The Cost-Effectiveness of Methadone Maintenance

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Abstract

Background: Although methadone maintenance is effective in reducing injection drug use, needle sharing, and the overall mortality associated with opiate abuse, many health plans offer little or no access to methadone, and many methadone providers do not comply with treatment guidelines regarding dose, duration of treatment, or provision of ancillary services. Moral and political judgments have helped shape the U.S. treatment system. Evaluations of methadone cost-effectiveness may play a role in changing public policy.

Methods: Cost-effectiveness analysis is used to compare a change, or changes, in treatment to that of current standard care. The cost of treatment and its effect on outcomes are used to find the incremental cost-effectiveness ratio, and determine whether the change(s) should be adopted. The literature on methadone maintenance is reviewed from an economic perspective, focusing on five policy questions: (1) whether methadone should be a health care benefit; (2) what level of ancillary services is optimal; (3) what methadone dose is appropriate; (4) what length of treatment is appropriate; and (5) whether contingency contracts should be employed.

Results: Expanded access to methadone maintenance has an incremental cost-effectiveness ratio of less than $11,000 per Quality-Adjusted Life Year. This is more cost-effective than many widely used medical therapies, a finding that strongly supports the inclusion of methadone in the formulary of health care plans. Ancillary services have been shown to be an effective part of methadone maintenance therapy, especially during the beginning of a treatment episode, but there is not enough information available to tell whether the optimal amount of services is being used. There is extensive evidence that many treatment programs dispense inadequate doses of methadone. The cost of additional drugs is very small compared to the benefits of an adequate dose. Many methadone programs limit treatment to 6 months or less, but such short episodes are not likely to be cost-effective. The medical model of methadone maintenance may increase the cost-effectiveness of the treatment for long-term patients. Programs that reward patients for negative urinalysis have proven effective at reducing illicit drug use, but their cost-effectiveness will need to be demonstrated before they are widely adopted.

Conclusions: Cost-effectiveness researchers need to measure substance abuse outcomes in terms of Quality-Adjusted Life Years, as this will make their findings more relevant to the development of treatment policy. It will allow different substance abuse treatments to be compared to each other and to medical care interventions.

Key Words: Methadone, cost-benefit analysis, opioid-related

Introduction

METHADONE MAINTENANCE is an effective treatment for opiate abuse. It reduces injection drug use and needle sharing (1–6) and the overall mortality associated with abuse of opiates by injection (7–9). Unfortunately, most who could benefit from methadone do not receive it. There are between 1 and 1.5 million injection drug users (IDUs) in the U.S. (10–12), between 600,000 and 800,000 of whom are addicted to heroin. There were 179,000 patients enrolled in U.S. methadone treatment programs in 1998 (13).

Many health care payers, including the Medicaid programs of 25 states and the Medicaid managed care programs of an additional 11 states, do not cover methadone maintenance (14). Out-of-pocket payments by patients are an important source of treatment revenue, and failure to pay these costs is an important reason why treatment is discontinued (15). Even when patients are able to enroll in a methadone program, the treatment they receive may not be optimal. Many programs do not follow treatment guidelines regarding length of treatment, provision of psychosocial services, or dose of methadone (16, 17).

Many factors affect access to methadone treatment and the design of treatment programs. Moral and political judgments about opiate dependence have influenced the U.S. treatment system (18). However, emerging literature on the cost-effectiveness of substance abuse treatment may play a role in changing public policy.

Health care payers are increasingly using cost-effectiveness analysis as a tool to decide which medical therapies should be covered by their health care plans. Cost-effectiveness analysis can help determine whether methadone maintenance should be included in health care plans

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and whether changes in methadone treatment add sufficient value to justify their cost. Moreover, such analysis can provide information on whether enhancements such as intense social services and contingency contracts that reward methadone patients with vouchers or cash for adhering to treatment are significantly cost-effective to be adopted.

Complete cost-effectiveness analysis should incorporate the effect of methadone maintenance on related medical care costs. The medical comorbidities associated with opiate addiction include HIV, hepatitis, endocarditis, overdose, soft-tissue infections, and many other diseases (19). These diseases are costly to treat. For example, the lifetime cost of treating HIV is estimated to be $103,552 (1999 dollars) (20). HIV-positive individuals who have not developed AIDS incur higher costs if they are IDUs (21). AIDS patients incur 38% more health care costs, as well as greater long-term care costs (22), if they are IDUs (23).

Methadone maintenance decreases costs incurred by social services agencies and the criminal justice system (24, 25). Public policy makers will be interested in cost-effectiveness analysis that also considers the effect of treatment on social costs such as these.

This paper reviews literature on methadone maintenance treatment from an economic perspective. It describes methods of cost-effectiveness analysis and then addresses the following policy questions: (a) Should methadone maintenance be offered as a benefit of health care plans? (b) What is the appropriate dose of methadone? (c) What psychosocial services should be offered? (d) How long should methadone maintenance treatment continue? (e) Should contingency interventions be adopted? This review not only considers the literature on methadone maintenance treatment that uses economic methods; it also reviews data from observational studies and clinical trials. We then propose hypotheses about the cost-effectiveness of proposed changes to methadone maintenance treatment.

Methods of Cost-Effectiveness Analysis

Cost-effectiveness analysis is a tool used to aid in making decisions as to what care should be offered. It is a method of comparing the cost and effectiveness of two or more alternatives. Such comparisons are most useful when one of the alternatives being considered is standard care, since this allows the decision maker to consider whether an innovation is better than the status quo. The figure is a graphical representation of four hypothetical treatments, plotted according to cost and outcome. Note that any of the points in the figure might be the status quo.

When one of the alternatives saves costs and improves outcomes, it is favored; this principle is called "dominance." In the graph, alternative A is always preferred over alternative C, since it yields better outcomes at lower cost.

When one of the alternatives is more costly and yields better outcomes, dominance provides no guidance. For example, intervention B is more effective than intervention A, and it is more costly. Whether intervention B is acceptable depends on whether the decision maker believes that the additional effectiveness it yields justifies its additional cost; it is a value decision. Cost-effectiveness analysis provides a formal means of making this decision.

First, the incremental cost-effectiveness ratio is found. This ratio is simply the change in cost divided by the change in outcome. Note that to find this ratio, a single-dimensional effectiveness measure is required. The ratio is then evaluated against a threshold criterion for what constitutes a cost-effective intervention.

To facilitate the comparison of different interventions, a standard method of cost-effectiveness analysis was developed by a task force of experts organized by the U.S. Public Health Service (PHS) (26). The Task Force recommended that cost-effectiveness studies use the Quality-Adjusted Life Year (QALY) as the outcome measure, acknowledging the widespread use of this measure in cost-effectiveness studies of health care interventions.

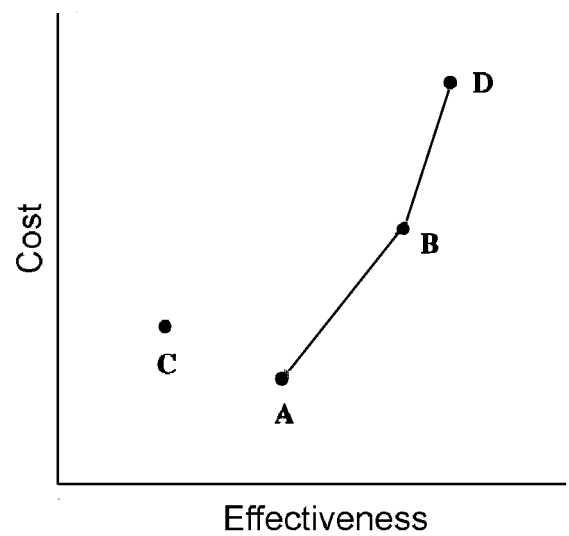

Figure. Comparison of the cost and effectiveness of four hypothetical interventions.

The QALY is an outcome measure that reflects both the quantity and quality of life (27). Quality-of-life adjustments are based on patient or societal ratings of the quality of life associated with different health states. The ratings, also known as "preferences" or "utilities," have a scale of zero (representing death) to one (representing perfect health). There are several methods for obtaining these ratings. The Time-Trade-Off method asks the individual doing the rating how much healthy life they are willing to give up to be cured of the condition. The Standard Gamble method asks them how much of a risk of death they are willing to incur in order to be cured of the condition. There has been widespread use of preference assessments in medical care, but they have not yet been used to rate the quality of life associated with substance abuse disorders.

The cost-effectiveness ratio represents a measure of how efficiently the proposed intervention can produce an additional QALY. By using this standard method, the cost-effectiveness of alternative innovations can be compared, helping health-care payers decide which changes they should adopt. The PHS Task Force did not recommend a standard of what constitutes a cost-effective intervention, that is, how low the cost-effectiveness ratio must be for an intervention to be adopted. Others have observed that the U.S. health care system adopts treatments that cost less than $50,000 per quality-adjusted life year (28).

Finally, the figure also illustrates the concept of diminishing marginal returns. Intervention D is more costly than intervention B, and more effective. The slope of the line connecting B to D is greater than the slope of the line connecting A to B. This means that the incremental cost-effectiveness ratio is greater. This illustrates a general economic law of diminishing marginal returns. Adding additional resources does not necessarily result in a proportionate increase in production; with very high levels of resource use, the production process becomes increasingly inefficient at producing the desired outcome. The goal of the decision maker is to adopt all interventions that represent efficient ways of producing QALYs and to disapprove of interventions with ratios that are too high.

The PHS Task Force made other recommendations on how a cost-effectiveness analysis should be conducted. Among these was the recommendation that society's perspective be adopted, so that all effects of an intervention on cost will be included. To follow this recommendation, substance-abuse treatment studies should include the effect of intervention on costs of medical care, patient-incurred costs, and costs of public agencies such as social welfare and criminal justice agencies.

With this background, we now examine how cost-effectiveness analysis can help decision makers decide whether methadone maintenance should be included in the scope of benefits of health care plans, what ancillary services, dose, and length of treatment are optimal, and whether contingency contracts are an appropriate part of treatment.

Should Methadone Maintenance Treatment Be Offered as a Benefit of Health Care Plans?

Methadone maintenance treatment is not covered as a benefit by many private insurers and state Medicaid programs (14). Recent studies suggest that methadone maintenance treatment should be included in health plans because it is cost-effective.

The cost-effectiveness of methadone maintenance was estimated with a simple mortality model. Providing access to methadone maintenance had an incremental cost-effectiveness ratio of $5,915 per life-year (29). This model estimated the effect of expanded methadone access using the change in mortality rates of IDUs after Sweden imposed a moratorium on new methadone enrollment. The model did not consider the effect of methadone treatment on health care costs or on quality of life.

More recent work has considered not only mortality, but also quality of life and the transmission of HIV, and the effect of methadone treatment on medical care costs (30). Expansion of methadone treatment was estimated to have a cost-effectiveness ratio of between $8,200 and $10,900 per QALY, depending on the prevalence of HIV in the community. A wide range of modeling assumptions found that most of the HIV infections that were prevented would be among IDUs, but because of their short life expectancy, most of the gain in quality-adjusted life years would be realized by members of the general population. In addition, this paper found that an intervention that was twice as costly and half as effective as methadone maintenance would still be judged as cost-effective.

Both studies were limited to the health care payer's perspective. They did not include costs incurred by patients or non-health care costs of government agencies. Some studies have found that reduction of public agency costs brought about by treatment is substantial (24, 25). If these additional costs were considered, they would

have offset some of the treatment costs, lowering the cost-effectiveness ratio.

These cost-effectiveness studies found that, by the standards used to judge medical care interventions, methadone maintenance is highly cost-effective. For example, its cost-effectiveness ratio is lower than that of many HIV interventions. Prophylaxis for opportunistic infections of AIDS has much higher ratios: $16,000 per QALY to prevent *Pneumocystis carinii* pneumonia (31), $35,000–74,000 for *Mycobacterium avium* complex, and more than $160,000 per QALY to prevent infection by cytomegalovirus (32, 33). Chemoprophylaxis for high-risk occupational exposure to HIV has a ratio of $37,000 per QALY (34). Access to methadone maintenance has a cost-effectiveness ratio that is similar to that of other HIV prevention programs, including chemoprophylaxis for high-risk sexual exposure, $6,300/QALY (35), and a program to increase condom use among high-risk women, $2,000/QALY (36).

Proponents of expanded methadone maintenance treatment should be encouraged by the finding that it is a highly cost-effective treatment. If they wish to apply cost-effectiveness rules to demonstrate that methadone maintenance treatment should be offered, they must also consider what cost-effectiveness analysis has to say about the design of treatment programs and the interventions that have been proposed to improve treatment effectiveness.

How Much Ancillary Service Should Be Offered with Methadone Maintenance Treatment?

There is substantial evidence that methadone maintenance is more effective when ancillary services, such as counseling, social services, and medical care, are offered along with methadone. According to a study of 17 clinics, patients in programs that provided more frequent counseling contacts were less likely to use illicit drugs (37). According to another study, patients were retained longer in programs that provided high-quality social services (38). And cognitive-behavioral interventions have been found to reduce risky injection practices (39) and cocaine use (40).

Although the data referred to above is impressive, cost-effectiveness analysis is needed to determine whether the additional benefit of different ancillary services justifies their costs. Few studies have examined this question. A randomized trial compared a day-treatment program that provided 25 hours a week of specialized services to a standard methadone program that included only a few enhancements. This trial found that the day-treatment program was three times more costly, but that there was no significant difference in patients' use of illicit drugs (6). This result suggests that, according to the dominance principle, the day-treatment program should not be adopted — since it is more costly and not more effective. However, the study has some limitations. The intervention was delivered over a limited time period and the alternative treatment was not standard care; the study did not report the statistical significance of the dominance finding; day-treatment patients were slightly less likely to use drugs, and the study may simply have been too small to detect an effect that was significant. There are a variety of statistical methods that can be used to determine the significance of cost-effectiveness findings (41).

Another randomized trial found that methadone with standard counseling yielded better outcomes than methadone alone, and that an enhanced set of counseling and medical services was even more effective (42). A subsequent analysis considered the cost-effectiveness implications of this trial (43). This analysis reported a cost-effectiveness ratio in terms of the annual cost per abstinent patient, and concluded that the highest level of services was not cost-effective. There are two problems with using abstinence as the outcome measure. This outcome measure assumes that there is no value in treatment effects other than total abstinence. Other outcomes, such as reduction in the use of opiates and the rate of unsafe injection practices, should be considered. Another problem is that we do not know how much society is willing to pay for a year of abstinence from opiates. Had this study used QALY as the outcome measure, we could have compared the incremental cost-effectiveness ratios to the ratios found for other types of health care.

Research on the impact of ancillary services on methadone effectiveness suggests a number of areas where cost-effectiveness research is needed. The Treatment Outcome Prospective Study (TOPS) found that patients were retained longer when specialized professionals were involved in diagnosis and development of treatment plans (44). A cost-effectiveness study is needed to determine whether using a different mix of treatment professionals will enhance the cost-effectiveness of methadone maintenance. This is a compelling area for research, since staffing costs account for most of the cost of treatment.

The effectiveness of psychosocial services may depend on when they are offered. Services offered at the beginning of a treatment episode

may be especially cost-effective. One of the studies referred to earlier (38) found that if the treatment program provided high quality social services during the first month of treatment, patients were three times as likely to be retained in treatment for at least a year. Patients in the 21 methadone clinics studied in the TOPS study were more likely to remain in treatment if they received more medical, psychosocial, and financial services during the first three months of treatment (44).

Services offered later in a treatment episode may not be as cost-effective. A study of medical maintenance found that about 83% of eligible long-term methadone patients were treated successfully in programs that involved monthly physician visits, dispensing a month's supply of take-home medication, and no ongoing counseling other than discussions with the treating physician about personal and medical problems (45). Taken together, these studies suggest that the marginal value of social services may decline during the later part of a treatment episode. Studies are needed to determine the optimal timing of psychosocial services and to learn whether services provided later in a treatment episode are sufficiently cost-effective to be justified.

A randomized trial found that individuals waiting to enter comprehensive methadone treatment did better if they received methadone with minimal services, rather than no treatment at all. Patients who received this interim treatment were less likely to use illicit opiates and had better long-term outcomes (46). It would be worthwhile to learn the incremental cost-effectiveness of interim treatment compared to standard therapy that includes psychosocial services. If the incremental cost-effectiveness of the additional services is not sufficiently large, then perhaps they are not cost-effective. In other words, if there are too few resources to treat all those who wish to enter methadone treatment slots, it is possible that resources could be better used to provide methadone to a greater number of individuals, but with minimal psychosocial services.

What Is the Proper Dose of Methadone?

There is extensive literature documenting the greater effectiveness of higher doses of methadone. Double-blind, randomized, controlled trials have found that patients who are given higher methadone doses are retained longer in treatment and are less likely to provide opiate-positive urine samples. The trials have demonstrated that a daily dose of 50–60 mg is superior to 20 mg (47, 48) and that a dose of 80–100 mg is superior to 40–50 mg (49, 50). Observational studies have also found that patients were retained longer if they received a higher dose (44–51), and that they also had fewer opiate-positive urine samples (52). One study reported that the relative odds of patients using heroin while in treatment were reduced by 2% for every 1 mg increase in the daily dose of methadone (53). Other studies have found that patients do better in treatment programs that use higher doses (54).

There is growing evidence that different patients require substantially different doses of methadone, and that some patients require doses well in excess of 100 mg per day (55). Treatment for one group of patients was improved when their daily dose was increased to a range of between 110 and 780 mg (56). Cost-effectiveness analysis will help to determine if high-dose treatments result in additional costs for such items as additional medical evaluation or additional testing of serum methadone levels.

Programs that provide higher doses have other characteristics that may affect the cost of an episode of care. High-dose programs have less restrictive rules and the intent of retaining patients longer (51). Treatment programs that have a higher upper limit on dose are more likely to have patients who are aware of their doses, allow them to influence their doses, and grant take-home privileges (17). These other characteristics are also associated with improved treatment efficacy. Patients are more likely to be retained in treatment when dosing policy is flexible (57) and when they are informed of the doses that they receive (58).

The efficacy of higher doses may be greater when administered early in the treatment episode. One study found that patients were less likely to provide opiate-positive urine specimens if they received higher methadone doses during the first 5 months of treatment; this measure of illicit drug use was not affected by the dosages received later in treatment (59). Another study found that the maximum dose in the first 120 days of treatment predicted subsequent retention (51). If higher doses result in higher costs, then this strategy may be more cost-effective if it is targeted to the early months of treatment.

While high doses, flexible-dosing policies, and informing patients of their dose are effective, such treatment strategies are not uniformly applied. A survey of 172 U.S. methadone maintenance programs found that nearly one-fourth of methadone patients received a daily dose of less than 40 mg per day, a level that most researchers

regard as too low to be effective (17). This same survey found that one-third of program patients were not well-informed of their doses, and that most patients had little or no influence over the doses they received.

Methadone is inexpensive. The cost of methadone, at less than a dollar a dose, makes up only a small part of the total treatment cost. Specialized dispensing adds to this cost, but the cost would be minimally affected by increasing the dose, adopting flexible dosing policies, or tailoring the dose so it is adequate for the patient's need. Such policies represent low-cost interventions; given their benefits, they are likely to be very cost-effective. A complete analysis requires inclusion of any additional costs associated with high doses, such as increased medical monitoring of patients or the risk associated with higher doses. Current studies suggest that such costs would be relatively small compared to the consequences of continued injection drug use that occurs when doses are too low.

How Long Should Treatment Continue?

There is considerable evidence that greater time in methadone treatment is associated with better outcomes. Methadone patients who were in treatment longer used illicit drugs less frequently and were involved in fewer criminal activities, according to the one-year follow-up interviews conducted by the Drug Abuse Reporting Program (DARP) (60) and TOPS (61) studies, and in the six-year follow-up interviews of DARP subjects (62). Arbitrary termination of methadone is associated with poor outcomes. A study of the closure of a California methadone program found that patients who continued their methadone treatment in a different program had better outcomes than those who did not continue in any program at all (63).

These observational studies were not randomized tests of the effect of longer treatment and thus cannot prove that longer treatment causes better outcomes. Although the studies had controls for the effect of patient characteristics, unmeasured patient characteristics that predict good treatment outcomes may also be associated with longer stays.

A causal relationship between treatment length and outcomes is suggested by studies that have found that programs that limit treatment length have poorer outcomes. Ball and Ross (16) found that patients had better outcomes when enrolled in programs that had long-term maintenance on methadone as their treatment goal; patients in abstinence-oriented programs did more poorly. Other studies (51–54) found that patients in programs that limit treatment length have poorer outcomes than those in programs without time limits. This result, however, is confounded by the lower doses used in the limited-length programs.

Long-term maintenance with methadone is advocated because efforts at detoxification are usually not successful. Long-term follow-up studies have found that patients who terminate methadone, even when detoxification is approved by program staff, have low rates of abstinence (64–66).

The efficacy of longer treatment has been demonstrated in at least one randomized clinical trial. Standard methadone care was compared to a 180-day detoxification program with enhanced services; despite the enhancements, the shorter program was less effective (67).

Although there is strong evidence that longer treatment is more effective, limits are often placed on the length of time patients may receive methadone. A survey of U.S. treatment programs found that 32% of their patients were encouraged to detoxify from methadone within the first 6 months of their treatment (17). Many health plans specify a maximum number of weeks of methadone maintenance that will be covered (14).

It is not known whether current limits on treatment length are based on cost-effectiveness considerations. Treatment length may be limited because of the social stigma associated with methadone treatment, moral judgments made about opioid dependence, and the belief by some that abstinence is the only acceptable treatment outcome. There are economic incentives to limit treatment length. The limits on methadone treatment specified by many private insurance plans have shifted treatment costs to the public sector (14).

A National Institutes of Health panel on methadone treatment recommended that "most, if not all, patients require continuous treatment [with methadone] for many years, and perhaps for life" (68). Opioid dependence is a chronic condition for which many patients cannot be cured; thus they require indefinite treatment, much as insulin is required by diabetics.

The six-year follow-up of DARP data found that patients who had received fewer than 90 days of treatment did not do better than patients who were never treated (62). Very short treatments have a cost; if they yield no benefit, the dominance principle holds that they are not cost-effective.

A medical model of maintenance therapy has been proposed for long-term methadone patients.

Pilot programs have enrolled longstanding patients with good records of compliance. The patients make monthly visits to a primary care physician and receive a month's supply of medication. Outcomes appear to be at least as good as those achieved in methadone treatment programs (45, 69, 70). If medical maintenance lowers the cost of treating long-term patients without compromising the outcomes, it will strongly dominate standard care.

Should Contingency Contracting Be Employed?

Most methadone patients are required to provide regular urine samples that are screened for illicit drugs. The value of this monitoring is not precisely known. It appears to have little value if the information is not used to guide care. When patients from 5 clinics were randomized to either a monitored or unmonitored group, surprise urinalysis found no statistically significant difference in the rate of illicit drug use (71). Patients assigned to the monitored group had fewer positive urinalyses, but they were also more likely to drop out of treatment. The authors of this report note that a system of monitoring urine samples may result in 5–11% fewer drug-positive urine specimens, but they were uncertain about whether the cost was worth the result.

Other trials have undertaken specific interventions that are contingent on the results of urine monitoring. Patients agree to contracts that specify the consequences of a positive urinalysis. It may affect their tenure in treatment, the dose they receive, whether they are granted take-home privileges, or whether they receive incentives such as vouchers or cash credits.

A randomized trial evaluated a structured treatment program that required patients to provide negative urine specimens for at least one month out of every four, or else be discharged (72). This intervention resulted in significantly less drug use and greater retention.

Methadone patients reduced their use of illicit opiates when their dose was changed as a result of a positive urinalysis (73). Patients reduced their drug use regardless of whether the dose was increased or decreased; however, the patients who were given a decreased dose were more likely to drop out of treatment.

A recent trial gave patients the choice between a take-home dose or a $25 voucher as their reward for a negative urinalysis (74). This intervention reduced use of opiates and cocaine. Cost-effectiveness research is needed to determine if the improvement in outcomes achieved by these interventions justifies their cost. Economic analysis will be especially important in justifying the use of contingent rewards.

A cost-effectiveness study examined a trial in a 180-day methadone detoxification program that rewarded negative urinalyses with cash credits (75). Patients who were randomized to the contingent rewards group were more likely to provide urine and breath samples that were free of drugs and alcohol. The contingency payments were a small part of the total cost of treatment. The contingent rewards group had higher treatment costs and incurred fewer health care costs, suggesting that the extra treatment costs are substantially offset by reductions in health care cost; however, the differences were not statistically significant. The authors report a cost-effectiveness ratio of $17.27 per 1% increase in the individuals whose samples were free of illicit substances. This ratio excludes the effect of treatment on health care costs. The use of abstinence as the outcome raises two problems. First, it does not value reductions in substance use that do not involve abstinence. Second, since the value of achieving abstinence has not been established, it is not known how low the ratio must be for the intervention to be considered cost-effective.

Discussion

Cost-effectiveness methods developed for the evaluation of health care have determined that expansion of methadone maintenance treatment capacity has a cost-effectiveness ratio that is lower than many widely used medical care interventions (29, 30). An important benefit of the expansion of methadone treatment capacity is a reduction in the transmission of HIV, an outcome that benefits the general population. This benefit is so substantial that expansion of methadone treatment is cost-effective regardless of what assumptions are made about the effect of opiate dependence or methadone prescription on quality of life (30).

For cost-effectiveness methods to be more widely applied to the substance abuse treatment system, however, information on quality-of-life adjustments will be needed. A key research gap is the need for preference assessments, to allow cost-effectiveness researchers to measure substance abuse outcomes in terms of Quality-Adjusted Life Years.

Because cost-effectiveness analysis is a tool for assigning community health care resources, community ratings should be used to assign qual-

ity adjustments to health states (26). Quality adjustments are needed to reflect the quality of life of untreated addicts and methadone maintenance patients. These adjustments will need to reflect the effect of co-morbidities, including HIV infection and AIDS.

In the absence of this information, cost-effectiveness analysts will be able to make only limited progress. They will be able to apply the dominance principle, recommending adoption of interventions that save costs and improve outcomes. Unfortunately, dominance is an inadequate tool for the evaluation of most policies. Dominance does not tell whether to adopt a policy that would both increase costs and improve outcomes (such as proposed treatment enhancements). It also does not help when choosing a policy designed to save costs at the expense of worsening outcomes (e.g., policies that limit dose, counseling services, or treatment length).

When dominance does not apply, the decision maker must evaluate the incremental cost-effectiveness ratio. Most economic evaluations of methadone maintenance have calculated this ratio using natural units of outcome, such as number of weeks with negative urinalysis, or the number of years of abstinence from illicit drugs. It is difficult to judge ratios that use this type of outcome measure. For example, no one has determined how much society should pay to achieve an abstinent year of life. In addition, such measures do not reflect the multi-dimensional nature of outcomes, such as reduced medical co-morbidities, or the effect of the treatment itself on the quality of life.

Incremental cost-effectiveness ratios that use QALYs as the outcome can be compared to the ratios found in other studies, and to the $50,000 per QALY threshold that has become the de facto standard for the U.S. health care system. The promise of this approach is that it will optimize the use of health care resources, maximizing the total number of QALYs that can be achieved with available health care resources. This promise can be achieved only if quality adjustments are developed that accurately reflect the value that society places on life spent with opioid disorders. These adjustments are needed for individuals with untreated opioid dependence and those in methadone maintenance.

Policy makers may be tempted to incorporate lower social preferences for health states involving illicit injection of drugs, by applying stricter criteria for cost-effectiveness, that is, by adopting a threshold that is higher than $50,000 per QALY. This would be inappropriate; quality adjustments are the way to incorporate these social preferences. A higher threshold would also undervalue the benefit that the non-drug-using population receives from maintenance treatment via reduced spread of HIV.

It must be conceded that cost-effectiveness considerations are not the only factors that shape methadone treatment policies. Untreated IDUs and methadone patients may be seen as less deserving due to the social stigma associated with drug use. Decision makers are influenced by philosophical and moral opposition to opiate substitution therapy. Practices which are known to be ineffective, including inadequate doses and limits on treatment, are still widely employed.

Economic analysts face a daunting challenge. They must find the effect of treatment on cost and outcomes, including the social valuation for these health states. They must also include the dynamic effect of treatment on the spread of communicable diseases, and on social service and criminal justice systems. If this can be accomplished, then improved cost-effectiveness analysis will allow treatment for opioid dependence to be compared to other health care interventions. A likely result is that they will find that funds currently used for health care may be more cost-effectively applied to methadone treatment of opioid dependence. The stigma associated with opiate dependence, however, may prevent policy makers from treating methadone on a parity with other health care interventions.

Even if policy makers cannot regard treatment of opiate addiction on the same level as other health care interventions, cost-effectiveness analysis can still play a role in determining the best use of treatment resources. If all substance-abuse cost-effectiveness studies included the QALY among the outcomes they measure, then decision makers would be able to compare interventions and adopt policies that maximize QALYs among those who seek treatment for opiate addiction.

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