

Are Supplementary Services Provided During Methadone Maintenance Really Cost-Effective?

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***Objective:** Previous research has suggested that support services supplementing methadone maintenance programs vary in their cost-effectiveness. This study examined the cost-effectiveness of varying levels of supplementary support services to determine whether the relative cost-effectiveness of alternative levels of support is sustained over time. **Method:** A group of 100 methadone-maintained opiate users were randomly assigned to three treatment groups receiving different levels of support services during a 24-week clinical trial. One group received methadone treatment with a minimum of counseling, the second received methadone plus more intensive counseling, and the third received methadone plus enhanced counseling, medical, and psychosocial services. The results at the end of the trial period have been published elsewhere. This article reports the results of an analysis at a 6-month follow-up. **Results:** The follow-up analysis reaffirmed the preliminary findings that the methadone plus counseling level provided the most cost-effective implementation of the treatment program. At 12 months, the annual cost per abstinent client was \$16,485, \$9,804, and \$11,818 for the low, intermediate, and high levels of support, respectively. Abstinence rates were highest, but modestly so, for the group receiving the high-intensity, high-cost methadone with enhanced services intervention. **Conclusions:** This study suggests that large amounts of support to methadone-maintained clients are not cost-effective, but it also demonstrates that moderate amounts of support are better than minimal amounts. As funding for these programs is reduced, these findings suggest a floor below which supplementary support should not fall.*

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Psychosocial support services are regarded by many as essential for effective methadone treatment. Despite a growing literature that identifies the combination of employment, housing, and medical care services as necessary for the rehabilitation of drug-addicted clients, most methadone treatment programs provide only limited support services because of the cost. Findings from the 1991–1993 Drug Abuse Treatment Outcome Study funded by the National Institute on Drug Abuse show substantial decreases over the last decade in patients receiving support services during their first 3

months of treatment (1). An evaluation of drug programs by McLellan et al. (2), initiated as part of the Targeted Cities program, supports those findings. Preliminary results affirm that as managed care programs have grown, the intensity and variety of support services have declined dramatically (3). These trends underscore the need to determine the type and intensity of support components that affect addiction treatment outcomes.

There is a paucity of literature on the cost-effectiveness of drug treatment programs with respect to the type and level of service provision (4). Two frequently cited studies (5, 6) concluded, however, that the cost of providing drug treatment is substantially offset by lowered costs associated with criminal activity, decreases in public assistance, and increases in productivity. The first of these studies analyzed the costs and crime-reducing effect of 41 drug abuse programs for 11,000 individuals who entered the programs between 1979 and 1981. The authors found that treatment resulted in considerable decreases in the abuse of both opioid and nonopioid drugs; however, very few persons achieved the goal of abstinence. Ultimately, these authors found

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substantial reductions in crime-related costs and concluded that these reductions were "at least as large as the cost of providing treatment, with much of the expenditure recovered during the time the drug abuser is in treatment" (5, p. 161).

In the second study, McGlothlin and Anglin (6) examined the effects of closing a methadone maintenance program by comparing the social costs incurred in the community where the program closed with those costs in a community with an operating drug program. Estimates were obtained for the costs of treatment, arrest and court processing, jail, probation, forgery, robbery, and welfare. The overall results indicated that for males, mean annual costs per subject in the community with the closed program were approximately 17 percent higher than those in the comparison community. However, for females, the mean annual costs were much lower in the community where the program closed than in the comparison community. These findings illustrate some of the complex and unexpected relationships that can emerge in an investigation of the cost-effectiveness of drug abuse treatment.

In a more recent study, McLellan et al. (7) evaluated the effects of varying levels of support services during a 24-week randomized clinical trial and found that the provision of additional counseling, medical, and psychosocial services substantially increased measures of effective outcome for methadone-maintained clients. The authors concluded that the quantity and quality of medical and psychosocial services in existing methadone clinics should be greatly enhanced to address the serious public health problems associated with opiate and cocaine dependence.

Using the same study group, Shepard and McKay (8) examined the cost-effectiveness of the same three psychosocial support levels at the end of the 24-week clinical trial by calculating the cost per abstinent client. The treatment costs were based on professional salaries and benefits and on the number of psychosocial contacts for each group of patients as reported by the study protocol. Self-report data from the Addiction Severity Index were used to determine heroin and cocaine abstinence rates, and methadone maintenance costs were developed from a national data set with adjustments made for inflation (5). Shepard and McKay's analysis showed that the cost-effectiveness ratio in dollars per abstinent client was \$22,558 for the minimum level program, \$16,150 for the methadone plus counseling program, and \$19,969 for the enhanced service level program. Although enhanced treatment levels produced better outcomes relative to the other two support levels, these investigators concluded that the methadone plus counseling level of support services was the most efficient on the basis of the cost per year per abstinent client.

In this article we examine the outcome of the McLellan et al. psychosocial support level study (7) at 12 months, 6 months after the 6-month intervention had ended and clients had returned to a level of treatment involving methadone plus counseling. The purpose of the follow-up analysis was to determine which of the

three support levels was most cost-effective with respect to longer-term benefits. In contrast to the costing approach of Shepard and McKay (8), the current study used the actual number of psychosocial and medical contacts provided to clients, rather than the psychosocial services "prescribed" by the protocol. Salary figures for professionals are the same for both analyses, although the contact hours differ. In addition, methadone costs were ascertained by using the cost of an average daily dose of methadone in 1992 as well as the dispensing time of the pharmacist. Heroin and cocaine abstinence rates were measured with the Addiction Severity Index (9).

Specifically, the study addressed the following questions. 1) What are the differential outcomes associated with the three support levels at the 6-month follow-up period? 2) What are the professional costs of providing these services? 3) What is the ratio of service costs to outcome that will maximize both resource allocation and treatment effectiveness? We hypothesized that clients who received enhanced support levels would maintain improvements gained during the first 6 months of treatment, while clients who received moderate and minimum levels of service would be likely to report diminished improvement.

METHOD

The subjects were drawn from patients admitted to the methadone maintenance clinic of the Philadelphia Veterans Affairs (VA) Medical Center during 1991. Participants (N=100) were randomly assigned to one of three possible support levels: minimum methadone services, counseling plus methadone services, or enhanced methadone services. Data examining the effects of varying levels of support services provided to methadone-maintained opiate users were collected during a 24-week clinical trial, as previously described by McLellan et al. (7). After the clinical trial ended, all subjects continued to receive the methadone plus counseling level of treatment for the next 6 months and were reevaluated at the end of this period. Written informed consent was obtained from each subject after the procedure had been fully explained.

All study subjects received 60–90 mg/day of methadone. The minimum methadone services treatment procedure was designed to provide the minimum level of supervised care acceptable under current Food and Drug Administration standards, which specified one counseling session per month. No ancillary medications, counseling, or other professional services were provided, except in emergency circumstances. In the counseling plus methadone services treatment group, three regular counseling sessions per week were required, including a series of behavioral interventions; however, no other services were provided within the program for the 6 months of the trial. The enhanced methadone services treatment procedure was designed to provide the highest level of care, with use of the standard components of methadone and counseling plus extended on-site medical, psychiatric, employment, and family therapy services. Seven counseling sessions a week were prescribed for this treatment level.

All subjects were administered the Addiction Severity Index (9) upon admission to the program, at the end of the 24-week clinical trial period, and at the 6-month follow-up period. The Addiction Severity Index measures problems commonly associated with addiction, i.e., medical, psychological, employment, legal, family, and criminal status. In addition, subjects completed a weekly Treatment Services Review (10) during the clinical trial period, which provided information on the type and amount of supplementary services received in each of the same problem areas assessed in the Addiction Severity Index.

TABLE 1. Characteristics of Methadone Study Subjects at Baseline

Variable	All Subjects (N=100)		Subjects Receiving Minimum Methadone Services (N=31)		Subjects Receiving Methadone Plus Counseling (N=36)		Subjects Receiving Enhanced Methadone Services (N=33)		Analysis		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	df	p
Age (years)	42.5	6.1	42.3	5.1	41.8	5.6	43.4	7.4	0.71	2, 96	0.49
Education (years)	12.2	1.8	12.3	1.6	12.3	2.0	11.9	1.8	0.41	2, 96	0.67
Heroin use (years)	15.8	8.0	16.4	7.0	14.1	7.6	17.0	10.0	1.09	2, 97	0.34
	N	%	N	%	N	%	N	%	χ^2	df	p
Male gender	85	85.0	26	83.9	30	83.3	29	87.9	0.26	2	0.88
Black race	70	70.0	24	77.4	25	69.4	21	63.6	4.78	6	0.57
Married	23	23.0	8	25.8	9	25.0	6	18.2	0.65	2	0.72
Employed	47	47.0	14	45.2	19	52.8	14	42.4	1.05	2	0.59

Four types of variables were required to construct the 12-month cost-effectiveness ratio: 1) salary and benefits of the professional staff, 2) average direct and indirect contact time per treatment episode, 3) number and type of service contacts per client, and 4) client outcome measures.

Salaries and benefits of the professional staff were derived from VA personnel reports based on 1993 figures. The average time spent performing various types of service activities was determined by a panel of drug treatment specialists who were asked to develop estimates of the number of minutes professional staff members engaged in direct and indirect client contact by type of service. The time estimates for each service were based on the panel's observations and interviews with staff members at the Philadelphia VA methadone program.

The consensus of the expert panel was that 60% of professional staff time is spent in direct client contact, and an additional 40% is needed to complete activities such as case planning, case documentation, consultation, and administrative responsibilities related to each direct contact. A markup reflecting that for every hour spent in direct client services an additional two-thirds of an hour is required for related activities was added. Thus, for every service episode provided to a client, an additional 67% was added to account for indirect client contact responsibilities. The amount of pharmacist time associated with each dose of methadone was estimated to be 10 minutes per dose, and the cost per dose was estimated at \$2.50 per day.

Service contacts were ascertained with the Treatment Services Review. This instrument identified the type and number of contacts for all services, both in and out of the program, and was administered weekly to each client during the 24-week study period. The services provided were 1) medical, 2) nursing, 3) individual drug counseling, 4) group counseling, 5) psychological counseling, 6) family counseling, 7) employment counseling, and 8) methadone medication.

Service contacts were calculated on a per-client basis by type of service. Because many subjects had incomplete service information, both the mean number and median number of service contacts by service type were calculated for all three treatment levels. The per-client cost was determined by taking the professional staffing cost per hour, by service, multiplied by the number of client contacts in that service and distributed over all service category costs by support level. The costs of program operation and overhead were not included in these calculations. However, overhead in these programs is typically low, and attributable overhead can be expected to be proportional to level of service.

Outcome measures, collected at the 6-month follow-up period with use of the Addiction Severity Index, were the same as those assessed at baseline and at 24 weeks by McLellan et al. (7) and included medical needs, welfare dependency, days of illegal activity, illegal income, psychological problems, drug use, and increased employment.

The cost per client per year to achieve a certain outcome measure

was constructed by using the total cost of services per client for the 24-week trial period plus the cost of service for 6 months of methadone plus counseling as the index numerator. The denominator was the drug abstinence rate for heroin and cocaine at follow-up. An additional economic analysis was performed to provide policy makers with information on program size or the optimum number of treatment slots. This marginal cost analysis gives the cost required to achieve an outcome of abstinence in one extra client.

RESULTS

Table 1 shows the characteristics of the participants at baseline. There were no significant differences in characteristics among the treatment assignment groups.

As indicated in table 2, the number of contacts per service type differed by level of treatment as in the design of the clinical trial. Although the average number of minutes per service contact and the cost per contact remained constant regardless of group service level, the differences in amounts of service were statistically significant for several services (i.e., individual drug counseling and family counseling).

To control for differences in services provided by other programs, an analysis of variance of out-of-program services was conducted on 21 service variables. The amount of service provided out of program was minimal. The differences were statistically significant between the three service levels on only two service types, inpatient drug treatment ($F=4.98$, $df=2, 45$, $p=0.01$) and family treatment ($F=3.36$, $df=2, 97$, $p=0.03$). In each case, the level receiving the additional service was the enhanced methadone services group.

During the 24-week trial, the counseling plus methadone services group received significantly more individual drug counseling than the group receiving minimum methadone services (18.70 versus 5.60 contacts), almost twice as much family counseling (6.40 versus 3.80 contacts), and almost four times as much group counseling (8.70 versus 2.30 contacts) (table 2). Similarly, the group receiving enhanced methadone services had almost twice as much psychological counseling as the

TABLE 2. Service Contacts per Person by Support Level for the First 24 Weeks of Methadone Treatment

Service	Number of Contacts for Subjects Receiving Minimum Methadone Services (N=31)			Number of Contacts for Subjects Receiving Methadone Plus Counseling (N=36)			Number of Contacts for Subjects Receiving Enhanced Methadone Services (N=33)			Analysis			Mean Cost per Contact (\$)
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	F	df	p	
Physician	5.94	10.30	2.50	4.17	5.15	2.00	5.12	6.39	3.00	0.47	2, 97	0.63	30.34
Nurse	4.96	12.30	0.50	1.97	2.95	1.00	3.06	4.44	2.00	1.34	2, 97	0.27	44.59
Counseling													
Psychological	4.30	10.90	1.00	4.80	7.90	2.00	8.90	8.90	8.50	2.41	2, 97	0.96	38.34
Individual drug	5.60	5.60	5.00	18.70	9.90	18.00	32.90	16.90	28.00	19.30	2, 45	<0.001	9.27
Family	3.80	4.10	2.00	6.40	9.30	2.00	15.50	12.60	14.50	13.70	2, 97	<0.001	39.36
Group	2.30	3.40	0.00	8.70	13.30	0.00	10.50	16.30	1.00	1.73	2, 45	0.19	8.34
Employment	16.00	21.70	5.50	13.00	11.30	12.00	20.00	21.80	11.00	1.36	2, 97	0.26	35.02
Methadone	147.00	16.00	148.00	142.00	17.00	140.00	141.00	26.00	139.00	0.34	2, 45	0.71	7.50

TABLE 3. Cost of Support Services per Person by Support Level for 24 Weeks of Methadone Treatment

Service	Cost for Subjects Receiving Minimum Methadone Services (N=31) (\$)			Cost for Subjects Receiving Methadone Plus Counseling (N=36) (\$)			Cost for Subjects Receiving Enhanced Methadone Services (N=33) (\$)		
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
Physician	191.79	327.00	76.00	114.72	141.83	61.00	175.04	190.01	91.00
Nurse	235.69	576.15	22.00	82.21	120.97	45.00	147.49	200.51	89.00
Counseling									
Psychological	186.22	436.61	77.00	185.71	304.68	77.00	361.28	350.41	326.00
Individual drug	52.31	52.13	46.00	173.92	92.28	167.00	305.20	157.43	259.00
Family	164.47	164.23	98.00	253.38	366.47	78.00	685.77	512.12	570.00
Group	4.17	7.50	0.00	16.16	36.77	0.00	74.63	18.73	0.00
Employment	507.85	789.05	124.00	397.53	351.22	367.00	580.79	674.66	318.00
Methadone	1,128.59	126.35	1,135.00	1,091.70	135.85	1,078.00	1,083.83	204.62	1,066.00
Total	2,471.09	2,479.02	1,578.00	2,315.33	1,550.07	1,873.00	3,414.03	2,308.49	2,719.00

members of the counseling plus methadone services group (8.90 versus 4.80 contacts), two and a half times as much family counseling (15.50 versus 6.40 contacts), and almost twice as many individual drug treatment sessions (32.90 versus 18.70 contacts). In addition, group members receiving enhanced methadone services received the highest levels of employment counseling services (20 versus 13 and 16 contacts).

Table 3 shows the mean and median costs of providing each type of support service per participant in the first 24 weeks of the program. It is interesting to note that methadone medication was the costliest component for the group receiving minimum methadone services and the group receiving counseling plus methadone services. Only in the group with enhanced methadone services was the cost of support services substantially greater than that for the methadone medication.

Even though the Addiction Severity Index medical criteria scores show no apparent difference in physical health status between the groups at baseline, in aggregate, the minimum methadone services group received substantially more medical care (i.e., physician and nursing services) than the others. The difference results from three members of that group who were very high users of medical services. To test the impact of these high users on costs, we performed a separate analysis excluding the data of these three members. In that analysis, the total cost of support services per person

decreased from \$2,471.09 to \$1,984.00. The decrease was due to a reduction in physician services (mean=86.60 contacts, SD=104.79, versus mean=192.00, SD=327.00), nursing care (mean=49.37 contacts, SD=81.7, versus mean=256.00, SD=576.13), and psychological counseling services (mean=99.96 contacts, SD=160.76, versus mean=186.22, SD=436.61).

Table 3 also reports the total costs associated with each program. Although the total service costs differ considerably when the median rather than the mean is used, the relationship across programs remains the same, with the cost per member of the enhanced methadone services group being greater than the cost per individual receiving minimum methadone services or counseling plus methadone services.

At 24 weeks, subjects in the enhanced methadone services group showed significantly better outcomes, as measured by urine screening and the Addiction Severity Index, than the clients receiving counseling plus methadone services and minimum methadone services with respect to decreases in medical needs, welfare dependency, days of illegal activity, illegal income, psychological problems, and drug use and increased employment. However, at 12 months, 6 months after supplemental services were stopped, only the difference in the level of abstinence from heroin remained statistically significant across groups ($F=4.05$, $df=2, 97$, $p=0.02$).

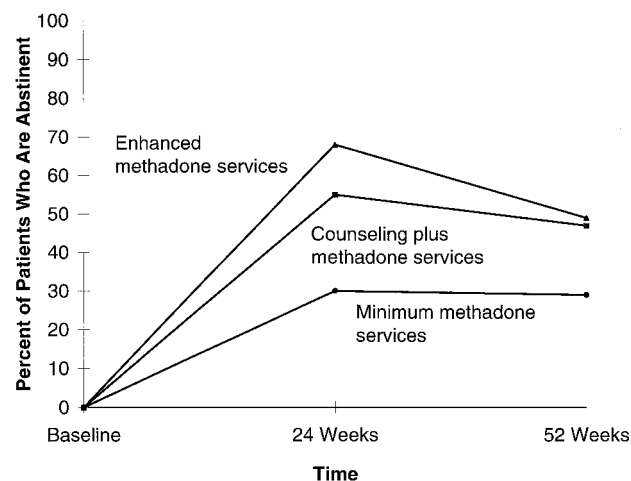
FIGURE 1. Drug Abstinence Rates by Level of Treatment at Baseline, 24 Weeks, and 12 Months

Figure 1 shows the change in abstinence rates from baseline to 24 weeks to 12 months for the three support levels. Clients in all levels showed reduced drug use from baseline at both assessment periods; however, drug abstinence rates were highest at week 24, when the clinical trial ended. Subsequently, all groups received counseling plus methadone. At week 52, when the long-term assessment was performed, abstinence rates had declined in all groups—from 30% to 29% in the minimum methadone services group, from 55% to 47% in the counseling plus methadone services group, and from 68% to 49% in the enhanced methadone services group.

At 12 months, with use of the mean cost values, the annual cost per abstinent client was estimated as \$16,485 for minimum methadone services (it was \$15,047 when the outliers were removed from the analysis), \$9,804 for counseling plus methadone services, and \$11,818 for enhanced methadone services. The findings were similar when the median values were used to develop the cost-effectiveness ratio: \$11,887 for minimum methadone services, \$7,932 for counseling plus methadone services, and \$9,471 for enhanced methadone services. Using the same method, we found a similar trend at the end of the 6-month clinical trial as well, with the average annual cost estimated at \$17,906 for minimum methadone services, \$9,150 for counseling plus methadone services, and \$10,934 for enhanced methadone services. These results suggest that the moderate treatment program (counseling plus methadone services) was the most cost-effective with respect to reduction of heroin and cocaine use, similar to Shepard and McKay's findings. However, it should be noted that the enhanced methadone services support level demonstrated the highest rate of abstinence throughout the 12-month period. Given the research design, it is difficult to say what abstinence rates might have been achieved if the enhanced methadone services intervention had continued through the entire 12-month assessment period.

An alternative way of analyzing these data is to examine the incremental costs, i.e., the dollars required to move a client from one level of support services to another in order to achieve a more cost-effective abstinence rate at 12 months. We found that a move from minimum methadone services to counseling plus methadone services would result in eight additional clients becoming abstinent, at a cost of \$2,289 per client. Since abstinence rates for counseling plus methadone services and enhanced methadone services were quite similar (47% and 49%, respectively), moving from counseling plus methadone services to enhanced methadone services would result in no additional abstinent clients; however, the result of the incremental analysis showed an increase in cost of \$22,410 for a slight change in rates of abstinence. Thus, we conclude that the cost of moving clients from a minimal level of care to a methadone plus counseling level is justified by improvements in abstinence, whereas a move from a methadone plus counseling level to an enhanced support level, even though outcomes were better, is not cost-effective.

DISCUSSION

The results of this analysis substantiate previous findings that for methadone-maintained opiate users, the provision of moderate levels of support service is more cost-effective than providing enhanced levels of service. Despite the fact that enhanced services produced better clinical outcomes at 24 weeks (7), only the rates of heroin abstinence remained significantly higher at the end of one year. Similarly, minimal levels of service involving methadone medication alone produced fewer abstinent clients for the cost incurred.

In several studies examining the relation between cost efficiency and outcome effectiveness in mental health programs, similar results were found, in that moderate levels of cost efficiency were related to higher outcome measures (11–13). These results suggest a nonmonotonic relation between the level of treatment services and the decrease in drug use. Thus, the minimum service level provides too little treatment, and the maximum service level provides more than is needed, to achieve a similar result.

However, an alternative conclusion could be that the trends seen at 24 weeks would have persisted if the intervention had continued through the 12-month assessment period. Because the enhanced methadone services group achieved the highest rate of abstinence at both 6 and 12 months, it is likely that the members of that group had more drug-free days in a year than the other study subjects. Nevertheless, our study allows us to speak confidently to the long-term effects of a limited enhanced methadone services intervention, since effects are not sufficiently sustained to justify short-term intervention programs.

Furthermore, these data empirically reflect the limited amount of time that heroin addicts in methadone

treatment programs actually spend in contact with the professional support staff. Despite the treatment protocol, which prescribed one to 28 counseling sessions per month, the actual service provision for all three groups was much lower; consequently, the cost of care for support services was relatively small. Perhaps the difference between actual and prescribed service levels reflects resistance by heroin addicts to engaging in psychosocial treatment. Even when individuals were provided the enhanced level of treatment, they received, on average, one 20-minute treatment session per week. To the degree that the support levels for the enhanced methadone services group are likely to represent the highest level of supplementary treatment in methadone maintenance programs, the limited amount of support may explain why the severely addicted population shows limited improvement in these areas.

In this small study, three clinical outliers in the minimum methadone services group were sufficient to raise the aggregate health care expenses in their group. Larger studies should be undertaken to determine whether higher medical care costs persist and represent true cost offsets for more intensive programs.

Furthermore, in this study, a panel of experts were asked to estimate the proportion of staff time allocated for both direct and indirect client contact. Given the importance of efficiency in the containment of costs, time and motion studies might provide more reliable measures of how drug treatment staffs spend their time.

Costs in this study were based on actual service utilization rather than anticipated costs of prescribed treatment. Thus, this method understates the cost of missed appointments. These costs might be considerable if alternative uses for that time cannot easily be found. Even so, if missed appointments occur at a predictable rate, they can be offset by overbooking. Furthermore, as treatment programs increase their contracting with counselors on a fee-for-service basis, the costs of missed appointments are shifted from programs to counselors.

Although treatment interventions from outside the program were not included in the follow-up period, the Treatment Services Review analysis of outside services during the 24-week clinical trial found these interventions to be minimal. There is no evidence to suggest that outside treatment interventions would have been any different during the follow-up months. However, if we had incorporated the out-of-program services, the group most affected would have been the one receiving enhanced methadone services. Consequently, their services would be even less cost-effective.

Finally, we used abstinence as our measure of effectiveness. Other measures—for example, the percent reduction in drug use—might have been more sensitive indicators of program success if they had been available.

Despite these limitations, the results of this study

have important implications for the funding of methadone maintenance programs. Although the study demonstrates that large amounts of support to methadone-maintained clients are not cost-effective, given time-limited interventions, it also demonstrates that moderate amounts are better than minimal amounts. In fact, as funding for these services falls, increasing numbers of opioid-addicted clients will receive minimal support, comparable to the minimum methadone services program examined in this study. Such reductions in funding are false economies. More efficiency can be gained by funding these programs at a level sufficient to sustain the counseling plus methadone level of services.

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