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## Spending on substance abuse treatment: how much is enough?

Ellen Meara and Richard G. Frank

Department of Health Care Policy, Harvard Medical School, Boston, MA , USA

### Abstract

**Aim**—To describe a framework that can be used to determine optimal spending on substance abuse treatment in the United States.

**Methods**—Selective review of the literature on spending for substance abuse treatment combined with an economic analysis of how to determine when spending is optimal, defining optimal spending as that which minimizes the social costs of substance use disorders.

**Results**—In 1997, only \$11.9 billion of the \$294 billion estimated social costs of substance abuse was spent on treatment. The discrepancy between the high indirect costs of illness relative to the level of spending on treatment of addictive disorders leads many to believe that the United States spends too little on treatment. In this paper, we argue that information on the social costs of substance abuse disorders and the level of spending on treatment is insufficient to determine whether current spending is optimal. We develop a framework that could be used to determine optimal spending on substance abuse treatment in the United States. We develop this framework in four steps. First, we provide background on the unique financial and delivery features of substance abuse treatment. Secondly, we outline the points raised by advocates of expanded substance abuse treatment: substance abuse has high social costs, yet few people receive the many effective treatments available partly because of financial barriers to treatment. Thirdly, we provide a framework that can be used to judge the additional benefits of alternative levels and types of spending on substance abuse treatment. Finally, we discuss the distinction between the potential impact of spending on substance abuse treatment and its actual impact, using productivity as an example of one significant portion of the costs of substance abuse.

**Conclusion**—To determine optimal spending on substance abuse treatment, research should describe who receives treatment, the quality of treatment received, and how treatments relate to outcomes that comprise a large share of the economic burden of substance abuse.

### Keywords

Economic costs; optimal spending; substance abuse treatment

## INTRODUCTION

Studies of the burden of substance abuse (SA) reveal that direct costs associated with treatment of substance use disorders in the United States comprise a small fraction of the total social costs of illness [1,2]. In 1997, the estimated social costs of SA in the United States exceeded \$294 billion. Only \$11.9 billion of the total social cost was spent on the treatment of SA problems [3]. The indirect costs of SA, or those not related to treatment include: medical costs due to related illness and injury; lost productivity from illness, premature death and drug- and alcohol-related crimes; resources directed towards the criminal justice system; resources directed towards special education and related costs. These other costs of SA far exceed current

spending on SA treatment. Furthermore, the existing evidence on SA treatment across a wide variety of settings suggests that the economic gains of treatment consistently outweigh treatment costs [4].

The discrepancy between the high indirect costs of illness relative to the level of spending on treatment of addictive disorders leads people interested in SA policy to fear that the United States spends too little on treatment. This view permeates recent reports on the cost of SA [3]. The relatively low level of spending on SA treatment is striking in light of recent evidence showing both efficacy and effectiveness of many treatments for substance use disorders [5–13].

Juxtaposing the two points made above implies a conclusion that the SA community reached long ago: the United States is probably spending too little on SA treatment [14,15]. Spending decisions for health services are most often made in a decentralized fashion in the context of health-care markets. Resource allocation and spending choices have a different character for SA care. Substance abuse treatment spending is frequently more centralized and involves decisions made by government and thus is a matter of direct public policy. Of the estimated \$11.9 billion spent on SA treatment in the United States in 1997, 64% was paid for by public sources [3]. In contrast, public sources finance only 45% of overall health-care spending [16]. Moreover, in general health care insurance-like mechanisms (Medicare and Medicaid) are used by government to pay for services. Paying for SA frequently involves direct government spending on services (36.5% of all spending for SA compared to 10% of all health care).

### **Are we spending the right amount on SA treatment?**

In this paper we take up the logic of the view that too little is spent on SA treatment. We set out to answer the question, ‘What information do we need to ascertain when spending on SA treatment is optimal?’ We define the optimal level of treatment as that which minimizes the total social costs of SA. The paper proceeds in four sections. First, we describe the unique financial and delivery features of SA treatment. Secondly, we outline the points raised by advocates of expanded SA treatment: SA has high social costs, yet few people receive the many effective treatments available, partly because of financial barriers to treatment. Thirdly, we provide a framework that can be used to judge the efficiency of alternative levels and types of spending on SA treatment. Finally, we consider the relationship between the potential productivity of spending on SA treatment and the actual impact of spending, using the example of work-related losses to illustrate our point.

### **SA TREATMENT IS A UNIQUE HEALTH-CARE SERVICE**

Substance abuse treatment services differ greatly from other health-care services in the way they are financed, and the setting in which services are delivered. In addition to the large role played by direct government financing and provision of treatment, a relatively large portion of spending pays for in-patient care, which is generally not viewed as a cost-effective way to treat most people with substance use disorders. Outside the in-patient setting, very little care for substance use disorders occurs in a traditional doctor’s office setting and the vast majority of services are provided in specialty SA treatment facilities. These unique features have important implications for how money is used to buy services, and the effectiveness of the current system of care for individuals with substance use disorders.

### Public sources cover most of the spending on SA care

Substance abuse care, like all health services, is financed through a diverse range of sources. The government's central role in financing SA treatment is important to understand. The government's share of total spending can be divided into: direct state government provision of SA treatment (20%), Medicaid (20%), federal block grants (7.7%) and other federal spending (16%), including spending by the Veterans Health Administration and military health care [3]. Because local, state and federal governments are directly involved in financing, SA spending levels and priorities are more vulnerable to tightening public budget constraints and political considerations than other health services.

### The care setting for SA treatment

Although hospital-based spending has declined since 1987, in-patient care continued to account for a large share of spending, about 42% in 1997. This is noteworthy both because the share of spending on in-patient settings is higher for SA services compared with other health-care services [3], and because in-patient care is generally not viewed as very cost-effective for most people with addictive disorders [14]. Another 42% of spending pays for care delivered in clinics and public agencies. Unlike other health services, very little spending occurs in doctors' offices (9%). Most care for SA disorders outside an in-patient setting occurs in residential treatment facilities or out-patient SA facilities. Because most care is delivered in settings outside a doctor's office where primary care physicians treat established patients, SA treatment decisions are made by a different set of providers working with patients.

### Decision making and SA resource allocation

To understand the decisions that must be made regarding spending on SA services, we first describe the different types of public spending available to cover SA treatment costs. The largest single source of public spending on SA services, targeting low-income individuals with substance use disorders, is Medicaid. Medicaid pays for 20% of SA care through programs administered by states, but funded jointly by states and matching funds from the federal government. Medicaid can cover a wide range of specialty treatment services for SA. However, due to wide latitude given to states in deciding which supplemental health-care services to cover, coverage of these services varies widely across states. Indeed, 15 state Medicaid programs cover no SA treatment services for adults [17]. Aside from Medicaid, the most important sources of federal funds are block grants, awarded by the Substance Abuse and Mental Health Services Administration (SAMHSA) in the Department of Health and Human Services, but administered by the states.

Most funding for SA treatment through SAMHSA (\$1.6 billion) comes through block grants for substance abuse treatment as well as grants for targeted capacity expansion. However, a number of other discretionary programs awarded as grants to the states target other areas including services directed at children and families with mental health (MH) and SA problems (\$272 million) and the MH and SA needs of specific populations including: the elderly, the homeless, those with co-occurring MH and SA disorders and individuals who have had contact with the criminal or juvenile justice system, over \$250 million combined [18]. Medicare also provides payment for SA treatment. Medicare played a small role in the past, but its role has grown in recent years.

As mentioned above, states and localities contribute a significant portion of overall spending on SA treatment both through Medicaid, as well as through funds from state general revenues. The composition of spending on SA treatment originating from these different sources varies significantly by state. The key implication of the variation in financing mechanisms used by states is that decision makers at all levels, federal policy makers, state and local administrators,

providers and patients, face different economic circumstances when making decisions about the design of SA treatment programs. The varied situations facing different decision makers can affect the SA services available to any given individual. Thus for people with low incomes across the nation, access to SA treatment services will depend heavily on state and local government choices.

## THE ADVOCACY CASE TO INCREASE SPENDING ON SA TREATMENT

It has been well documented that SA generates high social costs. Of the estimated \$294 billion of SA costs in 1997, less than \$12 billion stemmed from direct treatment. Productivity losses alone (lost earnings) due to premature death, illness, productivity loss of crime victims, incarceration and crime careers account for 69% of the estimated economic costs of alcohol and drug abuse [2]. At the same time, research on evidence-based practice suggests that efficacious treatments for a number of substance use disorders exist. Evidence from clinical trials and observational studies suggest the efficacy of several pharmacotherapies to aid in the treatment of addiction.

Examples of three prominent pharmacotherapies used to treat addiction include naltrexone for preventing relapse among individuals diagnosed with alcohol dependence and methadone and buprenorphine for management of opioid dependence. Naltrexone was approved in 1995 by the FDA to help treat alcoholism after clinical trials demonstrated a substantially lower relapse rate among subjects using naltrexone after detoxification [6,19]. Randomized clinical trials suggest that buprenorphine reduces withdrawal symptoms during detoxification for those individuals addicted to opioids such as heroin. Although methadone maintenance has been the most common pharmacotherapy used to treat opioid dependence, trials continue to test and support its efficacy [10,20]. Buprenorphine, a more recent addition to pharmacotherapies for addiction, offers an effective alternative to methadone. A review of results from 10 randomized controlled trials suggests that compared with methadone, buprenorphine is equally effective and that withdrawal symptoms may resolve more rapidly with buprenorphine [7,8]. A second trial comparing buprenorphine to methadone found them to be equally cost effective at reducing use of heroin during the 6-month period of the study [9].

Similarly, clinical research supports the efficacy of outpatient therapies such as cognitive behavioral therapy, family education and brief intervention models, such as that in the Trial for Early Alcohol Treatment (Project TrEAT). For example, among patients with substance use disorders and related medical conditions, integrated primary care and addiction treatment confer benefits by increasing abstinence 6 months after randomization [11]. In other examples of efficacious outpatient treatment, cognitive behavioral therapy has been shown to boost the efficacy of several pharmaceutical interventions when treatments are combined [12,13,21].

Despite the high social costs of SA, and the range of effective treatments available, only a fraction of those with substance use disorders receive *any* treatment. According to results from the National Survey on Drug Use and Health, in 2002 an estimated 7.7 million people (3.3% of the total population over age 12) had an illicit drug problem. Only 18.2% of these people received treatment for drug abuse at a specialty SA facility, implying that 6.3 million people over the age of 12, 2.7% of the total population, had an untreated SA problem [22]. This problem was most severe among youths aged 12–17 among whom only 10% of the 1.4 million youths with an illicit drug problem received treatment [22]. Even for those individuals receiving specialty treatment for drug abuse, many if not most do not receive adequate treatment. The picture is similarly stark for treatment of alcohol disorders. In 2002, an estimated 18.6 million people over the age of 12 had an alcohol problem, but only 8.3% received alcohol treatment at a specialty SA facility, leaving 7.3% of those over age 12 with an untreated alcohol problem

[22]. A recent study of the quality of care in the United States evaluated five indicators of appropriate screening, diagnosis and treatment for individuals with diagnosed alcohol dependence or individuals with some indication of an elevated risk for alcohol dependence in the medical record. Among individuals with medical records identifying alcohol dependence or factors that suggest a risk of alcohol abuse, even those who have contact with the medical system received recommended screening, diagnosis and treatment only 10.5% of the time [23]. This suggests that much of the current spending on SA treatment will deliver few benefits. It also implies that increasing spending on SA treatment may deliver no added benefits if we increase spending on care that is inadequate.

The low levels of treatment are not surprising when one considers the financial barriers posed to those who need treatment. Roughly one-third of payment for drug abuse treatment and nearly half of payments for specialty alcohol treatment were paid for out of pocket in 2002 [22]. Moreover, as discussed above, states suffering fiscal crises often cut discretionary spending on SA services either through their Medicaid programs or via cuts in state-funded categorical grant programs. Given the financial constraints on the supply of treatment to low income populations, increased funding for the treatment of SA disorders could increase treatment rates by relaxing the budget constraint. It is reasonable, based on the low levels of treatment and the significant financial barriers, to conclude that increased funding will reduce the social costs of SA. Low levels of funding can also limit the quality of care for people who seek treatment. Tight public budgets affect staffing levels in public programs, the level training of clinical staff and the ability of treatment programs to follow-up with clients of treatment programs. We next turn to a framework that can be used to think about when and how additional spending on treatment will decrease the total costs of SA.

## OPTIMAL USE OF PUBLIC FUNDS: A FRAMEWORK

Economic analysis offers approaches to considering the level of social costs of illness in terms of decisions regarding how to best use public funds for SA treatment efficiently. In this section, we describe a framework that can be used to evaluate how current spending on SA treatment compares to spending that is likely to be optimal. Based on this framework, we explain why our current knowledge regarding the costs of SA and the low levels of efficacious treatment provide insufficient information to determine optimal spending on SA treatment. We then examine what the framework implies about the information needed to determine optimal levels of spending on SA treatment.

As discussed above, SA clearly generates important social costs, and effective treatment for these conditions exist, but are seldom used. These facts alone do not answer the question of whether we spend too little or too much on SA treatment, or how best to target existing spending. Standard economic theory shows that social costs are minimized when spending is allocated so that the extra spending on SA treatment (the marginal direct cost) equals the reduction in the economic consequences of SA (the marginal indirect cost). Recall that the economic consequences of SA include a wide range of costs such as medical spending, lost earnings, criminal activity, special education and many other costs. In other words, if we are spending the optimal amount on SA treatment, an additional \$1 should lead to exactly \$1 reduction in the economic consequences of SA.

This framework has several implications for determining the ‘right level’ of spending on treatment. First, the level of social costs of SA by itself is not informative for debates on whether spending on treatment is optimal. The level of social costs imposed by SA offers no information regarding the degree to which additional spending will reduce the negative consequences of SA. In an extreme case, imagine a scenario where all those who can expect to benefit from treatment already receive high quality treatment. Spending additional funds for treatments not

expected to work for the remaining population with substance use disorders will yield no reduction in the social costs of SA.

The second implication is that, in order to determine the 'right' level of spending, we must understand two key empirical relationships. The first is the relationship between spending on treatment and the degree of illness in the population. The second is the impact of reducing the level of illness in the population on the economic burden of disease. The first relationship requires that we understand how expanding spending on 'usual care' (that actually delivered in real world settings) will affect the prevalence of SA disorders. This tells us how much it costs to reduce the prevalence of disease at different levels of expenditures. The second relationship tells us how reductions in the prevalence of disease change the social costs of SA.

The reduction in social costs will be determined by how reductions in the level of illness affect social costs such as productivity losses, medical care costs, or costs related to the criminal justice system. A second important determinant of the reduction in social costs is the method by which particular types of people are matched to treatment. In other words, the reduction in social costs of SA will be greatest and most cost-effective when treatment is delivered first to those who would respond the most to treatment.

## **CASE STUDY OF LOST EARNINGS: WHAT DOES EVIDENCE SUGGEST ABOUT THE EFFECT OF TREATMENT ON SOCIAL COSTS?**

The ultimate goal of gathering information on the effect of treatment evaluation of spending and treatment should be a comprehensive assessment of the impact of expanding treatment on social costs of SA. This end-goal is beyond the scope of this paper. Nevertheless, we can offer an example of how such an analysis might proceed, using one significant economic consequence of SA, lost earnings. Our choice of lost earnings in no way implies that this is the only important social cost of SA. One could assemble similar information about other significant social costs of SA, such as costs of the criminal justice system related to SA. The labor market impact of drug and alcohol abuse ranks high among the social costs of the illness, both because of the direct effects of illness on individuals' earnings, and because of its indirect effect on earnings through incarceration, crime careers and lost earnings among crime victims (see, for example, Harwood [24] and based on estimates, analyses and data reported in Harwood *et al.* [25]). As mentioned above, the combined cost of lost earnings due to drug- and alcohol-related illness, premature death and drug- and alcohol-related crimes were estimated to comprise 69% of the overall cost of drug abuse in 1998 [2]. Most studies find significant evidence of reduced employment and earnings for those who are heavy drinkers or dependent on illicit drugs, particularly when studies attempt to adjust for confounding factors such as differences in propensity to drink by income [26–29].

Thus, we will pursue our analysis of the costs of SA and the appropriate level of SA treatment using work-related losses as an example. Existing data on the impact of heavy drinking and illicit drug use shows substantial reductions in productivity, but this fact alone does not provide sufficient information to justify expanded treatment of SA.

Several criteria must be met to make the case for expanded treatment funds based on employment effects. First, treatment delivered to individuals must be effective. Not all treatments are equally effective, and the quality of treatment delivered can influence efficacy. Secondly, the individuals who generate productivity losses must be among those who receive treatment. If, for example, the most motivated workers with relatively mild addictions use employer-based SA interventions, the gains in productivity from treatment may be small compared with the overall productivity loss due to SA for an employer. Thirdly, treatment must be effective at restoring productivity. Treatments that lead clients to abstain successfully from

heavy drinking or use of illicit drugs but do not improve productivity will not reduce one of the most substantial social costs associated with SA. Finally, treatment should generate value (increased productivity) that is commensurate with its cost. All the above may be true, but if productivity gains of \$100 per year per worker treated come at a cost of \$500, such treatments cannot be justified solely on the basis of productivity gains.

### **The production frontier: is treatment effective in experimental settings?**

For many alcohol and drug disorders, a variety of evidence-based treatments have demonstrated benefits in the addiction literature. These evidence-based practices can be divided into pharmaceutical therapies and out-patient treatment protocols. As described earlier, randomized trials have demonstrated clear benefits from pharmacotherapies such as naltrexone, methadone and buprenorphine [6–10].

Research also shows benefits from specific out-patient therapies including cognitive behavioral therapy, family education and brief early interventions, such as those in project TrEAT [11–13,30,31]. For example, cognitive behavioral therapy has become a widely accepted complement to pharmacotherapies and clinical trials suggest that tailored cognitive-behavioural therapy (CBT) can enhance the efficacy of treatment for many substance use disorders [12–14,31]. A number of randomized controlled trials demonstrate substantial reductions in heavy drinking following brief interventions by primary care physicians [30, 32,33]. One of these interventions, Project TrEAT, showed substantial reductions in the rate of drinking in the last 7 days, binge drinking in the last 30 days and excessive drinking for individuals receiving a brief intervention (30 minutes total time with a primary care physician) [30].

### **Is treatment effective in practice?**

The interventions described above have been shown to offer significant benefits in controlled settings such as clinical trials, but the most efficient use of resources for SA treatment requires that those treatments be effectively delivered in practice. In considering the difference between efficacy in the context of clinical trials and effectiveness of usual care, we define effectiveness in practice as depending on (a) what portion of people are treated; (b) which people are treated; (c) what is received by the average user of services; and (d) how does treatment connect to the social cost in question? What do we know about each of these components in the context of work outcomes? Below, we consider each of these practical points in relation to our example of productivity losses associated with SA.

### **Who receives treatment? Workers with SA problems are heterogeneous**

An issue that further complicates efforts to determine optimal spending on SA treatment relates to the heterogeneity of treatment effects among the population with substance use disorders. The potential benefits of treatment vary across individuals for many reasons. Some individuals may not benefit from treatments due to an especially severe addiction, or co-occurring mental disorders that render common treatment ineffective. At the other extreme, recent evidence on alcohol dependence suggests that a substantial number of individuals with substance use disorders will recover without treatment [34]. The benefits of treatment are small or zero for this group, and treatment is unlikely to be cost-effective. In an extreme example, consider what will happen to our estimate of the optimal level of drug spending if we observe data where the only groups treated are those who would recover without treatment and those who will not recover even after treatment. This scenario would suggest that we are spending too much on SA treatment, when in fact we may be spending too little because we are allocating treatment resources poorly across individuals.

The problem of poor allocation of treatment to individuals who will have the largest gain in productivity from treatment arises because different subgroups have different probabilities of seeking treatment and differences in gaining access to treatment, conditional on seeking treatment. We know, for example, that very few low-income women with substance use disorders receive care. Less than one in five low-income women with a substance use disorders receive care, but individuals dually diagnosed with mental health and substance use disorders are more likely to receive care [35]. An individual's willingness to seek treatment and ability to access to treatment varies widely across workers and may be correlated with lost productivity. The heterogeneity among workers with substance use disorders can influence the effectiveness of treatment, as well as the productivity benefits one can expect from treatment.

### **What treatment does the average user of services receive?**

Even if all those needing treatment receive specialty SA services, treatment may not achieve the goal of reducing productivity losses if the quality of care is poor. Quality of care raises concerns in the treatment of virtually all health conditions, even those with no stigma associated with treatment and with clear practice guidelines. The concerns about quality of care are severe for SA treatment. We know that treatment for alcohol addiction, for example, suffers from low levels of quality. As mentioned above, only 10.5% of individuals treated for alcohol abuse disorders received guideline care [23]. For example, addiction specialists report that they prescribe naltrexone relatively infrequently because of concerns about patient compliance and the financial burden of paying for the drug [36]. We know that the nature and duration of treatment varies dramatically across individuals who are treated. One example of this comes from the CASA-WORKS program, an integrated set of services designed to help welfare users with substance use disorders get treatment, employment services and meet basic needs that would allow participants to return to work. One evaluation of the program found significant variation in the way in which care was delivered and the number of contacts participants received across sites [37].

### **How does treatment connect to the social cost in question?**

All the criteria for effectiveness described above will not yield desired reductions in the social costs we care about, in this example of productivity, unless successful treatment restores productivity. Precise information on the ability of treatment to restore earnings is very limited. Many evidence-based treatments are effective at reducing drug use, but it is less clear whether the reductions in drug use translate into changes in productivity. Indeed, the limited evidence on this topic is mixed. One recent study shows no significant correlation between an intervention that successfully lowers drug use with employment outcomes [38]. Consistent with this finding, the Services Research Outcomes Study suggests that in-patient, out-patient and residential treatment for drug use disorders reduce the use of alcohol, marijuana, cocaine, crack, heroin and any illicit drug [5]. Treatment in these settings also reduces self-reports of criminal activity and arrests (except for violating parole), but there was no improvement in employment outcomes, and a reduction in employment among some subgroups after treatment [5]. These findings stand in contrast to recent reviews of the economic benefits of drug treatment, suggesting that most economic gains from drug treatment occur because of reductions in criminal activity and increased employment [4].

Some evidence suggests that interventions can have significant effects on work-related outcomes, but the impact varies across industries and populations. For example, drug-free work-place programs which promote education, assessment, counseling and referral significantly reduced work-place injury, especially for workers in the construction and service industries [39].

Much of the new evidence on treatment and productivity outcomes focuses on the welfare population, because many interventions target substance-using participants so that states can help individuals meet work requirements and ultimately lower welfare case-loads. One such study in New Jersey suggests that interventions designed to assess and recruit recipients for drug treatment (rather than simply detoxification) have been increasingly successful, and have led to improvements in both substance use and employment outcomes [40]. Another intervention combined SA treatment with related employment services, domestic violence interventions and help with basic needs for substance-abusing women on welfare. This integrated care delivery model increased employment (part-time or more) by 36% 12 months from the baseline [41].

In yet another example, the National Treatment Improvement Evaluation Study (NTIES) offers some insight on how treatment influences work outcomes. In this study, the percentage of people employed after treatment improved from 31% to 48% before and after treatment [42]. Although this treatment intervention had a beneficial impact on employment, the intervention led to the employment of only one in four of those not employed before treatment. The NTIES results suggest that the social costs of lost productivity due to SA are probably an overestimate of expected economic benefits of treatment.

The evidence suggests something about the impact of the best treatment on labor market outcomes, but the most relevant information concerns the impact of the average treatment on labor market outcomes. If the treatment studied in the NTIES represents the best treatment, then the productivity benefits associated with the treatment represent an upper bound on the benefits (reduced productivity losses) of SA treatment. Average treatment will certainly yield lower benefits because it may not be targeted to the right people, may not influence productivity, or because it is not delivered as effectively as the best practice treatments.

All the evidence presented above suggests that only some of the productivity losses attributed to SA will be eliminated with treatment. This occurs because it is difficult to deliver high quality appropriate care to all those who need it, or even to some fraction of those needing care who will benefit most from treatment.

### **What do we need to know to complete the efficiency analysis of public spending on SA treatment?**

The evidence needed to analyze public spending thoroughly on SA treatment is incomplete. As noted above, we still have relatively little knowledge regarding who receives treatment, the average marginal benefit of treatment for different subgroups of workers, the nature and quality of treatment received, how variation in the quality of care affects treatment outcomes and how treatment specifically influences outcomes such as productivity. To perform a more rigorous efficiency analysis of public spending on SA, we need to obtain more information on these issues.

One encouraging trend that will inform policy makers as they decide how to allocate funds for SA treatment is that major evaluations of SA treatment such as the Drug Abuse Treatment Outcomes Study (DATOS) include employment outcomes in their 1-year and 5-year follow-ups [43]. Similarly, a recent review of 11 studies on the economic benefits of treatment of SA demonstrated substantial effects of treatment on criminal activity, though less impact on employment outcomes [44].

## POLICY RESEARCH ISSUES

To determine the optimal level and allocation of SA spending in the United States, policy researchers should address gaps in knowledge described in this paper. Additional research could feasibly inform policy decisions regarding efficient use of limited SA treatment resources by focusing on a few, relevant issues. First, research should focus directly on those costs of SA we most want to target. If policy makers want to reduce productivity losses from SA, treatment evaluation should assess the direct impact of treatment on labor market outcomes. Similarly, if policy makers want to target costs related to the criminal justice system, the research should assess the direct impact of treatment on outcomes in the criminal justice system. Secondly, researchers should expand the understanding of how treatments work outside of clinical trials. Studies of usual care, effectiveness research and systems effectiveness research offers steps in this direction by studying what happens when new treatments are launched or existing treatments expanded. Not only have we obtained growing evidence that treatments work, studies such as the National Treatment Improvement Evaluation Study offer information on the nature of the relationship between treatment duration (one measure of quality of care) and outcomes. This type of information can help policy makers target limited treatment resources by distinguishing whether there are threshold, linear or non-linear effects of treatment [45]. Thirdly, policy research should also assess who is most likely to receive care, in the context of particular social outcomes such as productivity. Given information on who experiences large or small productivity benefits from treatment, it would be relatively easy to describe, based on existing data, whether those receiving care for SA are those who will benefit most. Studies should address who is most likely to receive care and whether interventions targeting those with the greatest potential benefit are effective at changing the mix of who is treated. This information can work to raise the average effectiveness of treatment even without innovations in treatment or improvements in the quality of care delivered.

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### References

1. National Center on Addiction and Substance Abuse (2001) *Shoveling Up: The Impact of Substance Abuse on State Budgets*. New York: Columbia University.
2. Office of National Drug Control Policy (2001) *The Economic Costs of Drug Abuse in the United States, 1992–98*. Washington, DC: Executive Office of the President.
3. Coffey, R. M., Mark, T., King, E., Harwood, H. J., McKusick, D., Genuardi, J. *et al.* (2001) *National Estimates of Expenditures for Substance Abuse Treatment, 1997*. Rockville, MD: Center for Substance Abuse Treatment and Center for Mental Health Services, Substance Abuse and Mental Health Services Administration.
4. Belenko, S., Patapis, N. & French, M. (2005) Economic benefits of drug treatment: a critical review of the evidence for policy makers. In: *Pennsylvania, T. R. I. a. t. U. o.*, ed. Philadelphia, PA.
5. Office of Applied Studies (1998) *Services Research Outcomes Study*. Rockville, MD: United States Department of Health and Human Services, Substance Abuse and Mental Health Services Administration.
6. Weinrieb RM, O'Brien CP. Naltrexone in the treatment of alcoholism. *Annual Review of Medicine* 1997;48:477–487.
7. Fiellin DA, Kleber H, Trumble-Hejduk JG, McLellan AT, Kosten TR. Consensus statement on office-based treatment of opioid dependence using buprenorphine. *Journal of Substance Abuse Treatment* 2004;27:153–159. [PubMed: 15450648]
8. Gowing L, Ali R, White J. Buprenorphine for the Management of Opioid Withdrawal. *Cochrane Database of Systematic Review* 2004;18:CD002025.

9. Doran CM, Shanahan M, Mattick RP, Ali R, White J, Bell J. Buprenorphine versus methadone maintenance: a cost-effectiveness analysis. *Drug and Alcohol Dependence* 2003;71:295–302. [PubMed: 12957347]
10. National Consensus Development Panel on Effective Medical Treatment of Opiate Addiction. Effective medical treatment of opiate addiction. *JAMA* 1998;280:1936–1943. [PubMed: 9851480]
11. Weisner C, Mertens J, Parthasarathy S, Moore C, Lu Y. Integrating primary medical care with addiction treatment: a randomized controlled trial. *JAMA* 2001;286:1715–1723. [PubMed: 11594896]
12. Carroll KM, Fenton LR, Ball SA, Nich C, Frankforter TL, Shi J, et al. Efficacy of disulfiram and cognitive behavior therapy in cocaine-dependent outpatients: a randomized placebo-controlled trial. *Archives of General Psychiatry* 2004;61:264–272. [PubMed: 14993114]
13. Balldin J, Berglund M, Borg S, Mansson M, Bendtsen P, Franck J, et al. A 6-month controlled naltrexone study: combined effect with cognitive behavioral therapy in outpatient treatment of alcohol dependence. *Alcoholism: Clinical and Experimental Research* 2003;27:1142–1149.
14. Tucker, J. A. (1999) Changing addictive behavior: historical and contemporary perspectives. In: Tucker, J. A., Donovan, D. M. & Marlatt, G. A., eds. *Changing Addictive Behavior: Bridging Clinical and Public Health Strategies*, pp. 3–44. New York: Guilford Publications, Inc.
15. Baumohl J. The multi-site study of the termination of supplemental security income benefits for drug addicts and alcoholics. *Contemporary Drug Problems* 2003;30:1–537.
16. National Center for Health Statistics (2003) *Health United States, 2003*. Hyattsville, MD: Public Health Service.
17. The Henry J. Kaiser Family Foundation (2004) Medicaid benefits: services covered, limits, copayments and reimbursement methodologies for 50 states, District of Columbia and the territories (as of January 2003). In: The Henry J. Kaiser Family Foundation, eds. *The Kaiser Commission on Medicaid and the Uninsured*. Washington DC: Henry J. Kaiser Family Foundation and the National Conference of State Legislatures. Available at <http://www.kff.org/medicaidbenefits/index.cfm> [accessed 1 July 2005]
18. Substance Abuse and Mental Health Services Administration (2004) *State Summaries—Grant Awards*. Rockville, MD: United States Department of Health and Human Services.
19. Volpicelli JR, Alterman AI, Hayashida M, O'Brien CP. Naltrexone in the treatment of alcohol dependence. *Archives of General Psychiatry* 1992;49:876–880. [PubMed: 1345133]
20. Amato L, Davoli M, Ferri M, Ali R. Methadone at tapered doses for the management of opioid withdrawal. *Cochrane Database of Systematic Review* 2002;2002:CD003409.
21. Chandler RK, Peters RH, Field G, Juliano-Bult D. Challenges in implementing evidence-based treatment practices for co-occurring disorders in the criminal justice system. *Behavioral Sciences and the Law* 2004;22:431–448. [PubMed: 15282833]
22. Office of Applied Studies (2003) *Results from the 2002 National Survey on Drug Use and Health: National Findings*, pp. 1–197. Rockville, MD: US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration.
23. McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. *New England Journal of Medicine* 2003;348:2635–2645. [PubMed: 12826639]
24. Harwood, H. (2000) *Updating Estimates of the Economic Costs of Alcohol Abuse in the U.S. Estimates, Update Methods, and Data*. Report prepared by The Lewin Group for the National Institute on Alcohol Abuse and Alcoholism. Rockville, MD: National Institutes of Health.
25. Harwood, H., Fountain, D. & Livermore, G. (1998) *The Economic Costs of Alcohol and Drug Abuse in the U.S. 1992*. Report prepared for the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Department of Health and Human Services, NIH Publication no. 98–4327. Rockville, MD: National Institutes of Health.
26. MacDonald Z, Shields MA. Does problem drinking affect employment? Evidence from England. *Health Economics* 2004;13:139–155. [PubMed: 14737752]
27. Terza J. Alcohol abuse and employment: a second look. *Journal of Applied Econometrics* 2002;17:393–404.

28. Jones AS. Wage and non-wage compensation among young alcoholic and heavy drinking women: a preliminary analysis. *Journal of Family and Economic Issues* 2002;23:3–25.
29. DeSimone J. Illegal drug use and employment. *Journal of Labor Economics* 2002;20:952–977.
30. Fleming M, Barry K, Manwell L, Johnson K, London R. Brief physician advice for problem alcohol drinkers. A Randomized controlled trial in community-based primary care practices. *JAMA* 1997;277:1039–1045. [PubMed: 9091691]
31. Pollack MH, Penava SA, Bolton E, Worthington JJ 3rd, Allen GL, Farach FJ Jr, et al. A novel cognitive-behavioral approach for treatment-resistant drug dependence. *Journal of Substance Abuse and Treatment* 2002;23:335–342.
32. World Health Organization (WHO) (1992) *The Alcohol Use Disorders Identification Test (AUDIT). Guidelines for USE in Primary Health Care*. Geneva, Switzerland: World Health Organization.
33. Wallace P, Cutler S, Haines A. Randomised controlled trial of general practitioner intervention in patients with excessive alcohol consumption. *BMJ* 1988;297:663–668. [PubMed: 3052668]
34. Dawson DA, Grant BF, Stinson FS, Chou PS, Huang B, Ruan WJ, et al. Recovery from DSM-IV alcohol dependence: United States, 2001–02. *Addiction* 2005;100:281–292. [PubMed: 15733237]
35. Rosen D, Tolman R, Warner L. Low-income women’s use of substance abuse and mental health services. *Journal of Health Care for the Poor and Underserved* 2004;15:206–219. [PubMed: 15253374]
36. Mark TL, Kranzler HR, Song X. Understanding US addiction physicians’ low rate of naltrexone prescription. *Drug and Alcohol Dependence* 2003;71:219–228. [PubMed: 12957340]
37. McKay J, Gutman M, McLellan A, Lynch K, Ketterlinus R. Treatment services received in the CASAWORKS for Families program. *Evaluation Review* 2003;27:629–655. [PubMed: 14650278]
38. Sindelar JL, Jofre-Bonet M, French MT, McLellan AT. Cost-effectiveness analysis of addiction treatment: paradoxes of multiple outcomes. *Drug and Alcohol Dependence* 2004;73:41–50. [PubMed: 14687958]
39. Wickizer T, Kopjar B, Franklin G, Joesch J. Do Drug-free workplace programs prevent occupational injuries? Evidence from Washington State. *Health Services Research* 2004;39:91–110. [PubMed: 14965079]
40. Merrill JC. Providing care coordination and treatment services for substance-abusing women in the Work First/New Jersey (TANF) Program. *Journal of Health Social Policy* 2004;18:1–18. [PubMed: 15201116]
41. McLellan AT, Gutman M, Lynch K, McKay JR, Ketterlinus R, Morgenstern J, et al. One-year outcomes from the CASAWORKS for families intervention for substance-abusing women on welfare. *Evaluation Review* 2003;27:656–680. [PubMed: 14650279]
42. Zarkin GA, Dunlap LJ, Bray JW, Wechsberb WM. The effect of treatment completion and length of stay on employment and crime in outpatient drug-free treatment. *Journal of Substance Abuse Treatment* 2002;23:261–271. [PubMed: 12495788]
43. Hubbard RL, Craddock SG, Anderson J. Overview of 5-year followup outcomes in the Drug Abuse Treatment Outcome Studies (DATOS). *Journal of Substance Abuse Treatment* 2003;25:125–134. [PubMed: 14670518]
44. McCollister KE, French MT. The relative contribution of outcome domains in the total economic benefit of addiction interventions: a review of first findings. *Addiction* 2003;98:1647–1659. [PubMed: 14651494]
45. Zhang Z, Friedmann PD, Gerstein DR. Does retention matter? Treatment duration and improvement in drug use. *Addiction* 2003;98:673–684. [PubMed: 12751985]