of research and must be validated and extended to current conditions. All the factors that influence treatment-seeking behavior present important opportunities for research and policy.

Some people are too poor to afford the cost of treatment. Society has taken a broad ethical position applicable to such circumstances-that there are certain services, drug treatment arguably among them, that should not be denied to anyone in need because the individual cannot pay for them. However, the significance of funding considerations in drug treatment-seeking behavior is unknown.

Much of the interest in research on money constraints is now directed toward the extent and adequacy of insurance coverage (Woodward and Cartwright, this volume). Insurance benefits are an important factor for most Americans, but these are not the only private financial asset available to pay for treatment. To better understand the role of money in treatment-seeking behavior, survey work also is needed on the role of income, savings, liquidations, and formal and informal credit lines. This research must begin with case studies on instances in which public and private sources of similar treatments are available, in parallel or serially (Anglin et al. 1989). Focus groups should be convened to determine how such financial considerations enter the decisionmaking process on treatment application and admission. Focus group members should include intake personnel as well as individuals in treatment and current and potential applicants. These results can be incorporated into the piloting of pertinent items in several relevant surveys of treatment institutions and household-based and other population samples.

The most recent estimate of the number of individuals for whom treatment is delayed (or even denied) due to capacity limitations is from a survey conducted by the National Association of State Alcohol and Drug Abuse Directors in September 1989, which indicated that 66,000 individuals were awaiting treatment admission. Although this seems to be a modest number from a national perspective, this figure is equivalent to more than one-fourth of the total daily enrollment in public drug treatment programs. Unfortunately, although waiting lists are the best available indicator of the existence of unmet desire for treatment, they are not meaningful for quantitative analysis. Drug treatment waiting lists, unlike surgical appointment schedules or theater ticket lines, are notoriously volatile. Programs that have waiting lists have found that they attract even longer waiting lists when they are able to accelerate admissions as a result of expanded capacity. Better measures of desire for treatment must be developed, and there is a need to understand precisely how treatment program actions and other public agency actions affect treatment-seeking behavior.

STUDIES OF TREATMENT COSTS, EFFICIENCY, AND EFFECTIVENESS

The frequency of requests for studies of the cost-effectiveness and cost-benefits (CE/CB) of drug treatment seems to be caused by the desire to

minimize expenditures and maximize return on the dollar. However, this economic explanation is incomplete. Consider the contrast with other major social expenditures. Although concern about health care costs is rising, many health services are provided without worrying about the cost in areas such as cancer, heart disease, nursing care for the permanently feeble, end-stage renal disease (the only diagnosis with a population-wide Medicare entitlement), and many other serious conditions. Cost controls become a factor, if at all, at the level of access-Will the person be treated at all, based on eligibility criteria or availability of beds or clinician time? The major decision unit is the hospital-day: in or out?

In other social policy domains, the question of CE/CB is seldom broached. Are prisons cost-beneficial? Are courts cost-effective? How about colleges and universities? This is not to say that cost considerations never arise in these domains or that resources are not allocated with some consideration of how to economize in their expenditure. However, one does not hear a recurrent demand in these areas for quantitative research that justifies cost levels in terms of measured results of particular expenditures.

The demand for CE/CB measures in drug treatment programs represents something deeper than a desire for efficiency. Underlying it is an uneasiness about the moral qualities of people in treatment and questions about some of the people who are providing the treatment. For those in treatment there is the question of the degree to which the illness has been chosen by them rather than visited upon them. Why should the public be asked to help pay for the consequences of their choices? If it is pointed out that alcoholics are not denied treatment for liver cirrhosis and other gastrointestinal ailments, nor smokers denied treatment for lung cancer and coronary heart disease, and that these, too, are the results of choices, the response is that alcohol and cigarettes are legal, and cocaine, heroin, and marijuana are not. This is not a medical distinction, but a moral one.

For providers, the question is: If the illness being treated has been chosen, then is treatment really necessary to revise that choice? These questions reverberate particularly for private-sector providers that advertise their services far more aggressively than do other health care service providers. The high cost of certain cases, particularly of treating troubled adolescents in psychiatric hospitals, has been widely and skeptically publicized. All drug treatment providers are harmed by such skepticism.

There is no escaping the demand for CE/CB 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. It is

essential that treatment-oriented research (whether oriented to preclinical studies, clinical trials, or program evaluation) collect data, however crude they might be, on the costs of delivering the interventions being studied. Research also should determine the effects of interventions on different types of admissions and after treatment is initiated. Only if the framework is built into research programs at every level is there likely to be accurate accounting for different elements within broad program types, Especially significant is the need to look at the CE/CB of mechanisms such as following up on intake contacts to try to decrease initial attrition and concentrating resources on those who show signs of dropping out of treatment.

Research findings over the past 20 years have documented large variations in program performance, and there is consistent correlation between time spent in treatment and outcome. However, the evidence regarding the specific components of drug treatment that make it effective and attractive is based only on a scattering of careful studies of methadone programs, the consensus judgment of experienced clinicians, and organizational common sense. Core questions on the differences among the various modalities of public treatment are, What client and program factors influence treatment retention, efficacy, and relapse after treatment? How can these factors be better managed? What are the relations of treatment performance (i.e., differential outcomes, taking initial client characteristics into account), the content and organization of treatment (specific site arrangements, service offerings, therapeutic approaches, staffing practices), and the costs of treatment?

The competence, quality, and continuity of individual caregivers are likely to be critical elements in explaining the differential effectiveness of treatment programs. There are persuasive reasons to think that some personal characteristics, learned skills, and procedures followed by individual drug counselors and other clinicians contribute to measurable differences in clients' performance. Treatment professionals usually can detect or recognize these qualities, but studies are needed to characterize the critical elements more objectively, measure their relative importance, and define and test improvement strategies.

It is also critical to study more people who do not enter treatment, using assessment instruments comparable to those used in treatment-based studies, and including assessment of treatment-seeking behavior and motives. Although early dropouts for whom adequate measures were obtained are a good comparison group for multivariate study, it is imperative that untreated controls be studied to reduce the margins of doubt around nonexperimental results.

Despite the difficulties of maintaining the integrity of controlled experiments in treatment programs, these studies provide the most indisputable evidence about comparative treatment effects, and efforts to conduct them should be strongly encouraged. A more detailed understanding of treatment processes through ethnographic and case study methods also is needed. This work is not only informative but also forms the basis for the design and interpretation of survey instruments.

Some of the most compelling results of treatment research have come from large longitudinal studies involving thousands of clients: the Drug Abuse Reporting Program, which included a 12-year followup (Simpson and Friend 1988), the Treatment Outcome Prospective Study (TOPS) (Hubbard et al. 1989), and the Drug Abuse Treatment Outcome Study, now under way. Although some earlier findings such as the importance of time spent in treatment probably will hold up in the face of changing drug markets, others may not. Certainly, intervals of 10 years between major treatment followup studies are far too long. There Is enough variation across time in the character of drug epidemiology to require a more continuous sampling of treatment admissions.

In summary, a layered system of program evaluation is needed. Certain information (a "minimum data set" including admission and discharge status) should be collected for every client. More detailed information should be coded at admission and obtained at followup (whether before or after discharge) on carefully selected study panels-which should not exclude early dropouts or those who began but did not complete the admissions process-at 1-year, 3-year, and 10-year Intervals after initial contact. New study panels composed of 3-year entry cohorts should begin at intervals no greater than 5 years.

REACHING PRIORITY POPULATIONS: YOUNG MOTHERS AND CRIMINAL JUSTICE CASES

The IOM report identifies two groups as priorities for attention by the treatment system: young mothers (either pregnant or raising children) and individuals (predominantly young men) who are in prison, on probation, or on parole.

The responses of adult males 20 to 40 years old, who are the majority of individuals in treatment, dominate treatment research statistics. Major research findings on the effectiveness of different modalities and elements of treatment seem to apply roughly as well to women with young children as they do to the more prevalent demographic groups (Hubbard et al. 1989). Yet the significance of childbearing and childrearing women is great in terms of the future benefits of present treatment (or the future costs of present nontreatment).

It seems clear from earlier studies that women in treatment who are pregnant or have young children are especially likely to bring complex needs to the treatment system (Beschner et al. 1981; Reed et al. 1982), but there are few programs with appropriately tailored services, especially for pregnant women. Reaching more pregnant women seems to require active and expensive outreach, an expenditure that adds substantially to the costs of drug treatment, prenatal care, and other services. Although no study has examined specifically the number of expectant mothers In drug treatment, applying the roughly 10-percent annual fertility rate for women demographically similar to women currently in treatment indicates that about 30,000 expectant women receive some drug treatment each year. The IOM report estimated that 105,000 pregnant women a year need treatment.

Because generally there Is a collection of service needs in these families, what is the best way to address them? Should there be a focus on contiguity, putting different service agencies in the same location; on tighter referral through communication protocols and transportation services; on central case assignment; or on building specialized drug treatment agencies that incorporate the typically needed services internally? These questions require comparative case studies focusing on enabling conditions, relative costs, and effectiveness of alternative approaches.

In 1985 about 25 percent of public-tier clients in 14 States were under probation or parole supervision. Extrapolated to the national level, this percentage translates into a daily census of 55,000 community-based criminal justice clients. In addition, 30,000 to 50,000 prison inmates were in treatment, although these estimates include less specialized counseling, education, and self-help group meetings. When rates of flowthrough treatment are taken into account, these figures indicate a 10- to 20-percent rate of treatment among criminal justice clients who need treatment.

These individuals constitute the group whose imposition of high external costs represents the *raison d'être* of the public tier. A central lesson of research to date is that treatment, far from being antithetical to the criminal justice system, is complementary to it, sharing its principal goals and offering a resource that may permit more efficient use of enforcement, correctional, and judicial facilities and resources.

Collaborative and coordinating arrangements with the National Institute of Justice, the Bureau of Justice Statistics, the National Institute of Corrections, and other relevant agencies in the Department of Justice and other Federal departments should be extended. More extensive relationships would encourage technical improvements such as the inclusion of items to facilitate

synthesis with data from criminal justice populations in epidemiological and treatment surveys. For example, treatment applicants should be surveyed to determine the number and type of emergency room admissions and arrests they have undergone during the year before treatment. This survey would build baseline data for outcomes research and provide calibrations with respect to the Drug Abuse Warning Network and Drug Use Forecasting data systems. It is worth noting that the criminal justice system provides resources for good sample followup (Vaillant 1988; Anglin 1988) and quasi-experimental control (Falkin et al. 1990) that may improve the results of treatment research.

FEDERAL AND STATE ROLES

The high point of centralized Federal command of the drug treatment system occurred during the early 1970s the period of the Special Action Office for Drug Abuse Prevention (SAODAP) (Courtwright 1991; Besteman 1991). SAODAP negotiated directly with local treatment providers, specified the nature of the treatments to be delivered, set reimbursement rates based on those specifications, provided technical assistance to program managers, and organized and delivered clinical and management training to treatment staff. It also created a nationally standardized client-oriented data acquisition process to monitor the performance of treatment programs.

As the rapid growth of the treatment system outstripped SAODAP's capacity to maintain oversight, responsibility for administering Federal funding and for covering any shortfalls in financial support was turned over largely to other authorities, predominantly single-state agencies, By 1981 nearly 90 percent of Federal support to community-based treatment was routed through the State agencies,

The Omnibus Budget Reconciliation Act of 1981 consolidated State control of the national treatment system. All community-based categorical funding from the Federal level was combined into a block grant to each State to cover alcohol, drug, and mental health services, virtually giving States sovereign responsibility for the shape and vitality of the public drug treatment system. This responsibility included deciding how much drug treatment would be provided out of the combination of alcohol, drug, and mental health services funds and State appropriations, allocating monies among programs and localities, maintaining or revising treatment protocols and staffing and other requirements, monitoring program performance, delivering technical assistance and training services, and setting reimbursement rates.

Federally managed data systems that had monitored treatment were discontinued, leaving only a semblance of national information about how

treatment dollars were being spent and to what effect, For example, there was a 5-year gap in conducting the national survey of treatment providers; the national TOPS closed prematurely; and the client-oriented data acquisition process was terminated, although a dozen or so States elected to retain elements of that system and provide data summaries to NIDA. Between 1986 and 1990 there was a major expansion of Federal treatment funding but little change in Federal or State roles.

The IOM report expresses serious doubts that the block grant system of automatic spending formulas is the best way to use Federal authority under the current circumstances. In lieu of fixed formulas for the allocation of funds received by the States, the report recommends that State agencies be required to submit plans that analyze the conjunctions and mismatches among the most current epidemiological information and known treatment capabilities. It further recommends that the States propose annual spending patterns that reflect this information. Finally, It recommends that performance data be collected to indicate whether actual spending details departed from the plan, and if so, why, with analysis, explanation, and adjustment in the subsequent plan. An independent analysis of each State's performance with respect to its planning goals and control of resources would have to be developed and submitted in a report to Congress on an annual or biannual basis.

Whatever the fate of these particular recommendations to rationalize the system with appropriate research and management information, the organizational history of drug treatment policy and program development is important and should not be relegated to the personal knowledge of a few "old hands" whose objectivity is conditioned by their particular experiences. The Department of Defense supports studies in contemporary and historical military organizations and considers those studies necessary to its mission. The Department of State maintains a program of regional studies in diplomatic historiography. The National Science Foundation provides programmatic support to studies on the sociology and history of science. The National Institute on Alcohol Abuse and Alcoholism has supported conferences and ongoing research on the history of alcohol problems. Considered in this context, there has not been adequate research attention paid to the relation between the Federal and State Governments in developing the treatment system and the way it has affected the development of the system. There needs to be a program of documentary and analytical studies on intergovernmental relations, focusing on the question of how accountability is best preserved and encouraged.

FINANCIAL MECHANISMS, CONTROLS, AND INCENTIVES

There are two ways for a third-party payer to finance health and social services: provide grants or contracts to providers (with eligibility standards for their

clients) or provide vouchers or certificates to clients and let them choose among licensed providers. Most public support for drug treatment services is via grants and contracts. The major reasons to seek a greater role for public insurance, particularly Medicaid, are that public insurance (1) has already proven to be a useful revenue source for drug treatment in some States (particularly those with expansive eligibility standards), (2) helps to "mainstream" and hence legitimize drug treatment, and (3) sets an example of coverage for private insurance (mostly because of the Medicaid program's emphasis on providing maternal and child health care). The limits on Medicaid reimbursement rates for specific services have made this system look increasingly like a direct service grant arrangement, because a small fraction of the providers ("Medicaid hospitals" and "Medicaid doctors") are furnishing the majority of the reimbursed care.

The presumptive advantage of an insurance system is consumer freedom of choice, but between low reimbursement rates and the further problem of zoning limitations that constrain new drug treatment programs from opening and older ones from expanding their capacity, this advantage may be entirely hypothetical. Therefore, what would change if, as recommended by the IOM committee, there was substantial movement toward greater use of Medicaid to support drug treatment? The States where this already is happening should furnish ready lessons, and the expansion of benefits eligibility in the 1990 budget provides a further opportunity to learn.

Beyond financial considerations, there is not enough knowledge about the "not in my back yard" problem in siting community drug treatment programs. There is currently a NIDA-sponsored market research project (Technical Assistance and Training Corporation 1989) to create technical assistance materials to overcome this treatment barrier. Research support for definitive studies of program site effects such as effects on local real estate values and criminal victimization rates would provide a better foundation for such work.

Whatever form of financing is used, the IOM report advocates more rigorous and universal utilization management. Utilization management describes arrangements to define access to effective treatment while keeping costs at efficient levels (Gray and Field 1989). Good utilization management works to ensure that a fully appropriate and needed range of services is used and that service components are coordinated. The fundamental principle of such management is that access to and utilization of care be controlled and managed on a case basis by "neutral gatekeepers" or central intake personnel (although the central intake function may be dispersed geographically). The IOM report recommends that, whatever the form of financing, client assessment, referral, and monitoring of progress in treatment be reviewed or performed independently of the treatment provider. The major concern is the

use of high-cost treatment when lower cost alternatives could be as effective, a hazard attached principally to acute-care hospital inpatient services.

The scientific basis of drug treatment utilization management is rudimentary; of particular importance Is the need to refine clinical judgment about the probability of the client responding positively to specific forms of treatment. As the most important and immediately needed requirement, the IOM report recommends that all drug treatment programs receiving public support be required to participate in a client-oriented data system that reports client characteristics, retention, and progress indicators at admission, during treatment, at discharge, and (on a reasonable sampling basis) at one or more followup points. There should be periodic independent investigations on a sampling basis of the quality and accuracy of these data systems, and they should be designed to dovetail with ongoing services research and data collection in other government agencies and units concerned with drug problems.

A great deal of policy development is based on the belief that external regulations and data requirements can shape the way that treatment programs deliver services. This undoubtedly is valid to some degree, but a research program is needed to examine such incentive effects. Without a focused research effort, there will not be an adequate basis for knowing how regulatory and funding environments can operate to reward good program performance and punish poor performance without making categorical mistakes like rewarding programs for excluding clients who are most in need of help and punishing programs that take more than their share of hard cases.

CONCLUSION

The services research program outlined in the beginning of this chapter and partially described in the later sections should help over a period of several years to illuminate policy concerns about the drug treatment system and improve the system. Of course, no program of policy-directed research, no matter how sensible or wise, is going to successfully answer every question addressed. Neither will all policy-relevant research findings arise exclusively from policy-directed research unless all other types are unwisely suppressed. The Federal research program on drug treatment should define its objectives and actively manage its portfolio of grants, contracts, and cooperative agreements according to an overall vision of the policy issues, while remaining open to serendipity, second thoughts, and the occasional need for a completely fresh look at the agenda.

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Community-Based Drug Treatment Reimbursement: Progress and Barriers

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INTRODUCTION

In this chapter a "community-based" provider is defined as any noninstitutional provider located in the community where its user population resides. Community-based providers generally provide services on an outpatient basis to patients at locations close to where the patients reside. The treatment received by residents of halfway houses and small residential treatment facilities may be considered to be community-based, depending primarily on their location and noninstitutional classification.

Twenty years ago any discussion of financing of community-based and hospital-based drug abuse treatment would have been largely limited to that provided through Federal grants. Fifteen years ago third-party reimbursements were a minuscule component of the budgets of community-based providers but a significant and fast-growing component for the institutional providers. This trend was being watched closely until the advent of the block grants to States for drug abuse in 1981 when information on the extent and mix of sources of funding became more difficult to obtain. Five years ago a discussion of public and private sector issues on alcohol and drug abuse began with apologies for the lack of hard, comprehensive data (Jacob 1985), but the report went on to point out that there were signs of an increasing flow of reimbursements for alcohol and other drug abuse treatment, most of it flowing to hospitals.

The situation with respect to the availability of comprehensive data is not much better today, but the positive signs of continuing improvement in the flow of third-party funding continue for community- and hospital-based drug treatment services. Furthermore, there are several reasons for an increasingly optimistic picture of the prospects for third-party reimbursement for drug abuse treatment, particularly for community-based service providers.

This chapter describes some of the indicators of improved third-party reimbursements for community-based drug abuse treatment and outlines barriers to expansion of third-party coverage. Then several examples of current developments that support a generally optimistic perspective on further expansion in third-party reimbursement are outlined. This overview is followed by an outline of gaps in our knowledge that limit rational policymaking regarding coverage of drug abuse treatment options and in devising appropriate reimbursement systems. The chapter also includes an example of current research with a State Medicaid program that illustrates some of the methodological problems in drug abuse treatment financing research.

INDICATORS OF IMPROVED THIRD-PARTY REIMBURSEMENT

Third-party reimbursement for drug abuse treatment has been limited historically through several avenues:

- Denial of coverage for treatment on the basis that drug abuse is a self-inflicted condition rather than a disease

- Limitations as to eligible providers of drug abuse treatment, restricting the covered services to those offered by hospitals

- Requirements of large cost-sharing by the insured and limitations permitting only nominal annual or lifetime utilization and reimbursed costs

Comprehensive and detailed information on the extent to which many private-sector health insurance plans provide reimbursement for drug abuse has been limited. Insurance firms tend to combine information on alcohol and drug abuse coverage, limitations on coverage, and utilization reports under the general rubric of "substance abuse." Employers also have selected differing ways to deal with various aspects of drug abuse treatment such that obtaining data that can be compared or aggregated across employers is difficult.

The 1988 Bureau of Labor Statistics (BLS) survey of employee benefits in medium and large firms found, for example, that 50 percent of the employees of such firms are covered by employee assistance programs (EAPs), which increasingly are being used to manage referral for alcohol and other drug abuse treatment, provide utilization review, and directly provide limited counseling to employees and family members. Some employers also have established special programs outside their basic health benefits plan that cover health promotion, prevention, and behavioral modification regarding smoking, substance abuse, and other high-risk behavior. Thus, for example, the Wyatt Company's annual group benefits survey, which covers large numbers of

employers and which previously distinguished drug abuse treatment from alcohol abuse treatment as a covered benefit, now gives only combined information for alcohol and drug abuse (Wyatt Company 1989).

Despite these limitations, the Wyatt Company survey results for 1986 compared with those for 1968 can be used to infer progress in drug abuse treatment coverage. In 1986, 68 percent of responding employers reported coverage of drug abuse compared to 67 percent offering coverage for alcohol treatment (Wyatt Company 1987). The 1988 survey reported that 76 percent of employers covered both alcohol and drug abuse treatment. The changes in the Wyatt data from 1986 to 1988 are consistent with those reported from the BLS survey of employee benefits. BLS reported that 74 percent of employees had coverage for drug abuse, while 80 percent of employees had alcohol treatment coverage in 1988 (Bureau of Labor Statistics 1989). The 1989 BLS survey found that the coverage for drug abuse treatment had jumped to 88 percent of employees of medium to large firms (Bureau of Labor Statistics 1990).

Why the rapid expansion of coverage for drug abuse under private health insurance and related plans? Are the changes cosmetic, or do coverages and reimbursements provide truly useful benefits? Neither of these national surveys provide the detail needed to assess the extent to which such coverage extends to community-based treatment, nor do they provide any detail on reimbursement methodology or amounts. They do indicate that limitations apply to most drug abuse treatment coverages and that these limitations tend to be more restrictive than those that apply to treatment for most common diseases and conditions.

Some specific examples suggest that private insurance benefits also are being extended to community-based treatment. Blue Cross and Blue Shield of the National Capital Area, for example, has extended coverage for drug abuse rehabilitation to treatment in a hospital or “other approved treatment facility.” A residential treatment facility or a freestanding drug abuse clinic licensed by a State will qualify for benefits, the reimbursement amounts being based on the reasonable charges for such a facility, subject to caps on amounts and utilization. In April 1987 Blue Cross and Blue Shield of the National Capital Area revised several coverage limitations, including separating out the caps on utilization and costs for mental health vs. alcohol and drug, expanding reimbursement coverage to 80 percent of the allowable charge rather than 50 percent, and extending the stop-loss on out-of-pocket expenditure to include drug and alcohol.

In the public sector, Medicaid agencies increasingly are being directed by their State legislatures to expand benefits where the additional Medicaid payments

will substitute for existing State subsidies. This enlightened self-interest by the States brings additional Federal dollars into the State through the Federal Financial Participation (FFP) in Medicaid payments for services that are allowable under Federal guidelines and the approved State plan. For many States this has led to the States providing Medicaid coverage of drug abuse treatment in community-based settings to Medicaid recipients. Currently, the Federal guidelines allow but do not require States to cover freestanding drug abuse outpatient clinic services. However, payments for nonhospital inpatient care in residential treatment facilities for drug abuse do not qualify for FFP and therefore often are excluded from Medicaid coverage.

Pennsylvania Medicaid, for example, reimbursed 192 freestanding drug and alcohol clinics about $8.5 million in fiscal year 1988 for the treatments received by 19,000 recipients. These reimbursements, averaging about $25 per paid claim, brought about $4.25 million in FFP into the State. Although the costs to the Pennsylvania Medical Assistance (MA) program include more than $4 million for these payments, it is likely that other State and county programs would have had to pay the full $8.5 million without this Medicaid coverage. During this same year Medicaid paid for about 7,500 hospital inpatient detoxification admissions and 1,000 hospital inpatient rehabilitation cases for substance abuse.

State Medicaid reimbursement to community-based providers of drug abuse treatment is invariably linked to State licensure. This, in turn, provides a rationale for private insurance plans also to recognize these providers. The insurance industry looks to the licensing process to provide a necessary degree of protection to the consumer and to the actuarial soundness of the cost-benefit estimates. Historically, the reluctance of Medicaid and Medicare (especially Medicare) to reimburse community-based substance abuse treatment providers has been inferred to mean that they are somehow neither legitimate nor cost-effective, and this, in turn, caused many insurance companies also to resist extending reimbursement. Today, however, it is the private employers and insurers who are leading in extending reimbursement to community-based providers of drug abuse treatment, with Medicaid following not far behind and Medicare still at the starting gate.

The change in private-sector coverage of drug abuse treatment in a variety of settings has been brought about largely by a combination of factors. The proliferation of EAPs and managed-care programs is believed to account for much of this progress. EAPs and various prepaid plans have contracted selectively with community-based providers, bringing credibility and, through utilization review, some assurances of appropriateness and quality of services.

CHANGES IN EMPLOYER ATTITUDES

Health insurance plans are designed to meet the requirements of the marketplace. Thus, private insurance firms offer plans with those provisions that their clients demand. If a large employer does not want to cover drug abuse treatment and such coverage is not mandated for insurance sold within that State, an insurance firm will offer to provide a plan with this exclusion. Conversely, if employers want drug abuse treatment covered, plans will be marketed to them with such coverage. Employer motivation to demand coverage of drug abuse treatment is complex, reflecting consideration of employee attitudes, costs, where it fits into the benefit package, competitive pressures, perceptions as to the effectiveness of drug treatment programs, the extent of the problem among employees and their dependence, and the indirect costs of drug abuse that already are being experienced.

Until recently it generally was agreed that a comprehensive drug abuse treatment package similar to other benefits in a liberal health plan would produce a sharp rise in premiums. The actuaries who estimate the expected costs and risks associated with new benefits would ascribe a high cost unless a variety of cost-sharing, limitations on benefits, and limitations on providers were included. For example, a recent study used the 1981 and 1984 BLS surveys to compute an estimate of an 8.8-percent premium increase for the addition of substance abuse coverage to a comprehensive family health benefits plan (Gabel and Jensen 1989). For health plans that offer substance abuse coverage, it is not difficult to determine the proportion of payments that go to organized substance abuse treatment programs. Normally, however, some of these costs would be offset to reflect actual treatment for complications and related conditions by traditional medical care providers before the addition of the new drug treatment benefit. The reservations of actuaries and the computations included in the Gabel and Jensen study illustrate the lack of knowledge as to the size of the offsets and whether employers and insurance companies already may be paying most of the costs for an effective drug treatment program in other ways.

Over the past few years most large employers have had it brought to their attention that the costs of substance abuse are large and that they probably already are paying some of these costs through adverse effects on productivity, turnover, absenteeism, and on- and off-the-job safety and in utilization of traditional health benefits for complications and second-order health effects. The implementation in March 1989 of the Drug-Free Workplace Act, which requires that Government contractors adopt drug-free workplace policies, has been associated with proliferation of other changes in employer provision of drug abuse prevention and treatment services support. Policies and programs

dealing with the identification of drug abusers generally are implemented together with programs to ensure that those with drug abuse problems will have access to drug abuse counseling and referral for treatment. It is hypothesized that some of the recent increases in employee benefits coverage of substance abuse treatment is in response to Federal requirements concerning drugs and the workplace (General Accounting Office 1989).

BARRIERS TO REIMBURSEMENT

The barriers to coverage of drug abuse treatment and to the reimbursement for community-based drug abuse treatment are many and varied. The first hurdle begins with the public and private schism between calls for punishment of those who use illicit drugs and the argument for treatment of drug abuse as a chronic disease (regardless of the treatment provider). This issue has polarized many opinions, particularly when dealing with those incarcerated for criminality related to their drug abuse or when it comes to the substance abuser who happens to be a pregnant woman. The second barrier is cost control. If drug abuse treatment is covered, what will it cost and will the premiums for health insurance or publicly funded programs still be affordable? Here the managed-care programs, particularly those operating within the constraints of a capitation fee, have provided clear evidence of controllable costs. These are significant costs, to be sure, but they appear to range from about 3 to 12 percent of the costs of a comprehensive health plan, depending on cost-sharing, caps, and the covered population characteristics. Furthermore, if one assumes an offset effect on non-drug-related care, the net long-term costs may be negligible or even negative.

The next hurdle is that of treatment effectiveness and quality assurance, which is an issue of how to ensure accountability. Because drug abuse treatment may continue for protracted periods and seems to rely heavily on Interpersonal aspects for effectiveness and because its proponents often use subjective outcome measures, there is much skepticism about treatment efficacy within the health insurance industry. Third-party payers are wary of funding care for which it is hard to recognize and control for quality and medical necessity.

Drug abuse treatment coverage arguments often revolve around the effectiveness of differing treatment models for individuals with differing problems. Who will decide which settings and modalities are appropriate? Once placed in treatment, who sets the treatment objectives? If the relationship between process of care and outcome is weak, then treatment objectives (the desired outcomes) cannot be used as a rational basis for prescribing treatment process. If the relationship of process and outcome is strong, the measure of one is a surrogate for the measure of the other. For some drug abusers there

may be a lack of consensus as to exactly what the outcomes of treatment reallstically should be. The clinician may look to achievement of short-term treatment goals (e.g., reduced symptoms of dependence, improved self-image) as the outcome he or she will provide. The treatment effectiveness researcher may seek drug use abstinence and improved social functioning as the outcome, measures that are difficult to collect reliably and may require long-term followup studies. The economist may focus on reduction in costs and utilization of health care resources and improvements in other measures, such as employment, as the types of outcomes that should be ensured if reimbursement for the treatment is to be provided.

There are many questions about drug and alcohol abuse treatment effectiveness, particularly when there are severe psychiatric complications or major somatic illnesses. Can community-based treatment sources deal with these combinations? Are the patient variables as Important as the treatment variables in determining the outcomes? The Consolidated Standards Manual, 1987, published by the Joint Commission for Accreditation of Healthcare Organizations, clearly indicates that individualized assessments and prescription of treatment responsive to those needs are essential to the provision of competent care. Moreover, the treatment plan must treat all impairments identified in the initial assessment, must be regularly reviewed and adjusted if clinical problems persist, must provide for referrals, and must include a complete discharge plan and evidence of followthrough. Given that many drug abusers have an array of problems, who should be responsible for coordination of care? Can existing drug treatment providers fill this role? Who will do it better-the institution-based or the community-based provider? Will they work with other organizations charged with such a role by the payer?

Even for uncomplicated drug abuse cases, knowledge of treatment effectiveness is limited due to the problems of doing clinical trials with these patients (for example, high patlent attrition and problems in ensuring provider compliance represent major methodological problems). Some work has been done, but often the results are not available until after public interest in the problem has peaked and begun to diminish. With respect to opioid addiction treatment, for example, long-term outcomes do not appear to differ among the major treatment modalities or settings (Simpson and Sells 1982). Although this may be partially an artifact of selection bias and difficulty in measuring long-term outcome, more work is needed. At the same time the emergence of crack and cocaine as the leading reasons for admission for treatment raises the question of when it will be known with some degree of assurance what does and does not work for treating crack and cocaine users.

EXAMPLES OF RESEARCH ON PENNSYLVANIA MEDICAID COVERAGE AND REIMBURSEMENT OF DRUG ABUSE TREATMENT

Pennsylvania Medicaid began reimbursing freestanding drug and alcohol clinics in 1974. However, from 1976 until recently the reimbursement rate remained fixed for counseling services. Because the reimbursement rate for therapeutic sessions was the same for hospital outpatient departments or freestanding clinics, most of the hospitals have not pursued this business, and it is dominated by the freestanding clinics in Pennsylvania.

Concerned about MA costs, Pennsylvania decided In the early 1980s to experiment with other forms of reimbursement arrangements. In 1985 the Commonwealth implemented diagnosis-related group (DRG) reimbursements for hospital inpatient care for MA recipients. In 1986 the Pennsylvania MA program contracted with an operator of health maintenance organizations (HMOs) to establish and operate a health-insuring organization (HIO) called HealthPASS. The HIO covers six health districts in Philadelphia, with mandatory enrollment of most MA recipients who reside in those districts (about 90,000 are enrolled at any given time). The contractor is paid a capitation premium for arranging and paying for most Medicaid-covered benefits. Outpatient mental health and substance abuse treatment were excluded from the capitation and continue to be reimbursed directly by the MA program on a fee-for-service basis, while costs of hospital inpatient mental health and substance abuse treatment are the responsibility of HealthPASS. Cost savings were expected to accrue to the State because it would pay the HIO contractor only 90 percent of the expected adjusted per capita costs for enrolled recipients. The HIO, in turn, contracted with primary care physicians (PCPs) on a capitated basis to provide primary care and to serve as gatekeepers for referrals for specialist care. Of interest in the present context were the arrangements for the coverage of alcohol, drug abuse, and mental health (ADM) care.

Originally, the HIO contractor requested that all ADM services be included in the capitation package. However, because of the involvement of other groups, such as the courts for commitments, and because the outpatient ADM services system already contained some characteristics of case management, it was decided to exclude these services (the same was done for traditional HMO contractors within the MA program). The HIO contractor, however, successfully argued for inclusion of the inpatient portion of ADM care because the HIO case management system was expected to achieve substantial savings on rates of admission and average length of stay. At that time Pennsylvania Medicaid did not cover residential treatment facilities. Furthermore, the MA program was in the process of implementing hospital payments for inpatient stays using a DRG

rate. Also, reimbursement rates for outpatient treatment were well below the usual, customary, and reasonable rate for the private sector (in 1989 the Medicaid payment for therapeutic sessions was at the rate of $25 per hour). It was anticipated that the PCPs and the ADM case managers within the community would communicate and coordinate the provision of comprehensive care to substance abuse and mental health patients.

Findings from the evaluation of the first 2 years of the HIO operations are available (Solon Consulting Group and Center for Health Policy Studies 1989; Solon Consulting Group and Center for Demographic Studies 1990). Although the evaluations that have been completed to date were performed strictly to meet the Federal requirement for continuing the waiver, they provide some information relating to the substance abuse treatment costs and utilization questions. It is clear that the savings and care improvement objectives for ADM services that were anticipated when the responsibility was divided between the HIO and the substance abuse treatment system in Philadelphia were not achieved. First, the inpatient hospital care did not decrease. Second, the PCPs and the ADM case managers did not communicate. Third, the HIO was prevented from contracting with subacute care facilities, such as residential treatment centers, for inpatient substance abuse treatment.

The HIO contractor underestimated the hospitalization rate for the enrollees and overestimated their ability to control it. Because most such admissions were emergency rather than elective admissions, it was not possible to reduce admissions substantially, although length of stay was open to some control. The HIO negotiated to reimburse hospitals on a per diem basis rather than a DRG rate because it was expected that the HIO's utilization review and ability to pay for "program exceptions" to allow early discharge would result in a reduced length of stay. In retrospect, the HIO did achieve some reductions in hospital utilization but with an Increase in the unit price it paid. Moreover, the PCPs often did not know that an enrollee on their panel was being treated for substance abuse until there was a hospital admission. Because of confidentiality concerns the fact that Medicaid was paying a drug and alcohol clinic to treat an HIO enrollee was not communicated to the PCP. Thus, coordination among case managers responsible for differing aspects of care for the same patient was fragmented or nonexistent. Finally, when the HIO identified and attempted to contract with some residential treatment facilities, the Health Care Financing Administration took exception to use within a waiver program of providers not recognized by the State Medicaid program, and the practice was stopped.

Grade-of-membership analytic techniques were used to analyze comparisons between HIO and non-HIO MA recipients identified as drug and/or alcohol

treatment patients. Table 1 and figure 1 Indicate that “adjusted” hospital utilization rates and costs by comparable drug and alcohol abusers were reduced slightly for HIO vs. the comparable Medicaid fee-for-service recipients in Philadelphia. On the other hand, total outpatient services costs were substantially higher for the HIO enrollees (figure 2). A more extensive study funded by the National Institute on Drug Abuse is under way to try to confirm and understand these findings (Contract No. 271-89-8519 with the Center for Health Policy Studies [CHPS], Columbia, MD).

TABLE 1. *Hospital utilization measures for the drug and alcohol abuser subpopulation of all Medicaid recipients, Philadelphia County, March 1987-August 1088*

	Case-Mix Adjusted Groups[a]				
	Problem Child	Young Adult	Drug Abuser	Sick Alcoholic	Entire Subpopulatlon
Median hospital length of stay					
HIO enroliees	18.61	5.72	5.13	7.73	530
Non-HIO	18.37	5.88	7.85	7.17	7.01
Probability of a hospital admission					
HIO enrollees	28.1	85.5	37.7	58.3	82.1
Non-HIO	45.1	83.3	48.4	87.1	88.8

[a]Case mix adjusted groups within the drug and alcohol abuser subpopulation were developed using the grade-of-membership technique.

SOURCE: Solon Consulting Group and Center for Demographic Studies 1990

The CHPS Is testing a series of hypotheses about the effects of the economic Incentives that PCPs had during the first 30 months of the HIO. The 21 -month period before HIO startup will be used to provide a more powerful research design with before/after measurements for experimental and control groups. Because the HIO and PCPs do not pay for outpatient substance abuse treatment and because there is considerable evidence that substance abusers utilize higher rates of medical care services, there should be a strong incentive for PCPs to identify and refer substance abusers to community-based treatment providers. This, in turn, is hypothesized to lead to reduced hospital use for substance abuse and substantial savings in other nonsubstance abuse treatment health care costs (the cost offset).

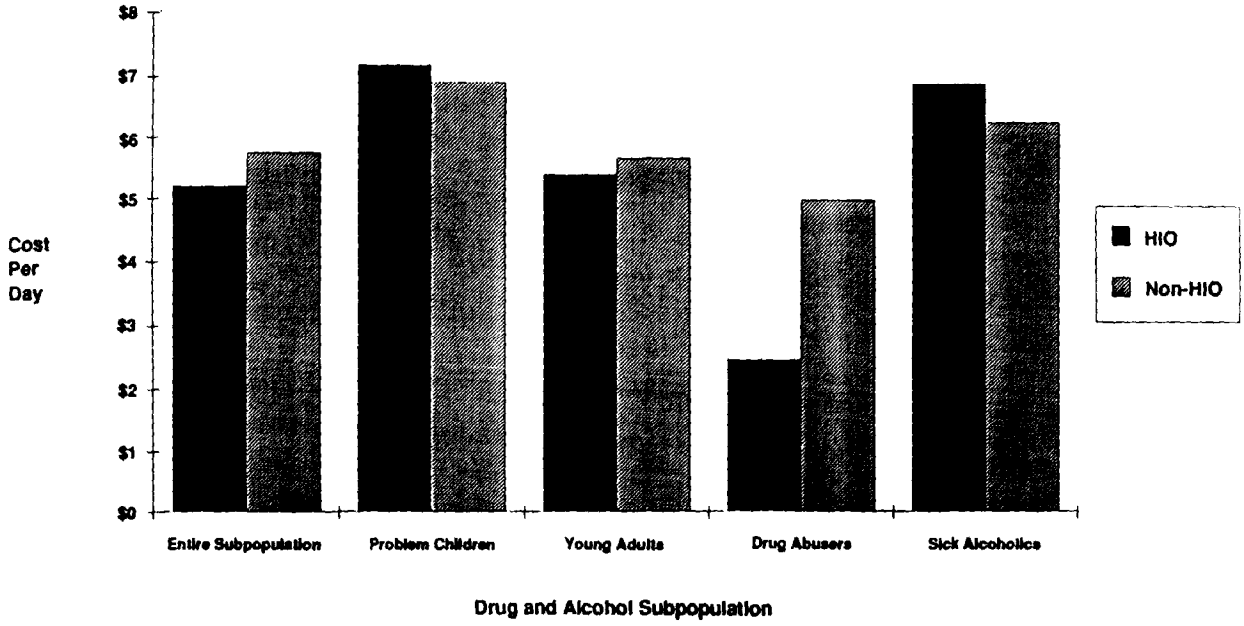

FIGURE 1. *HIO and non-HIO drug and alcohol subpopulation hospital costs per day of exposure for case-mix adjusted groups*

SOURCE: Solon Consulting Group and Center for Health Policy Studies 1989

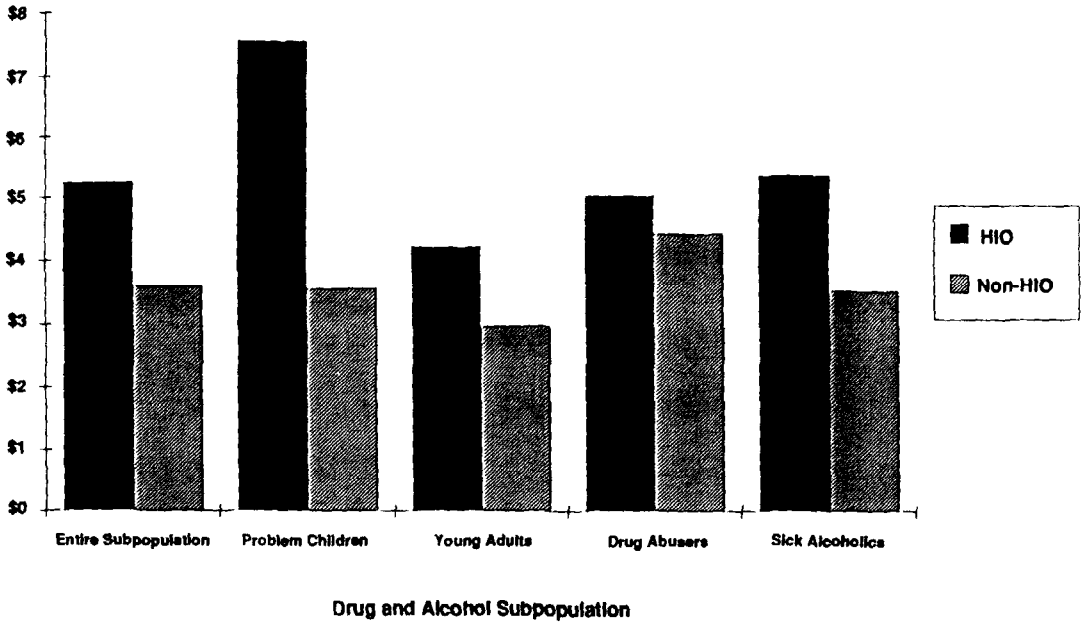

FIGURE 2. *HIO and non-HIO drug and alcohol subpopulation outpatient costs per day of exposure for case-mix adjusted groups*

SOURCE: Solon Consulting Group and Center for Health Policy Studies 1989

The study team is assembling a longitudinal file of all MA recipients who resided in Philadelphia county at any time from January 1985 to March 1989. The longitudinal file contains all eligibility file data and all medical services and institutional paid claims. Identifying drug abusers depends on the availability of diagnoses on these paid claims. Table 2 lists the algorithms used to define a drug abuse case. As is common in this type of research, several data quality problems have been encountered, particularly with the payment records provided by the HIO. For many payment records, no diagnosis appears or only a single diagnosis is listed. HIO payment records do not contain any procedures codes. Therefore, a very conservative technique has been used to identify drug abuse cases.

TABLE 2. *Algorithms and ICD-9-CM codes to be used to identify drug abusers*

Step 1. identify MA recipients with a principal diagnosis of drug abuse.

Any of the following codes as a principal diagnosis for a drug and alcohol clinic, hospital, or physician service (excluding anesthesiologist, radiologist, and pathologist claims) indicate a definite case of drug abuse. Scan all medical invoice principal diagnosis fields against the following list.

Code	Description	Qualification of Use
292	Drug psychoses	Fourth digit must be 0, 1, 8, or 9. Ignore fifth digits.
304	Drug dependence	Any fourth digit. Ignore fifth digits, except for 3. If 3, accept with an “other” diagnosis of V57.89.
305	Nondependent drug abuse	Exclude if fourth digit is 0 or 1, Note: If there is an acceptable fourth digit and the fifth digit is 3, V57.89 must be present.

Step 2. Identify MA recipients provided only rehabilitation for drug abuse.

If V57.89 is the principal diagnosis and an “other” diagnosis indicative of drug abuse (any acceptable diagnosis used in step 1 above, ignoring all fifth digits, including 3), consider it a drug rehabilitation case.

Step 3. Identify MA recipients treated for selected drug poisonings as the principal diagnosis.

Scan Invoices for the following diagnoses in the principal diagnosis fields:

Code	Description	Qualification of Use
965.0	Opiates/related narcotics	Any fifth digit.
967	Sedatives and hypnotics	Fourth digit must be 0, 1, 2, 3, 4, 5, or 6.
968.5	Cocaine	
969	Psychotropic agents	Any fourth digit. Fourth digit must be 0, 1, or 8.
970	Central nervous system (CNS) stimulants	
987.4	Freon	
989.8	Glue/other nonmedicinal	

For each "hit," either of the following contingencies must apply or else ignore:

Contingency based on presence of one of the following "other" diagnoses:

a. Any acceptable drug diagnosis as listed in step 1 above.
b. V57.89

Step 4. Identify MA Recipients treated for complications attributed to drug abuse.

The following codes appearing as a principal diagnosis for a service by a drug and alcohol clinic, hospital, or physician services (except ancillary service referral physicians) indicate a definite case of drug abuse.

Code	Description	Qualification of Use
648.3	Complication of pregnancy due to drug dependence	Any fifth digit.

Step 5. Identify MA recipients with secondary diagnoses indicating drug abuse.

Scan all "other" diagnosis fields for any of the diagnoses listed in step 1 or 4 as principal diagnoses. All "hits" on claims from provider drug and alcohol clinics, hospitals, and PCP or "treating" physicians indicate drug abuse cases.

Step 6. Identify MA recipients with diagnosis/E-code combinations indicating drug abuse.

Scan all "other" diagnosis fields for any of the following E-codes. If found, one of the following diagnoses also must be present to indicate this is a drug abuse case (ignore fifth digits for these diagnoses): 357.6, 648.4, 655.5.

E-Code	Description of Substance
E935.0	Heroin
E935.1	Methadone
E935.2	Other opiates and narcotics
E937	Sedatives and hypnotics (include all fourth digits except 9)
E938	Other CNS depressants and anesthetics (include all fourth digits)
E939	Psychotropic agents (include all fourth digits)
E940	CNS stimulants (include all fourth digits)

Once all drug abusers who can be identified have been so labeled, all paid claims for these cases will be retrieved and the patterns of utilization and costs of care to Medicaid and the HIO analyzed.

Concurrent with the implementation of the present retrospective study based on paid claims, the Commonwealth of Pennsylvania has launched an expanded program to provide for all aspects of drug abuse prevention, treatment, and control. In 1988 the Pennsylvania Legislature enacted and the Governor signed into law the legislation known as Act 152, which will phase in Medicaid reimbursement of nonhospital inpatient substance abuse treatment as one part of what is known as the Penn-Free program. Residential treatment facilities will become part of a case-managed continuum of care available to MA recipients, The first step for phasing in this coverage was to authorize the HIO and the several HMOs with Medicaid contracts to begin in January 1989 to contract with residential treatment facilities. The second step took effect in January 1990 when single-county agencies in seven counties were authorized to negotiate

rates and begin to place MA recipients in nonhospital inpatient settings for case-managed care. All such facilities were to be State licensed. The last phase, statewide implementation of reimbursement for residential care settings, was scheduled to begin in July 1991, It is of interest to note that the legislation also provided for a concurrent evaluation of each phase as it is implemented to provide prompt feedback on the costs.

CONCLUSIONS

1. Federal and State reimbursement of community-based drug treatment providers are intertwined. Although all States have used block grant funds to support community-based providers, eligibility of these providers to be reimbursed under State Medicaid programs varies, with only one State covering nonhospital residential settings, Federal Medicaid laws do not provide FFP for reimbursement of nonhospital residential treatment programs except under specific waiver programs. Medicare does not recognize community-based outpatient or nonhospital residential drug treatment providers.

2. Private employers and third-party payers have greatly expanded coverage of drug abuse treatment over the past 5 years and have included a variety of outpatient and residential community-based programs as eligible providers,

3. Many questions and some skepticism remain over the efficacy of drug abuse treatment. Services research outcome studies are needed urgently, particularly for cocaine and crack abusers who are detected and referred through workplace programs. Cost-offset studies also are needed urgently for supporting coverage of cocaine and crack abuse treatment.

4. Use of Medicaid Management Information System capabilities to track all health services utilization by cohorts of drug abusers with access to differing treatment programs represents a relatively untapped outcome and cost-offset research opportunity.

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Financing Treatment for Substance Abuse

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INTRODUCTION

This chapter has two objectives: (1) to provide some general observations on the current state of financing treatment for substance abuse in the United States and (2) to summarize some critical economic considerations related to judging the adequacy of that financing and predicting its future course.

FINANCING THE DUAL SYSTEM

The critical feature of the current treatment system is its dual character. The publicly financed treatment system for low-income people exists side by side with a private, largely insurance-financed system for people who are not poor. To a considerable extent, these two systems are parallel and do not overlap. The only overlap occurs when some treatment firms provide services to public and private clients, although this is relatively uncommon.

The two systems are not only separate but also unequal. The public system experiences excess demand, treats clients with relatively brief, low-cost interventions, and expects low success rates. The private system has plenty of capacity, emphasizes high-cost residential or inpatient treatment methods, and promises success for most of its clients.

Both systems, however, suffer from a fundamental problem: Neither can show with certainty that the services they provide are effective. Some circumstantial evidence, which varies considerably in quality depending on the type of addiction, shows that people who receive treatment do better than people who do not. It is surely the case that people who stay in treatment do better than those who do not, but the relationship of cause and effect in this phenomenon is unclear. Even when treatment works, there is no doubt that its effectiveness varies for people with different kinds of problems, yet precise knowledge of how to match problems with treatment is lacking.

The consequence of this uncertainty is fundamental: External observers-whether insurance company, employer, politician, or voter-have a difficult time judging whether they are getting value for the money put into treatment programs, They have even more difficulty determining whether the care a particular person received was as effective as it could be.

The most obvious research topic, therefore, would be that of determining the effectiveness, in the sense of effects on work performance, absenteeism, or overall level of functioning, of various types of treatments. A related question is a positive one: How do decisions on coverage and treatment, in the sense of the willingness to commit resources, vary with the quality of the evidence on effectiveness? Worded slightly differently, do public or private decisions on financing seem to reflect information, accurate or not, on the benefits to be obtained from treatment? Do voters and politicians refuse to approve and insurers refuse to finance benefits for obviously effective care?

If beliefs about effectiveness between the public and private sectors turn out to be similar, why are the programs so different? Perhaps a lower level of effect (but higher effectiveness) is desired by the public sector, or perhaps the value attached to effectiveness is smaller. The substantial variation across geographic areas in the number of affected persons, the income distribution of substance abusers, and the affluence of taxpayers suggest that variation in the level of public support might be explainable.

A related issue concerns spillover and substitution between the two treatment systems. The spillover question asks how the quantity or style of treatment in the private system influences the public system and vice versa. The substitution effect concerns the use of the public system by people who would otherwise have used and paid for the private system. To some extent, substitution is possible for out-of-pocket payments. A privately insured person usually will not receive public care. However, the availability of such care may discourage the provision of private insurance; it becomes easier to fire the employee and then hire him or her back if treatment works. This may seem unlikely but could occur.

At a more fundamental level, the reason public funds are spent on substance abuse treatment is that, presumably, successful treatment provides spillover benefits to the taxpayers who must pay for the treatment. External benefits in the form of lower crime, a more aesthetically pleasing community, lower public health costs for addicts and their families, and lower welfare taxes deserve to be documented. There are other benefits as well, primarily connected with capital market imperfections. A neighborhood crippled by drug abuse and its consequences may not be able to raise the money to invest in treatment and

control, but the benefits, even the direct economic benefits of an investment in the neighborhood, may be substantial. In addition, the individual who returns to a more productive life not only pays more taxes (and so benefits others) but also benefits from a profitable investment.

Ail these factors are part of sophisticated cost-benefit analysis. The results have financing implications in that methods of distributing the cost, which parallel the distribution of net benefit and therefore facilitate its achievement, can be found. For example, are there ways of making *de facto* loans to communities or individuals for treatment, to be paid according to a fixed schedule if treatment is effective? Strange as it sounds, if the net benefit from treatment is as great as the cost-effectiveness work suggests, investing in treatment of drug addicts should be a highly profitable investment.

One issue is the role of migration in affecting treatment expenditure. Low outflow and low inflow would be expected to be associated with high levels of support. If a community's treatment program attracts people with problems who leave when cured, these "external benefits" may discourage expenditure.

PUBLIC FINANCING OF SUBSTANCE ABUSE TREATMENT IN A FEDERAL SYSTEM

The current arrangement for financing public treatment for substance abuse involves all levels of government. The Federal Government provides some block grants, greatly reduced in real value and restrictiveness over the past decade. States provide most of the resources for treatment, whereas some cities and counties fund specific programs or facilities. Some treatment-how much is not precisely known-is furnished under the Medicaid program.

What impact does the allocation of roles and responsibilities to various levels of government have on the form and support for public treatment? What should the governmental configuration be? it is by no means obvious that a fully federalized program would increase levels of support or be the most appropriate configuration. To be sure, a generously funded Federal program, by definition, would improve matters in the opinion of advocates of care, but that generosity is by no means ensured. If the rationale for public support is based primarily on externalities, the ideal configuration of government would appear to be a Federal system. Such a system would allow local citizens where the problem is concentrated and who therefore have (other things being equal) greater willingness to pay for prevention and treatment to express that willingness and to choose the form of program most suited to their needs. Federal subsidy, in some type of matching program, expresses the concern that others in areas

with less severe problems nevertheless may feel some concern about pockets of severe need. Federal supplementation also deals with the fact that, in reality, all things are not equal; some (though by no means all) communities with more severe problems may be low (or average) income, and therefore deserving of some additional support. Fiscally motivated migration-of either beneficiaries or taxpayers-limits the desirable extent of federalism.

The capital market imperfection rationales have less obvious implications for governmental structure. In an ideal world, the optimal pattern of investment would vary only with local input costs, not with governmental structure. If treatment was more costly in one locality than in another, and the return (e.g., in the form of enhanced productivity) was the same, treatment should be less intensively provided in the high-cost location, In principle, any level of government could do the optimal thing. Perhaps it would be more difficult for the Federal Government to vary programs with local needs, but it also would be more difficult for local government to capture the benefits for a successful investment if workers migrate.

Another issue relates to the form of production and ownership of providers of services to tax-financed clients. It is an old practice in public economics to distinguish between public provision and public production (Musgrave 1959). Externalities and market failures frequently call for public provision of services in the sense that resources are raised via taxation (rather than the market) and decisions on how much and what to buy are made collectively (rather than by individual consumers). Those services then could be produced either by publicly or privately owned firms,

The primary rationale for public production is the alleged difficulty of monitoring the quality or type of service being financed with public funds. The theoretical question is whether it is easier (or cheaper) to monitor a regulated private firm than to monitor a public bureaucracy. A sophisticated theory currently is being developed on the question of “privatization,” The current wide differential between privately produced and publicly produced treatment services suggests that a useful test application might be provided here. The critical descriptive empirical question would be whether there are differences in quality, efficiency, or “style” of services by ownership, given equal resources.

A related issue concerns the likely supply response to increased public resources for treatment (should such resources become available). Even if the financing is present, will the people be there? Would expansion of treatment dilute the resource intensity of treatment? This question raises the issue of the appropriate level of resource intensity. Although it is generally believed that drug abuse treatment needs to be resource intensive (in contrast, for example,

to alcoholism treatment), the tradeoff between the extensive and intensive margins has not been well studied. Would dollars be better spent providing intensive treatment to a few crack addicts or an extensive outreach effort to provide some counseling to a large number? In economic jargon, how quickly do diminishing returns set in?

Moreover, there is also fear that the facilities and trained personnel may not be available even if the financing is. The history of the medical care sector is one of amazingly rapid supply response to jumps in demand-whether the demand is for renal dialysis or home health care-as long as licensure rules do not inhibit. The growth of private-sector substance abuse treatment facilities also suggests that there are few impediments, but documenting supply response is surely worthwhile.

PRIVATE-SECTOR FINANCING

In many ways private-sector financing raises the same issues as public financing. Effective treatments should pay for themselves, and there should be a way of distributing the cost across those who benefit that satisfies everyone.

One question is whether the net benefit can be captured in the context of typical private employment-based group insurance. Suppose effective treatment is paid for by private health insurance. The incidence of the cost of this insurance is presumably on wages, but it seems unlikely that the wages of those who benefit can be reduced differentially. Instead, the wages of ail workers in a firm potentially would fall, including the wages of those who have no alcohol-related problems. Financing such coverage raises problems with the existing work force. A more appropriate way of viewing the problem may be in terms of the marginal worker. if, for example, p percent of newly hired workers are expected to need treatment for substance abuse problems, then the benefit cost per worker would be pX, where X is the cost of treatment. Wages therefore would fail by pX. If firms correctly anticipate attracting a smaller percentage, they can offer higher money wages. One issue is whether a firm can maintain a lower percentage. Another issue is whether adverse selection will occur. Workers with no alcoholism problems will be attracted to firms with no treatment programs. If workers with problems prefer treatment, they will prefer the plan that offers a benefit, raising the possibility of adverse selection.

Probably the most important missing link in the analysis of insurance financing is the absence of a model of private demand for treatment. In addressing the demand for or value of insurance, one needs to know what the demand for treatment is and how insurance will affect it. Even if addiction is caused by a

rational demand process, one still must explain why costly treatment is demanded as opposed to expecting addicts to stop (Becker and Murphy 1988).

Understanding the private demand for treatment is critical for judging whether insurance coverage is warranted. If the desire for treatment is random, insurance coverage of treatment makes sense as an insurance benefit for risk-averse people but will not affect access. Access effects require that insurance coverage affects demand, that is, that there is "moral hazard." If treatment has a large cost offset, the likelihood that coverage of treatment will lower total premium costs depends on the price elasticity of demand for treatment. The higher the demand elasticity (i.e., the greater the moral hazard), the better the outcome (Pauly and Held 1990). If some will use (and pay for) effective treatment whether or not insurance covers it, whereas, others will seek treatment only if it is covered, the amount by which coverage pays off depends on the proportion of these two groups. If the number who would pay regardless is relatively large and the number who would be induced to use care by insurance coverage is relatively small, most of any coverage (and its associated loading and administration costs) is wasted on transfers to people who would have been users anyway. Likewise, if the bulk of people with substance abuse problems will not use care even if it is covered, providing coverage does not do any harm, but it does not do a great deal of good either.

As already suggested, the existence, size, and form of cost offsets may be important influences on private financing decisions. Setter documentation of offsets caused by treatment, or by coverage for treatment, is needed (Holder 1987). In this connection, studies in which people (or populations) are assigned exogenously to different levels of insurance coverage and the resulting impact on use of services and cost offsets is monitored is a way to avoid problems of human subjects and generate information on effectiveness rather than efficacy. Some experimentation along these lines has been initiated by some health maintenance organizations and Medicaid programs, but much more should be done (Freeborn and Hayami 1981).

A final critical Issue in the demand for treatment concerns the impact on demand of greater treatment intensity, especially as represented by inpatient detoxification or rehabilitative treatment relative to outpatient treatment. The possibility that these are effective lower cost alternatives that can be substituted for high-cost treatments is well documented. For a person who already has elected to seek treatment, an insurer's choosing the set of controls that leads to the lower cost appropriate setting is known as economizing.

However, the availability of treatment in high-cost but attractive or convenient sites possibly may increase the demand for treatment. The high-amenity

residential facility may not be medically necessary once a person has entered treatment and may not be more effective but may help to induce agreement to be treated. Denial may cause a person to refuse any treatment but the ostensibly more "medical" treatment offered in a hospital. Even the presence of second-guessing and required proof by case managers may discourage some people from seeking treatment.

Although inappropriate substitutions surely occur, it would be worthwhile to research whether the presence of such high-cost but hassle-free financing arrangements may increase the demand for treatment.

EMPLOYMENT-RELATED INSURANCE COVERAGE

Insurance coverage for substance abuse treatment is provided increasingly as part of an employer's total compensation package (Morrissey and Jensen 1988). Because payments of insurance premiums by the employer to the insurer are excluded from both the employer's and the employee's taxable income, there is already a fairly strong subsidy to such coverage. In general, we need better knowledge of how this market works.

One critical issue is the role of the tax subsidy in affecting decisions (of employer, employee, and union) to include substance abuse coverage in the group's insurance policy. The subsidy is at a higher rate for higher income workers but varies across workers as local tax rates and family income vary. What is the impact of this subsidy, or of the price of insurance in general, on the demand for substance abuse coverage? What accounts for variations across firms in the generosity of the coverage of the insurance package?

The presence of generous benefits for types of care alleged to be inappropriate and expensive in typical health insurance policies requires some explanation. Mandates (discussed below) are one reason, but coverage took that form even in the absence of mandates. Why did people voluntarily choose "inefficient" coverage? Is the tax subsidy responsible, or was there provider influence? More to the point, why is coverage moving more rapidly into a more restrictive managed-care model in some places rather than others? Why are some insurers leading the way while others hold back? Is it that the former had worse problems, or did they find better solutions more feasible?

One interesting explanation is the role of employee turnover on the demand for substance abuse insurance. If turnover is naturally high and if there is a future cost offset, then one might expect coverage to be lower, unless the employee can capture the benefit of lower future health costs in the form of higher wages. If turnover does affect coverage, that will be evidence for cost offsets.

Is the employment-related health insurance market for substance abuse coverage In need of regulatlon? Regulation usually takes the form of mandating the presence and type of substance abuse coverage (and chiropractic and acupuncture services as well). State mandates have some important gaps. They do not apply to firms that are self-insured, and they do not apply to firms that provide no health insurance. Jensen (1988) concludes that mandated coverage will have little effect for larger firms but will constrain the coverage choices of smaller firms.

Given the rapidly increasing costs for substance abuse, it is possible that mandating benefits decreases the number of employee groups that choose to obtain coverage. The State of Virginia recently passed a law exempting small employers from State mandates for coverage of (among other things) drug dependency. What effect will such a law have?

More generally, the basis (if any) in welfare economics for mandated coverage needs to be worked out. At one level, the push for mandating coverage of all types appears to be based on the economic fallacy that employers and insurers (rather than employees or, perhaps, consumers of products) will bear the cost of required coverage. Focusing on a rapidly growing part of total premiums whose presence varies considerably across firms might help to determine who does pay.

Do mandates represent hidden taxes (in the sense of compulsory payments for public purposes)? If so, what are those public purposes or rationales? One would be consumer ignorance-an attempt to overcome buyer misperception of a low value of such coverage. Given the well-informed buyers in the group insurance market, this seems unlikely to be true, but it might have some validity for the small group market, There is a need to investigate this matter.

A more cogent argument views mandates as a way of dealing with the inefficient choice that arises from employee turnover. However, the ideal solution then is not a mandate but rather a turnover-related subsidy to choose types of coverage with strong future cost offsets. Measurement of how large this subsidy should be would be worthwhile. Absent a subsidy, mandating coverage may induce some firms to cut benefits of other types, switch to self-insurance, or drop group health insurance entirely. What impact does mandated coverage have on the demand for insurance?

A final set of questions regarding private coverage of substance abuse treatment concerns trends in costs and management strategies. It is widely believed that growth in substance abuse costs (including adolescent costs) has fueled some employers' concerns about health insurance premiums. A clear

overall picture does not exist, and an analysis of the impact on overall cost with the possibility that some growth may represent a transfer of services formerly labeled "medical" or "mental health" has yet to be performed. Likewise, managed care for substance abuse benefits has been growing along with the benefits but with few data and less analysis of effectiveness or of which employee groups choose which management strategies.

It would be administratively simpler and would improve market transparency greatly if substance abuse benefits were covered with the same deductibles, coinsurance, and stop-loss provisions as other insurances. But what would such coverage imply to cost and use? The answer depends on the relative degree of moral hazard for different services.

CONCLUSION

A comprehensive financing policy for drug abuse treatment, both public and private, suffers from a scarcity of believable information on effectiveness and benefits. For the most rapidly growing forms of substance abuse, cocaine and crack, there is the least reliable information. Research on finance should be sensitive to this imprecision and should view most of what goes on in the market as an attempt to cope with it.

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Forecasting the Cost of Drug Abuse Treatment Coverage in Private Health Insurance

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INTRODUCTION

The usual paradigm for employment-based health insurance views insurance as a fringe benefit, with the firm's objective being to minimize compensation costs given the worker utility determined in the labor market, An implication of this is that worker preferences for the form and extent of coverage dictate the structure of insurance, and standard models of "optimal insurance" can be applied to this issue. This usual paradigm is inadequate in the case of workplace Insurance for drug abuse treatment. Insurance coverage for drug abuse treatment costs is only one part of an employer's policy toward drug abuse. Testing, sanctions, and in-house programs, such as Employee Assistance Plans (EAP), make up other important elements of workplace policy. in descriptive models of employers' choice of coverage and in prescriptive models addressing public policy issues, insurance should be viewed as a part of workplace policy, with risk coverage, incentives to use appropriate care, deterrence, and worker/job sorting issues all part of the analysis (McGuire et al. 1990).

This chapter focuses on the seemingly more simple question of the cost of health insurance coverage for drug abuse treatment. Although this question is a direct one, there are many difficulties in providing a clear answer. Some of these would arise in any discussion of insurance for a new service or disorder, such as the possibility that coverage for a new diagnosis would lead to reclassification from closely related diagnoses. Other difficulties, primarily related to selection issues, emerge from the unique position of drug abuse in workplace policy. The chapter focuses more on the problems and limitations of existing methods for estimating costs than on solutions to the problem of estimating costs, This unfortunately reflects the authors' judgment about the present state of the field.

The cost of insurance coverage for drug abuse treatment is important for both private and public policy. Private employers obviously have an immediate

interest in the cost of any fringe benefit. Public interest in costs of private health insurance has been enhanced because of a concern about the heavy regulatory burden imposed, particularly on small employers, by State and Federal laws attempting to finance social goals without raising taxes by imposing requirements on private insurance.

State regulation of insurance coverage through mandates has been an important influence on alcohol and other drug abuse and mental health coverage available to employees and dependents, As States and the Federal Government turn attention to the uninsured, all mandated benefits have been put under close scrutiny. Regulations that increase the cost of purchased health insurance may work against the goal of universal coverage and increase the financial burden of new State regulations requiring employers to offer insurance to workers. Small employers are at the center of this debate. With respect to coverage for drug abuse treatment, small employers are the ones that would be most affected by mandate legislation. On the other hand, almost half the working uninsured are employed in firms with fewer than 25 employees (ICF, Inc. 1987). Public policy toward insurance must choose between encouraging coverage for more people or more services. The cost of specified coverages, including drug treatment, is a key factor in the decision.

PRIVATE HEALTH INSURANCE COVERAGE FOR DRUG ABUSE TREATMENT

Data reported here on work-based health insurance benefits for drug abuse come from Bureau of Labor Statistics (BLS) surveys, as well as privately conducted surveys of private industry. The BLS (1989) Employee Benefits Survey is the only nationally representative random sample survey investigating group health insurance coverage for drug abuse offered by private, nonagricultural, medium- and large-size U.S. establishments. The 1988 survey was expanded to include a larger percentage of service workers and workers in smaller firms than in previous years' surveys.

Private health insurance coverage for drug abuse is now a common feature of health insurance plans for full-time U.S. workers. BLS surveys have documented a rapid increase over the past decade in the addition of drug abuse coverage to health insurance benefits offered by U.S. employers. In 1983 and 1985, 43 and 61 percent of full-time workers in medium and large firms, respectively, had drug abuse benefits (Morrisey and Jensen 1988). By 1988, 90 percent of all full-time workers had health insurance, and 74 percent had drug abuse coverage (Bureau of Labor Statistics 1989).

Establishment size is the main determinant of drug abuse coverage, with firms employing 2,500 or more workers most likely to provide coverage. In 1985, establishments in the Western United States were most likely to offer coverage, while those in the South were least likely. The transportation industry offered drug abuse coverage to the highest percentage of employees (75.5 percent), and the wholesale trade industry covered the lowest proportion (44.1 percent). Workers with self-insurance plans were only slightly less likely (4 percentage points) to have drug abuse coverage than other employees (56.4 percent).

Drug abuse coverage typically is subject to cost limits and rarely is comparable to coverage for other illnesses. Data for 1988 indicate that among individuals with drug abuse coverage, only 4 percent had their treatment costs covered in full. Nineteen percent had drug abuse coverage that was subject to internal limits only (i.e., a deductible or copayment placed on an individual category of care, such as hospitalization); 3 percent were subject to overall limits only (i.e., a limit on the total drug abuse benefit); and 48 percent were subject to both internal and overall limits. Ninety-six percent of all individuals with some drug abuse treatment benefit were covered for inpatient detoxification, 77 percent for inpatient rehabilitation, and 81 percent for outpatient care.

Coverage for drug abuse treatment shows some variation across the three categories of workers surveyed, with production and service workers being slightly less likely to have coverage than professional and administrative workers or technical and clerical workers. Production and service workers were also slightly less likely to be covered for inpatient care and slightly more likely to have both internal and overall limits.

A health care benefits survey of 1,600 employers conducted by a benefits research firm found that with regard to substance abuse coverage (drug abuse was not specifically investigated), limitation of benefits and preemployment substance abuse screening were more typical than utilization review (UR) cost management techniques (A. Foster Higgins, Inc. 1988). Substance abuse coverage was managed separately from mental health care coverage in approximately hatf the plans surveyed, and 88 percent of employers placed some type of limit on inpatient treatment for substance abuse. It was common for firms to limit coverage and to limit coverage in more than one way: 56 percent limited the number of days per inpatient episode (most common number of days was 30), 48 percent limited the total number of inpatient episodes per year or per lifetime (most common number of episodes was 2), 30 percent limited the amount payable per lifetime, and 23 percent limited the amount payable per year.

A survey of chief executive officers of Fortune 1000 companies, all State governors, and the mayors of 64 of the largest U.S. cities (n=265), as well as human resource directors of these same organizations, provides insight into employer behavior regarding drug abuse-related health insurance and health costs, although drug abuse is not disaggregated from substance abuse in this research (Mercer Meidinger Hansen, Inc. 1988). Only about one-third of employers surveyed reported monitoring health insurance claims, one-quarter had preferred provider arrangements with substance abuse treatment facilities, and only one-third of preferred provider organizations assumed any risk for performance or guaranteed cost savings to employers as a result of utilization management. Only one-third used UR to manage substance abuse treatment costs. Of those using UR, approximately four-fifths used the same organization reviewing their regular medical utilization. One-half of the human resource directors surveyed had not requested UR groups or claims payers to disaggregate substance abuse claims from other medical claims.

Health maintenance organizations (HMOs) generally do not cover substance abuse treatment on a par with other treatment. Results from a 1986 national survey of mental health and substance abuse services within HMOs indicate that although two-thirds of the HMOs surveyed had alcohol and drug abuse benefits, 31 percent had only detoxification and emergency drug abuse coverage (Levin et al. 1988). The median benefits for alcohol and other drug abuse coverage were 20 outpatient visits and 30 inpatient days. Forty-eight percent also had multiple or supplemental alcohol or other drug abuse benefits,

In summary, about three-quarters of all full-time US. workers have health insurance plans providing drug abuse coverage. Workplace size is the main determinant of such coverage. Drug abuse coverage generally is subject to greater restrictions than coverage for other illnesses. Private surveys suggest that firms typically do not use sophisticated health cost management techniques and appear to adopt a strategy of limiting benefits to control costs.

PROBLEMS IN PREDICTING THE COST OF COVERAGE FOR DRUG ABUSE TREATMENT

Two fundamental problems plague the task of forecasting the costs of drug abuse treatment in private health insurance. Prediction of health insurance costs must be based on experience. Changing patterns of drug use and treatment mean some sources of data that can be used in other parts of health care will be of limited or no use in the drug abuse treatment field. This is referred to here as a “changing baseline.” The second fundamental problem is that the relationship between drug abuse treatment and other diagnoses and treatments is complicated and poorly understood. This issue has numerous

parts, including comorbidity issues, offsets, masking, and others, It is referred to here as the limits of "partial analysis." After discussing these two problems, we will consider whether some recent research studying how premiums are affected by the presence of drug abuse treatment coverage is a potential solution to these problems.

A Changing Baseline

A great deal of research In health services has been concerned with the question of how demand or expenditures are affected by insurance coverage. The Health Insurance Experiment (HIE), conducted by researchers at the Rand Corporation in the mid-1970s (Keeler et al. 1986), is the best known study, but there have been hundreds of others. This research yields two types of information, both of interest to the problem of forecasting cost: information on the position of the demand curve for treatment and information on the responsiveness of demand to changes in coverage.

The second type of information can be commented on quickly. We are aware of no study that examines the response of drug abuse treatment use to insurance coverage. On the basis of the experience in mental health, one would suspect that the overall demand response may be quite large and that the form of treatment provided would be responsive to the structure of the benefit. However, these are just speculations at this point.

Research on the position of the demand curve would require study of the patterns of use for defined insured populations. This research is essential to establishing a baseline of utilization patterns. There are serious problems in using available data. Drug abuse and drug abuse treatment have been increasing greatly over the past several years, and older data may be of little help in indicating present patterns of use.

Published results from the Rand HIE contain no information about drug abuse treatment and clearly show that, unless patterns of treated prevalence are from recent data, they will not be of much use. Coverage in the HIE was provided for drug abuse treatment equivalent to other medical services, but the treatment was apparently so rare in the mid-1970s that it was not observed in a nationally representative group of about 4,000 persons followed for 3 to 5 years (Keeler et al. 1986).

Costs of hospital treatment for mental health are defined broadly in Keeler and colleagues (1986) to include substance abuse care. Keeler and colleagues (1986, p. 39) count four types of admissions as "psychiatric": (1) a "pure" psychiatric admission, with mental health treatment provided for a mental health

problem: (2) an admission where psychiatric treatment was provided for substance abuse; (3) an admission where medical treatment was provided for a substance abuse-related problem: and (4) a medical admission that probably had a psychiatric problem as one of the reasons for admission (e.g., an admission with a discharge diagnosis of both depression and chronic obstructive pulmonary disease).

The distribution of admissions across these four categories is contained in table 1. (These hospitalizations made up slightly more than half of the mental health costs in the HIE.) Categories 2 and 3, admissions related to substance abuse, make up a notable share of the total. However, the insignificance of drug treatment costs is indicated when, making the same observation about the importance of categories 2 and 3, Keeler and coworkers (1986, p. 42) remark that half the admissions included "alcoholism." Drug abuse treatment occurring in outpatient settings was not indicated. However, some drug abuse treatment may have been taking place, but If so, it was reported as something else. Recognizing this does not help with the problem of the irrelevance of older data.

TABLE 1. *Psychiatric and substance abuse hospitalizations in the Rand HIE*

Type	Number	Percent	Rate Per 1,000
1. Pure psychiatric	58	50.0	2.96
2. Psychiatric treatment for substance abuse	37	31.8	1.89
3. Medical treatment for substance abuse-related problem	19	16.3	0.97
4. Medical treatment with psychiatric diagnosis	2	1.7	0.10
Total	116	100.0	5.91

NOTE: Discharge diagnoses classified as mental health hospitalization were in the following ranges of HICDA(2): 290-319.0, 792.6, 783.4, 770.2, and 0-Y85.9.

SOURCE: Keeler et al. 1986, p. 43

Data from more recent periods show a much different pattern of use. One company's use is presented here for purposes of comparison. These data are from insurance claims from approximately 135,000 employees and dependents of a single manufacturing company enrolled in a conventional insured plan for a 2-year period. Coverage for alcohol, drug abuse, and mental illness (ADM) conditions included complete inpatient coverage (with a per episode length-of-stay ceiling), partial hospitalization, and $1,000 of ambulatory coverage per person per year.

Data on the treatment costs for alcohol abuse diagnoses and all mental disorders diagnoses are included in tables 2 and 3. Disease categories were defined by International Classification of Diseases (ICD)-9 discharge diagnoses; mental illness disorders were defined by ICD-9 discharge diagnoses between (290) and (319). Diagnoses are reported to the four-digit level to show detail.

Table 2 contains information about hospitalizations. The direct cost of ADM disorders is 23 percent of all hospitalization costs. Drug abuse treatments are a significant share of the ADM costs. For this P-year period, drug abuse treatment was 15.3 percent of the ADM hospital costs and 3.5 percent of all hospital costs. Shatkin (1990) uses recent data from the same employer to examine the health care use of children whose parents are diagnosed with psychiatric and substance abuse disorders. These other sources of costs can add to the total dollars spent on ADM disorders.

Outpatient facility costs, including partial hospitalization program costs, are contained in table 3. These constitute a much smaller share of the total. Physician office claims for this population contain limited diagnostic information; therefore, it is not possible to separate the components of ADM costs. These are not reported here.

Patterns of treatment for drug abuse certainly are changing rapidly and probably exhibit unusually large cross-sectional variation, In this context, it is best to have recent and, ideally, plan-specific baseline data on which to make forecasts about changes in costs and use with an insurance plan change. Models based on "nationally representative data," with patterns of use that are several years old, may be useful in simulating insurance effects for general health care (Buchanan et al., in press), but they are unlikely to be useful in the drug abuse treatment field.

The Inadequacy of a "Partial" Cost Analysis

If the Rand HIE went into the field today and could give us current data on the patterns of drug abuse treatment costs for a representative sample from the

US. population, would our problems be solved? Unfortunately, "what if questions regarding institution of or changes in drug abuse treatment coverage still would be hard to answer.

TABLE 2. *Cost of inpatient ADM care for a private corporation, January 1985 through December 1986*

ICD-9 Code	Diagnoses	Number of Episodes	Hospital Payment	Physician Payment	Total Payment
291.9	Alcohol psychoses	230	434,001	64,654	498,655
303.0	Acute alcohol Intoxication	634	1,610,941	147,575	1,758,516
303.9	Alcohol dependence	2,301	8,837,651	507,925	9,345,576
305.0	Alcohol abuse	16	68,888	4,541	73,429
292.0	Drug withdrawal syndrome	197	278,022	42,277	320,299
292.1	Drug paranoid state	4	10,085	2,554	12,639
292.8	Other drug-Induced mental disorders	2	18,687	1,792	20,479
292.9	Drug mental disorders-NOS[a]	9	57,685	10,518	68,201
304.0	Opioid-type dependence	534	1,690,418	103,922	1,794,340
304.1	Barbituate dependence	14	56,046	3,188	59,234
304.2	Cocaine dependence	838	2,958,786	160,670	3,119,456
304.3	Cannabis dependence	84	197,211	2,353	199,564
304.4	Amphetamine dependence	2	4,286	997	5,283
304.5	Hallucinogen dependence	3	2,577	215	2,792
304.6	Drug dependence	1	837		837
304.7	Opioid/other drug dependence	133	428,435	33,211	461,646
304.8	Combined drug dependence	15	43,433	3,879	47,312
	Drug dependence/NOS	103	323,357	26,799	350,156
304.9	Cannabls abuse	1	1,360	847	2,007
305.5	Opioid abuse	13	19,711	3,105	22,816
305.6	Cocaine abuse	31	42,651	7,380	50,031
305.9	Drug abuse NEC[b]/NOS[a]	19	43,418	4,943	48,361
All alcohol disorders					11,676,176
All drug disorders					6,585,453
All other mental disorders[c]					24,909,448
Total mental disorders (290-319)					43,171,077
All Inpatient costs					185,891,174

[a]Not otherwise specified
[b]Not elsewhere classifiable
[c]Includes all diagnoses 290-319, exclusive of substance abuse diagnoses specifically Identified In above list

SOURCE: Authors' calculations

TABLE 3. *Cost of outpatient ADM care for a private corporation, January 1985 through December 1986*

ICD-9 Code	Diagnosia	Number of Episodea	Hospital Payment	Physician Payment	Total Payment
291.0	Alcohol psychoses	25	9,089	926	10,015
303.0	Acute alcohol Intoxication	260	38,972	2,900	41,872
303.9	Alcohol dependence	9,247	1,208,540	78,837	1,287,377
305.0	Alcohol abuse	39	9,500	719	10,219
304.0	Opioid-type dependence	2,657	437,176	40,636	477,812
304.1	Barbltuate dependence	18	2,644	0	2,644
304.2	Cocaine dependence	834	89,977	7,055	97,032
304.3	Cannabls dependence	153	13,599	150	13,749
304.4	Amphetamlne dependence	2	353	0	353
304.5	Hallucinogen dependence	3	819	0	819
304.6	Drug dependence	8	2,009	0	2,009
304.7	Opioid/other drug dependence	37	4,581	217	4,798
304.8	Combined drug dependence	87	8,931	0	8,931
304.9	Drug dependence/NOS	116	36,182	329	36,511
305.1	Tobacco use disorder/abuse	2	171	0	171
305.2	Cannabls abuse	3	553	0	553
305.5	Opioid abuse	2	871	0	871
305.6	Cocaine abuse	7	1,361	134	1,495
305.9	Drug abuse NEC[b]/NOS[a]	17	1,912	147	2,059
	All alcohol disorders				1,349,483
	All drug abuse disorders				649,807
	All other mental disorders[c]				723,093
	Total mental disorders (290-319)				2,722,383
	All outpatient costs				60,442,925

[a]Not otherwise specified
[b]Not elsewhere classifiable
[c]Includee all diagnoses 290-319, exclusive of substance abuse diagnosea specifically Identified In above list

SOURCE: Authors' calculations

Consider a simple version of the type of question that might be of interest. What would be the cost of introducing drug abuse treatment for a given population with an existing and known pattern of insurance claims and uncovered services? The difficulties in answering this question stem from not knowing the answers to related questions: How many people are being diagnosed and treated for drug use but are labeled as something else? How many people have coaddictions or related psychiatric problems that are being treated? Would costs for these persons not change, increase, or decrease with funding of specialized drug abuse treatment services?

The clinical problems of drug abuse, alcohol abuse, and psychiatric disorder clearly overlap. For example, in a study of individuals treated for alcoholism in the mid-1980s Walsh and coworkers (1989) found that 40 percent of the alcoholics being treated at the EAP had used cocaine in the previous 6 months. Gawin and Ellinwood (1988) contend that regular use of high doses of cocaine leads to acute psychiatric complications. These overlaps suggest that the costs of net drug abuse treatment are less than the gross costs of expenditures on drug abuse treatment because treatment would occur under an associated condition if the drug abuse treatment coverage was not in place.

The issue of masking has a similar effect. Even if there are no clinically related conditions, treatment for drug abuse may occur under another diagnosis. If drug abuse treatment was covered, then drug abuse treatment costs would appear, but these would not be net costs,

A final interrelation between drug abuse treatment and other costs is via the so-called "offset effect" in which treatment for a drug-related condition reduces costs for the treatment of other illnesses by having a generally positive effect on the person's health. It is certainly plausible that elimination of setf-destructive patterns of behavior could lead to general savings in across-the-board health care costs, and some evidence suggests that there could be quite a large effect. In an analysis of the costs and benefits of a drug testing program at Georgia Power, Southern Electrical International, Inc. (1989) found that the medical insurance costs of individuals testing positive for drugs were many times higher than the costs of similar employees not testing positive. In the alcohol field, research on offset effects in nonexperimental settings leads to results consistent with the existence of some effect (Holder 1987).

In summary, the real (or "real" according to reported data) relation of drug abuse and drug abuse treatment to other disorders and their treatment indicates that the full costs of including treatment for drug abuse in an insurance plan are less than the gross costs of drug abuse treatment after the benefit is in place. Some of these conditions would have been treated anyway, and if there were any offset, other medical costs also would be reduced.

Are "Premium Regressions" an Answer?

Some recent research on insurance costs has focused on the impact of regulation and mandatory inclusion of "marginal" coverages, such as ADM benefits, on plan costs. Jensen and Morrisey (1990, summarized in Gabel and Jensen 1989) use "premium regressions" to estimate the marginal effect on total insured costs of various benefit provisions, including some from the mental health and substance abuse area. A premium regression can take account of

the direct and indirect effects of a benefit change. In the case of home health care, for example, use of this covered service might substitute for inpatient hospital care in ways that would be hard to measure except at the level of the total premium. Jensen and Morrisey use data on 9,000 plans from large employers from 1981 to 1984 to estimate the marginal effect on premiums of a number of plan features. They control for characteristics of the plan group in the form of variables for percent males, percent nonwhites, region of the country, and the form of insurance contract. Although these data are not particularly recent and therefore do not address the first problem discussed above, more recent results from the BLS survey are now available. Because it is concerned directly with the total insured costs of a benefit feature, the premium regression method would seem to solve the problem with partial analysis.

For the three ADM benefit variables (among seven) used in the regression, coverage for substance abuse increased family premium 8.8 percent, psychiatric hospital stays increased family premium 12.8 percent, and psychologists' visits increased family premium 11.8 percent. These findings are of course highly implausible. It is inconceivable, especially in the early 1980s that these selective features of a mental health benefit, over and above more standard coverage such as psychiatrist visits and hospitalization in general hospitals, could increase premiums by 33.4 percent.

The problem is one of empirical specification, and the difficulties are so fundamental that it is unlikely that premium regressions ever will be much help. Although the authors refer to their empirical method as a "hedonic price" equation (an equation that uses the character of the product to determine its price), another way to view what Jensen and Morrisey (1990) have done Is to regard the dependent variable as a quantity index of average demand, specified as a function of population covered and coverage features. Seen in this way, serious drawbacks of their approach are evident: (1) Population characteristics and regional variables typically dominate health care expenditure regressions. They have few variables positioning the demand curve; their equation is without even an age measure, probably the most important single variable. (2) There is no control for adverse selection. (3) As acknowledged by the authors, by choice of a few plan characteristics, it is likely that these characteristics proxy the presence of a generous plan overall. The authors may be mistakenly attributing the effect of many plan design features to the singled-out variables. (4) There is no distinction between the cost-shifting effect of coverage and the demand-response effect In terms of impact on premiums. (5) Finally, coverages are measured in a simple "yes-or-no" form.

If mandated ADM coverage increased insurance costs, it could be expected that such mandates would lead some firms, particularly small firms, to decline to offer Insurance at all. Jensen and Gabel (1989, results summarized in Gabel and Jensen [1989]), studied health insurance provision in response to State insurance regulation in a sample of 1,320 small businesses in 1985. The decision to offer insurance was modeled as a function of workforce composition, corporate form and size of the employer, and nine measures of State regulation. The strongest negative effects on a firm's decision were found for the existence of a continuation of coverage rule (t=2.7), premium taxes (t=1.7), and risk-pool taxes (t=1.6), all forms of regulation that impose costs without increasing benefits to the firms' employees. This study is particularly valuable because the empirical work distinguishes different forms of State regulation. Continuation of coverage provisions does provide a kind of insurance to workers against job loss. The cost of this regulation to the employers may be much less than its value to the workers if workers have other options after employment termination, such as a spouse's coverage or Medicaid. Interestingly, mandated benefits did not seem to decrease the likelihood of coverage. Counts of the total number and of recently enacted mandates had small but insignificant negative effects (t statistics of 0.4 and 1.0, respectively). Jensen and Gabel added separate mandate indicators for substance abuse and mental health care because these are the mandates that, according to the authors, "businesses often complain about." Although no estimated coefficient of the four measures was statistically significant, on balance the presence of these mandates *increased* the likelihood of insurance. The four measures and their signs and significance were a mandate for psychologists' services (-, t=0.7), inpatient mental health coverage (+, t=0.1), alcoholism treatment (+, t=0.1), and drug abuse treatment (+, t=1.6).

On the basis of these results, an important distinction appears to exist between State regulations that are mainly cost-increasing without directly benefiting the firm and workers, such as taxes to finance risk pools, and regulations that impose costs but confer benefits, such as a mandated coverage law. Jensen and Gabel (1989, p. 18) unfortunately lump these together in a general condemnation of mandates by saying that "Mandates enacted between 1983 and 1985 together with those mandates most often complained about by employers account for 16 percent of noncoverage among small businesses." This effect is due almost exclusively to continuation of coverage provisions and premium taxes, not mandated benefit provisions, according to their own work. Although mandated ADM benefits may increase costs and discourage small employers from offering health insurance (bearing on the tradeoff between targeting insurance regulation to increase the *number* of persons covered vs. depth of coverage), the Jensen and Gabel work provides no evidence for such an impact.

IMPLICATIONS FOR RESEARCH

Given the changing epidemiology of drug abuse and the changing technology of drug abuse treatment, it is important for decisions about private insurance to be based on recent data. Research reports from national samples must be supplemented with plan-level information from employers, insurers, or others with accessible experience. The Federal employees' plans may be one possible resource for such data. By observing differences in patterns of care provided to enrollees with different payment systems, information may be gathered about the nature of supply response to alternative payment systems. If there were changes in plan coverages, demand response may be studied as well. Studies of this form should pay attention to use across the whole ADM area in light of the potential for a change in drug abuse coverage or payment to affect patterns of use or diagnosis in the psychiatric or alcohol treatment area.

Although recent data on patterns of use are certainly helpful, it still will be worthwhile to review experience in drug abuse treatment costs to date. In addition to information about treatment users and the costs, forms, and sites of treatment, this review should be alert to the relation of drug abuse treatment to other ADM treatments.

Drug abuse coverage policy is likely to be a target for public policy in the form of insurance mandates or other employer regulation. Why do some employers voluntarily adopt certain policies or components of health insurance coverage? What determines the differences in employer policies toward drug abuse? It needs to be recognized in this investigation that drug abuse treatment coverage decisions are part of a set of policies adopted by an employer. What effects is regulation likely to have on costs, coverage, and patterns of treatment?

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Health Insurance Coverage Questions, Public Health Surveys, and Drug Abuse

William S. Cartwright and Albert M. Woodward

INTRODUCTION

The National Institute on Drug Abuse (NIDA) and other governmental agencies are interested in the extent of health insurance coverage, prevalence of alcohol and other drug abuse and mental health coverage, and access to drug treatment services. NIDA conducts the annual National Household Survey on Drug Abuse (NHSDA), which measures the prevalence of alcohol and other drug use in the United States. Previously the survey has not been an important source of information on drug treatment, health service use, or health insurance coverage.

This chapter reviews coverage questions contained in national health insurance surveys and proposes a set of questions to be added to the NHSDA. The proposed questions are relatively few in recognition that the focus of the NIDA survey is on national prevalence rates for alcohol and other drug use. These questions are consistent with those of the existing national health insurance surveys to facilitate comparison among populations on the subjects of access and coverage.

The NHSDA is an obvious choice to include a set of questions on health Insurance coverage and access to drug treatment services, because it provides the potential for obtaining nationally representative data on utilization of treatment and insurance coverage. The survey structure and process provide confidentiality of individual participation and anonymity of the person's response to questions of drug use. Because the survey asks questions about behavior that may be *illegal,* confidentiality and anonymity must be ensured.

At least four other issues need to be resolved in addition to the special requirements of confidentiality and anonymity: (1) who in the household is most knowledgeable about the health insurance coverage of the person being

interviewed, an especially difficult issue if that person is an adolescent; (2) how to ask about specific alcohol and other drug abuse coverage, because most interviewees are unlikely to know unless they have tried to use this coverage; (3) how to ask if the respondent needed, sought, and obtained treatment, and if so, was the treatment covered by health insurance; and (4) what period of coverage should be asked about. These issues will influence the content of the questions on coverage and treatment and their placement in the survey.

The chapter begins with a brief review of the 1985 and 1988 NHSDA and then briefly reviews issues and questions from national health insurance surveys. The chapter concludes with a list of questions and reasons for their selection.

NATIONAL HOUSEHOLD SURVEY ON DRUG ABUSE

The NHSDA (National Institute on Drug Abuse 1989) measures the prevalence of alcohol and other drug use in the continental U.S. population for ages 12 and older for 1988. In each household, the composition and demographic characteristics are determined for all members, and a random selection is made to interview one, two, or none. The survey ensures adequate sample sizes to stratify by four age groups (12-17, 18-25, 26-34, and 35+) and three racial/ethnic groups (Hispanic in origin, regardless of race; white, non-Hispanic; and black, non-Hispanic). The survey is designed statistically to obtain responses from a significant number of adolescents ages 12 to 17. In 1988 these represented 3,095 out of 8,814 sampled persons and about 10 percent of the total projected U.S. population. The survey reports national frequency distributions and rates about the following illicit drugs: marijuana, cocaine (including crack), crack (separately), inhalants, hallucinogens (including phencyclidine [PCP]), psychotherapeutic drugs (nonmedical use), and heroin. The survey also reports on the use of the licit drugs alcohol and nicotine (cigarettes and smokeless tobacco).

The interview process is designed to maximize confidentiality of participation and anonymity of response. Identifying information is separated from survey response. The interviewer never has access to the individual's response, because in those segments of the interview involving sensitive questions, cards are shown and answer sheets marked to questions read aloud by the interviewer. The participant seals the answer sheet in a postage-paid envelope and mails it to the firm hired by NIDA to tabulate the responses.

Information on treatment is not sought in each survey year and, when collected, appears to be underreported. In 1985 *Treatment Answer Sheet #14* was added, which collected information on whether the individual sought help to stop smoking (TR-1), treatment for drinking (TR-2), or treatment for drug use

(TR-3). If the response was "yes," then the individual was asked to circle the places where treatment was received (TR-4). Later the individual was asked if he or she had received treatment in the past 12 months. *The National Household Survey on Drug Abuse: Main Findings 1985* report (National Institute on Drug Abuse 1988) did not show information on the treatment questions. In the 1988 survey, this treatment answer sheet was not present; however, a few questions on nondrug treatment were asked in the health section of the survey.

OTHER HOUSEHOLD SURVEYS

Current Population Survey

Statistics from the Current Population Survey (CPS) are used to determine the unemployment rate and other labor force characteristics. The subject matter of the survey presents survey designers with an opportunity to include questions about health insurance. Beginning in 1980, every March the Census Bureau asked questions about health insurance for the previous calendar year. The sample for 1987 comprised about 60,000 households and about 156,000 individuals, which was representative of the 244 million in the noninstitutional population. The size of this sample, the timeliness, the demographic characteristics, the income, and the health insurance information have made this survey an important source of policy analysis on the question of the number of uninsured in the U.S. population.

The questions were changed in March 1988 to probe for the presence of health insurance from an absent parent or anyone outside of the household. In the 1988 CPS, the respondent was asked which member in the household had a health insurance plan and if each person in the household age 15 and older was covered by the plan. Information was requested on children 14 years and younger to find out if they were covered by someone not present in the household. Children younger than 15 are not interviewed because the usual respondent is an adult in the household. These changes in the questions had two effects: (1) Complete comparisons between 1979 and 1986 cannot be made with the years after 1986 and (2) the level of coverage was greater than had been reported in 1979-1986 (i.e., reported coverage was biased downward). The result of these changes in the survey led to a reduction of previous CPS estimates of the number who were reported "uninsured" from 37 million to 31 million (Moyers 1989).

The health insurance questions are placed in the Income Supplement at the end of the CPS. About half of those interviewed in March are interviewed again the following March. Questions probe for information on Medicaid, Medicare,

Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), Veterans Administration (VA) or military health care, and coverage by a private health insurance plan. Respondents also are asked if the health insurance plan came through an employer or union and whether it was a premium subsidy. There are 12 health insurance questions in the survey. Overall, nonresponse rates have been from 10 to 15.5 percent for the survey as a whole, and imputations are made for missing data on coverage. One unasked question of great importance is the presence of alcohol and other drug abuse treatment coverage in the plans of those that are covered.

Kronlck (1989) conducted a study with 1988 CPS data for the Office of Technology Assessment. He found that in 1987, 10- to 18-year-old adolescents without health insurance numbered 4.6 million, or about 15 percent of this age group. This was a lower estimate than those of previous years, due to question wording changes introduced in the 1988 CPS. This group of adolescents overlaps in age the group of adolescents 12 and older that is in the NHSDA.

Swartz (1985) maintains that the CPS respondents answer the question in terms of a "point-in-time" rather than the previous year's coverage. Kronick argues that this is overstated and notes that there are several anomalous findings in some groups if Swartz's conjecture is true. For example, insurance status is more closely aligned with employment status during the previous year rather than employment status in the survey month. Second, the 1987 National Medical Expenditure Survey (NMES) has preliminary first-round "point estimates" of uninsured people that are 6 million higher than the 1988 CPS estimate. The lower CPS estimate is consistent with a survey in which some coverage during the year results in a positive response to the coverage question. Kronick maintains that question wording is the principal reason for the lower level of insurance coverage in the CPS.

Public Health Surveys

National Medical Expenditure Survey. The 1987 NMES is an important source of information concerning household insurance coverage (Edwards and Edwards 1989; Edwards and Berlin 1989). The survey targets the U.S. civilian noninstitutional and institutional populations. In the 1987 NMES, approximately 14,090 households represented the civilian noninstitutional population of the United States, and 2,000 households represented of Native Americans and Alaska Natives. In the institutional component, information about 11,000 individuals in nursing and personal care homes and facilities for the mentally retarded was collected for 1987. The data permit analysis of private health care insurance coverage and benefits, public programs, and long-term care.

Besides a household survey done in five waves, a health insurance plans survey was conducted to obtain detailed information concerning the extent of coverage, benefits, and premium costs.

The principal goal of the 1987 NMES was to determine the extent of and gaps in coverage for the entire calendar year and to allow linkage between health insurance coverage and employers. For each private plan reported, the source of the plan was obtained and compared with the employer roster. The design of two precursor surveys, the 1977 National Medical Care Expenditure Survey (NMCES) (Bonham and Corder 1981) and the 1980 National Medical Care Utilization and Expenditure Survey (NMCUES) (Bonham 1983), permitted a point of measurement only at the time of the interview dates in the survey. Information in the first round represents a beginning point for the 1987 data collection; thus, it represents a point estimate for coverage.

About 70 items were probed that related to the public and private coverage of all individuals in the household. In the first wave, information was obtained on the health insurance status of all household members at the time of interview for Medicare and CHAMPUS/CHAMPVA. (CHAMPVA covers disabled veterans and their dependents and survivors.) Questions were answered by a knowledgeable respondent in the household. Medicaid, other public medical assistance, and private insurance coverage information was collected to obtain continuous coverage information for the year. Benefit and coverage data were collected from such sources as employer, business, union, other group, or insurance company plans for all persons in the household. Information on coverage of an adolescent through an absent parent's policy also was collected.

In the health insurance plans survey, respondents were asked directly if the plan includes a drug abuse treatment benefit, an alcohol abuse treatment benefit, and/or a mental health benefit. The first wave of the survey has been published without the detailed health insurance plans information, scheduled to be available in 1991. The questions on alcohol and other drug abuse coverage is in section L, Chemical Dependency (p. 25) on Basic Coverage (Hospital and Medical):

1. Are benefits provided for the treatment of chemical dependency?

2. Are benefits provided for:

    a. Inpatient alcoholism treatment?
    b. Outpatient alcoholism treatment?

3. Are benefits provided for:

    a. Inpatient drug dependency treatment?
    b. Outpatient drug dependency treatment?

These same questions are asked in the section concerning major medical insurance coverage (p. 71) (National Center for Health Statistics 1987).

National Medical Care Utilization and Expenditure Survey. The 1980 NMCUES previously mentioned collected household data on the noninstitutional population. Individuals in the survey were interviewed five times at approximately 3-month intervals. About 6,000 randomly selected households (17,600 individuals) and a State Medicaid component of 4,000 households (13,400 individuals) were drawn from the eligibility roles of California, Michigan, New York, and Texas. Health insurance coverage data were obtained in the core interview and included Medicare, Medicaid, CHAMPUS/CHAMPVA, Indian Health Service, and private coverage. Because health insurance was in the core questionnaire, changes in coverage over time could be monitored. If an individual was not covered, a reason was probed. Alcohol or other drug abuse was not a topic of the survey.

National Health Interview Survey. The National Health Interview Survey (NHIS) collects information on acute health conditions, episodes of persons injured, restrictions in activity due to chronic conditions, self-assessed health status, use of medical services, and demographic characteristics of the respondents. The Bureau of the Census conducts the survey for the National Center for Health Statistics (NCHS), interviewing each week randomly selected samples that are representative of civilian noninstitutional persons. In 1987, 122,859 persons in 47,240 households were interviewed. Only 4.7 percent of those individuals randomly selected did not participate in the survey. In 1985 the NHIS initiated the following major changes:

- Reduce the number of primary sampling locations from 376 to 198 to improve sampling efficiency
- Oversampled the number of black persons to improve the precision of statistics
- Made the sample more comparable to other NCHS surveys
- Based the population universe on revisions to the decennial census for followup surveys

Information is collected from responsible family members residing in the household. Proxy responses are accepted for all children and others not present at the time of the interview or incapable of responding.

The 1989 NHIS has a supplement that collected information about health insurance status at the time of the survey. Questions were asked concerning Medicare, Medicaid, military and veterans programs, and private health insurance coverage. If there was participation in a private plan, data were collected on whether it was a health maintenance organization obtained through an employer or union, and whether coverage extends to hospital expenses, doctor's or surgeon's bills, dental services, prescription drugs outside of the hospital, and mental health or alcohol and other drug abuse services. The reason for not carrying health insurance is asked. Information concerning receipt of welfare under the Aid to Families with Dependent Children or Supplemental Security Income programs (a measure of Medicaid eligibility) also is collected. One series of questions asks if an individual was laid off during the past 12 months, if private insurance coverage was lost, and if so, whether some other private or public insurance was obtained during the job loss,

The 1989 survey also has a supplement on mental health in which the respondent is asked whether anyone in the family had an alcohol or other drug abuse disorder in the past year. This question is the only one on alcohol or other drug problems among the national health and health insurance surveys. It is not possible to match insurance coverage at the current time with the possible alcohol or other drug problem in the past year. Because confidentiality and anonymity are not handled the same as the NIDA National Household Survey on Drug Abuse, the response rate to this question may not be as high as that for questions on the NIDA survey.

Other Surveys. Several other national surveys inquire about the presence of insurance. The 1977 NMCES, like the 1987 NMES and the 1980 NMCUES, collected data on health insurance status. These three surveys allow the determination of insurance status at various times in a given year. In contrast, the NHIS asks about insurance coverage at the time of the interview. These both contrast with the CPS, which asks about coverage during the previous year.

The Bureau of the Census conducted a Survey of Income and Program Participation (SIPP) to provide statistical information on income and social welfare program changes over time for persons and households. The first interviews of the first wave of SIPP were conducted in October 1983 (Frankel 1985). Persons interviewed were surveyed about their income and related topics once every 4 months for approximately 2 1/2 years. Questions about

Medicaid, Medicare, and health insurance coverage were asked in the section on noncash benefits. No questions were asked about drug use.

Conducted In fall 1986, the Robert Wood Johnson Access Survey of 10,130 noninstitutional persons estimated the proportion of uninsured persons to be 10 percent (Freeman et al. 1990). Adults were interviewed directly and children younger than 17 through proxy interviews with parents or guardians. Questions were asked about health status, access to and use of services, demographic characteristics, and insurance coverage. The survey reported on access to health services and the odds of workers being uninsured, but it neither collected nor reported information on drug use.

RECOMMENDATIONS FOR THE HOUSEHOLD SURVEY ON DRUG ABUSE

No detailed knowledge exists of the demand for health insurance coverage for drug treatment. The distribution of expenditures on health services of those who seek or have undergone treatment for drug problems is unknown. The adequacy of health insurance in providing access to drug treatment services is also unknown. Two unanswered questions are, To what extent are benefits available and used for the treatment of drug problems? and How does the population with drug problems differ from the rest of the population in terms of its need for coverage? Finally, the extent to which cost sharing and copayments are part of rational decisionmaking in benefit coverage is unknown. That is, to what extent do the out-of-pocket expenditures influence the utilization of drug treatment services?

Adding questions on insurance coverage to the NIDA National Household Survey on Drug Abuse will permit the analysis of the demand for insurance of drug treatment services. This survey provides the most comprehensive information on use of drugs among the US. household population. Other surveys, such as the NHIS or the NMES, provide detailed insurance information but little information on drug use. Furthermore, comparisons of coverage reported by the NIDA survey and of the more detailed information from other surveys will permit a more comprehensive characterization of the demand response for drug users vs. the rest of the population.

The analysis of health insurance coverage may be extended along several lines, First, from the NIDA survey, public or private health insurance coverage may be examined over the various treatment modalities. Second, within the private insurance market, the NMES will permit a study of the proportion of insurance with mental health or alcohol or other drug abuse coverage when health insurance plan data become available in 1991. Third, the employee benefits survey of 1989 (US. Department of Labor 1989), conducted by the

Bureau of Labor Statistics, also has information concerning alcohol and other drug abuse treatment benefits. Fourth, the CPS will have questions concerning health insurance coverage and workplace alcohol and other drug prevention programs. Also, the NHIS contains information on both coverage and alcohol and other drug abuse disorders, Thus, by examining all these surveys, a clearer picture will emerge of the extent and adequacy of alcohol and other drug abuse coverage in health insurance in the United States. As previously discussed, the technical nature of questions about alcohol and other drug abuse and health insurance coverage requires the use of all these surveys.

The confidentiality and anonymity requirements of the survey limit the phrasing of questions concerning coverage and treatment. The fundamental unit of analysis is the person, not the household, because in epidemiologic studies, rates of disease are measured with respect to persons in a defined population at risk. This also limits the way that questions concerning coverage and treatment may be asked.

The first issue is the source of health insurance coverage. The policyholder within the family may obtain health insurance coverage through the employer, from a union, from the Federal and/or State Government, or through individual purchase. For an individual family member, insurance may be obtained from one's employer or the spouse's employer. Dependents may be covered on either spouse's policy or may be covered by a parent who is not present in the home. As previously discussed, questions must be worded carefully to avoid some of the pitfalls in interpreting insurance coverage that analysts have discovered in past CPSs.

Asking adolescents questions about sources of payment may not yield high-quality information for this group but is an issue worthy of investigation. Youth who are 18 years and older may know whether they have health insurance coverage. Numerous household studies sponsored by the Public Health Service have shown that individuals know their coverage status. Such household studies attempt to obtain information on the insurance status of every member of the household and the source of that coverage. This would not be practical in the NIDA survey because individuals are picked randomly rather than selected on the basis of their knowledge of the household members' health insurance coverage.

There Is a question of whether individuals understand their health insurance coverage, that is, how divergent their perception of benefit coverage and provisions for copayment are from the actual coverage and copayments. Waldo and colleagues (1982) found that as more specific information concerning health insurance characteristics was asked in a national household survey,

reporting bias occurred. Alcohol and other drug abuse coverage may not be well understood because it is one of many coverages and, thus, subject to reporting bias. To obtain better information, the NMES has a separate followup survey on the health insurance plans to determine plan characteristics, and alcohol and other drug abuse coverage questions occur In this part of the NMES. Asking the respondent of the NIDA survey for permission to contact the employer to survey the health plan Is not feasible because of the appearance of potential violation of confidentiality to the respondent. As a second-best alternative, the respondent can be asked about the availability of alcohol or other drug abuse or mental health coverage. The respondent is likely to know the coverage for alcohol or other drug treatment if he or she has sought treatment. By changing to an employer or insurance provider as the sampling unit, information on alcohol or other drug abuse coverage may be obtained (e.g., the Employer Benefits Survey). Unfortunately, this information does not allow the examination of health outcomes.

The requirement of confidentiality and the fundamental unit of analysis (the person) also affect questions on treatment and personal income. Drug treatment questions cannot be added to a survey during the screening process of the household, because such questions would compromise the confidentiality requirement and destroy the viability of the whole survey. Treatment for drug abuse is important information because it cannot be divorced from health insurance reimbursement, The probability, intensity, and adequacy of treatment may hinge on the dual presence of health insurance and benefits for alcohol or other drug abuse. However, data on treatment, although collected in prior NIDA surveys, have been of secondary importance to high-quality, epidemiologic information.

To a lesser degree, personal income and household Income are important in assessing access to treatment, especially in the presence of insurance coverage. The ability to pay out-of-pocket treatment expenses is connected intimately to income, even if there is coverage. In an epidemiologic survey such as the NIDA survey, income questions usually are asked at the end of the interview because the income question has the potential to terminate the interview prematurely. Household income cannot be estimated, because only personal income is obtained in the NIDA survey. Adolescents are usually not in a position to answer household income questions. In these circumstances the best action is to continue to ask for total personal income, recognizing the possible lack of validity for adolescents.

The final issue is what period of time should the respondent be asked about. The coverage questions can ask about several periods: (1) a point in time, such as the time of interview; (2) a period of time, such as the past year; and

(3) several points in time in a panel study approach. One could ask for coverage as of the time of the interview or in terms of some previous coverage. In addition, one must decide if any coverage in the period is relevant or whether one is most interested in coverage that lasts for the whole period. Obtaining information about the duration of health insurance is difficult because of problems related to recall, as has been noted for the CPS. The SIPP allows the duration of coverage to be measured by asking individuals questions regarding their coverage at several different points in time. In this way, the changes of eligibility and participation of coverage may be discerned over the duration of the survey waves. This is particularly important in analyzing Medicaid where eligibility of Medicaid beneficiaries can change within a year's time. The necessity of adding only a few questions narrows the question of duration to that of the CPS.

The March CPS and the 1987 NMES are the two most important surveys for national analysis of health insurance coverage. The NMES is too detailed to permit adaptation of the questions to the NHSDA. The shorter CPS questionnaire will be more feasible to implement. Furthermore, the CPS can provide weights to project the data in future years. The CPS should be used for its questions on insurance coverage. The health insurance questions might be placed either In the beginning for the initial screening of the household or in the last section, called "statistical information," as a second-best alternative.

The health insurance questions should follow the CPS, questions 74 and 75. These questions could be asked at the beginning of the interview during the initial screening of the household to determine insurance coverage for each member of the household. Alternatively, these could be asked at the end of the survey in the statistical section for each member of the household. This is disadvantageous because the respondents are less likely to know about coverage than the person being interviewed in the screening process.

Obtaining valid information about specific alcohol or other drug abuse benefits will be difficult. Like the questions on whether there is insurance coverage, these questions could be asked during the screening process. The specific questions are based on those of the CPS.

In the previous discussion, alcohol and other drug treatment and source of payment were shown to be linked; thus, they would naturally appear in a confidential answer sheet. Treatment by modality and setting must be asked so that it can be linked to the type of coverage (e.g., public treatment paid for by Medicaid). The treatment modalities and settings asked about in the questions are taken from several NIDA epidemiologic surveys. Finally, a question on access to treatment must be asked to determine the effect of health insurance

coverage. This question should be placed with the confidential questions in the survey. An access question in this section serves to corroborate coverage information obtained in the screening process.

Table 1 presents suggested questions.

TABLE 1. *Health insurance coverage questions*

A. Many government programs provide medical care or help pay medical bills. Please circle the programs from which (PERSON) received coverage during 1990:

1. Medicaid
2. Medicare
3. CHAMPUS, VA, or military

B. During 1990, was (PERSON) covered by a health insurance plan other than Medicare, Medicaid, or military health insurance? Yes___ No___

If the answers to Questions A and B indicate no coverage, the interviewer can skip Question #C.

C. Did (PERSON'S) health insurance plan include coverage for any of the following:

___Alcohol abuse
___Other drug abuse
___Mental health

Confidential Questions

The following questions must be placed in a confidential answer sheet because of their sensitivity.

D. During 1990, did you receive treatment for a drug problem? Yes___No___

E. During 1990, in which of the places listed have you received treatment for your drug use? (Circle the number of each of those places.)

Hospital inpatient 1

Residential 2

Outpatient detoxification/drug maintenance 3

Outpatient drug free 4

Partial hospitalization
(Day program or intensive ambulatory services) 5

Self-help group 6

Other (specify) 7

F. During the past year, were you referred to drug treatment through an Employee Assistance Program or other employee nonhealth insurance program?

Yes_ No_

G. During 1990, have you ever been denied benefits for a drug abuse treatment claim because:

- Not covered by the plan
- Already used up all the benefits available in the plan
- Not applicable, fully covered

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Recommendations

William S. Cartwright and James M. Kaple

INTRODUCTION

After formal presentations and discussion of the papers, members of the technical review convened into three groups to prepare recommendations in the areas of economic costs, cost-effectiveness, and financing. Members also were encouraged to move to other groups to make contributions across other areas. The members of the technical review then reconvened, at large, and reported on the recommendations made in the small groups. Each area received discussion by the full group, and participants developed an outline of the recommendations that are presented below.

ECONOMIC COST RESEARCH

The members of the technical review recommended as an overarching goal that existing surveys be examined and modified where necessary to capture improved economic data to inform services research.

1. Methodological problems of small target populations in a large survey population should be overcome through better screening and oversampling.

2. The National Household Survey on Drug Abuse should obtain more complete information on individual and household socioeconomic status, including better income and labor force participation data.

3. The National Health Interview Survey should continue to include health status, service use, and insurance coverage on alcohol and other drug abuse and mental health (ADM) problems/conditions.

4. Public use tapes should be made available more quickly following surveys and disseminated more widely.

5. The National Health and Nutrition Examination Survey should be studied for possible addition of drug testing questions.

6. There should be a minimum data set of questions that should be asked on all surveys in the same way, including source of payment, comorbidity data (surveys of single disorders may be misleading if comorbidity is not obtained), and onset, duration, and symptoms of disorders.

7. Questions of income should specify better household and individual earnings and add transfer and other unearned income payments.

6. Research should be done on the possibility of adding questions concerning disorders among all people in the household (not just the interviewee).

9. The Drug Abuse Warning Network should be expanded to include some cost data.

10. The results of the Drug Services Research Survey should be used to improve the current National Drug Abuse Treatment Unit Survey.

11. Special supplements to the National Longitudinal Surveys should continue to be conducted, and findings should be made known,

The technical review established a second overarching recommendation that more health services research should be done on specific areas for economic costs.

12. Research should be conducted on defining and measuring the full costs of drug abuse and treatment.

13. Research should be conducted on hidden costs that up to now have not been studied.

14. Research should be conducted on following a population at risk or in treatment over time to identify long-term costs (and outcomes).

15. Research should be conducted on costs and utilization of services funded under the block grants programs covering ADM disorders.

16. Regional services research centers should be established to promote data collection and analysis at the local level on topics for which national data collection may not be appropriate.

17. Research should be conducted on improving diagnostic measures of disorders such as those in the Diagnostic and Statistical Manual of Mental Disorders and the International Classification of Diseases.

18. A research grant program on services research, including economic cost analysis, should be established.

COST-EFFECTIVENESS RESEARCH

Cost-effectiveness of alternative approaches to drug abuse services is a critical research focus. It must be determined if resources devoted to alternative treatment options result in efficient drug abuse programs and services. Cost-effectiveness research requires comparison of outcomes and associated costs for alternative ways of providing drug abuse services. The technical review group focused their recommendations on six areas of concern.

19. Services research should be stimulated to answer several recruitment questions: In what ways can the treatment referral system be improved to more appropriately match client needs with available treatment services? Can outreach programs make contact with persons who have no history of treatment but would avail themselves if an appropriate referral were made? Can assessments aid in the identification of clients at high risk for leaving treatment programs prematurely?

20. Treatment goals should be studied to answer several questions. What is the impact of different goals of treatment outcome? What are the differences to be inferred from monitoring behavioral change vs. permanent lifestyle and cognitive behavioral development and recovery?

21. Services should be examined more broadly. What are the individual and combined effects of components of treatment and services? How are clients referred to health and other services in the community?

22. Treatment career also should be studied to examine the potential effects of a treatment episode. How does a particular treatment episode function in a person's life? Does treatment accelerate maturing out of drug addiction? If cost-containment acts to reduce effectiveness, do short-term savings increase subsequent long-term costs?

23. A variety of methodological studies should be initiated to improve services research in general and cost-effectiveness in particular. The quality and utility of current approaches to study effectiveness and cost-

effectiveness need to be assessed and improved. Particular attention is directed to the following:

- Diagnostic techniques: readiness, need, and service
- Cost accounting systems
- Treatment and service definitions and content
- Measurement of outcome and translation into dollar terms

24. A three-level approach to methodology is proposed in the following areas:

    - Minimum data set for program management, treatment planning, and accounting

    - Common core set of measures and procedures across research studies

    - Indepth examination of issues that can be replicated in appropriate studies

In addition, participants recommended services research in the following areas:

25. Develop common-use instruments, methodologies, and procedures.

26. Conduct continuing efforts to assess and improve quality and utility of research approaches. Research centers of excellence would be a focus for this process.

27. Emphasize collaborative field trials for issues and approaches. Demonstration efforts should be coordinated to facilitate central evaluation using state-of-the-art methodology with sufficient sample size and combination of treatments to provide conclusive evidence of relative cost-effectiveness.

28. Establish a services research clearinghouse to disseminate information on instruments, methodologies, protocols, and findings.

29. Regional centers should coordinate with State and private systems to disseminate and develop research and evaluation efforts.

FINANCING RESEARCH

Public support for the supply of drug treatment services leads to several research topics in the financing area:

30. What are the sources of funds for suppliers in the public system?

31. How sensitive are suppliers to changes in sources and levels of these funds? What if reimbursement were enhanced? What changes could be expected? Would the intensity and type of services or number of clients change?

32. How would response vary in the short and long runs? The long run involves issues of technology choice, capacity, and entry and exit.

33. What are costs for existing programs? How do these vary? What are possible units of payment? What is known about production relationships?

The demand for treatment services financed through public means creates a need for several questions to be explored.

34. What is the nature of the persons using publicly supported drug treatment services?

35. What is the mix of service need/demand on other public programs such as criminal justice, welfare, housing, income support, and public health?

38. How does the need/demand for services vary by any relevant personal characteristic such as income and nature of drug abuse?

37. Does the pattern of public service use suggest problems and/or possible restructuring?

Both privately financed and publicly supported drug treatment services raise many similar questions, but privately financed services also offer unique questions for consideration.

38. What is the nature of the persons using private drug abuse treatment services?

39. How does the need/demand for private services vary by any relevant personal characteristic such as income and nature of drug abuse?

40. Does the pattern of private service use suggest problems and/or possible restructuring?

41. How do licensing and regulatory issues affect private supply?

42. How does a change in the reimbursement system affect both private and public supply? The group pointed to the Philadelphia Medicaid Health Insuring Organization as a good example of a study that involved reimbursement and private/public supply issues.

The demand for drug treatment services, predominantly privately financed, is linked to the various distributions of payment and reimbursement policies. Some important recommendations for further study include:

43. It is necessary to link the insurance market with the labor market in understanding demand for treatment and insurance for drug abuse services as well as in examining the full set of employer strategies with respect to drug abuse services.

44. What market failures are possible rationales for public intervention, and what is the impetus for regulation of insurance or testing?

45. What are the effects of insurance regulation, sanctions, and testing on firms and labor markets?

46. What is the experience with the costs of drug abuse treatment coverage?

47. The Federal employee insurance plans are a possible database with longitudinal capabilities for studying financing issues,

48. There are many natural experiments created by regulatory differences. Private employees may be induced into participating in other experiments.

49. The process by which demand for insurance and demand for treatment are determined needs to be better understood. Is moral hazard good or bad? What is the process of help-seeking in drug abuse treatment? How is demand for insurance generated?

There are also two other areas of interest.

50. State governments, as they adopt various policies toward drug abuse treatment financing, can be made a subject of study. What are the factors associated with various State policy choices?

51. What is the role of managed care in payment for drug abuse services? What are its effects?

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