The Effect of Substance Abuse Treatment on Medicaid Expenditures among General Assistance Welfare Clients in Washington State

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Little is currently known about the effect of substance abuse treatment on Medicaid expenses and other health care costs for welfare clients. This study examined the association between substance abuse treatment and reductions in medical care expenditures (primarily Medicaid expenses) for General Assistance (GA) welfare clients in Washington State. The treatment group included 3,235 GA clients who received treatment during 2000 or 2001. The comparison group included 4,863 GA clients who needed substance abuse treatment but did not receive it. Substance abuse treatment was associated with a reduction ($p < .01$) in medical expenses of approximately \$2,500 annually. This estimated savings equaled the cost of treatment and represented approximately 35 percent of the annual Medicaid expenses incurred by GA clients with substance abuse problems.

Keywords: Substance abuse treatment, Medicaid costs, cost savings, cost offset.

THE SUSTAINED INCREASE IN MEDICAID COSTS HAS placed state budgets under significant cost pressure. Indeed, in FY 2002, declining revenue and higher Medicaid costs in forty-three states led to Medicaid budget gaps totaling \$36 billion (Boyd

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2003). It is likely that state finances will remain highly constrained for the foreseeable future, placing significant pressure on Medicaid budgets, as well as on other state budgets for social and health services and education. Because the states must thus aggressively control expenses, demonstrating the economic value of publicly financed programs will become even more important in the future.

Over the last several years, substance abuse and its social and economic consequences have received much attention and continue to be widely viewed as among the nation's most serious public health problems. Survey data suggest that more than 3 million persons in the United States have a serious drug problem (Pope, Ionescu-Pioggia, and Pope 2001; Schroeder 2005). In 2000, alcohol abuse was responsible for an estimated 85,000 deaths, and illicit drug abuse accounted for 17,000 deaths (Mokdad et al. 2004). But these data tell only part of the story of the real consequences of substance abuse because they fail to account for substance abuse's devastation of individuals or communities or for the economic loss associated with substance abuse. The best available national data show that substance abuse resulted in an annual economic loss, measured in 1992 dollars, of \$98 billion for illicit drug abuse and \$148 billion for alcohol abuse, in terms of lost productivity (morbidity), premature death, criminal activity, excess health care utilization, property damage, and related consequences (National Institute on Drug Abuse 1998). In 2005 dollars, these estimates would be \$136 billion and \$206 billion, respectively.

Recent years have brought a growing interest in economically evaluating substance abuse treatment (Cartwright 2000; French et al. 2002; Holder 1998). Researchers want to better understand the economic impact of treatment on criminal activity, health care utilization, employment, and other outcomes. Such studies, often referred to as "cost offset" studies, analyze costs that are avoided as a result of a change in outcome, for example, less utilization of health care or less criminal activity.

Economic evaluations of substance abuse treatment began appearing in the literature as early as the late 1970s and 1980s (Holder 1987; Holder and Blose 1986; Jones and Vischi 1979), and since then, the literature on economic evaluations of substance abuse treatment has grown considerably in size and sophistication. Holder (1998), the Institute of Medicine (1990), Cartwright (2000), and McCollister and French (2003) all have written useful reviews of this literature. As these reviews point out, most of the studies have been naturalistic (observational).

Although because of different methods, study populations, and treatment settings, they have produced mixed findings, most of the evidence indicates a (short-term) positive cost offset (Cartwright 2000; Holder 1998).

Two recent studies, however, produced somewhat different findings regarding the economic impact of substance abuse treatment. In their study of privately insured patients who received alcohol treatment through a large behavioral managed care company, Kane and colleagues (2004) found little meaningful evidence of a cost offset. In contrast, in their study of persons who received outpatient chemical dependency treatment over a two-year period beginning in 1994 through the Sacramento (California) Kaiser Permanente facility, Parthasarathy and colleagues (2001) reported a substantial decline in the use of medical care, especially emergency rooms and inpatient care.

To date, economic evaluations of substance abuse treatment have focused largely on private patients, with welfare recipients a conspicuous absence. A few studies have examined employment outcomes for welfare clients (Kirby and Anderson 2000; Metsch et al. 2003; Wickizer et al. 2000) but have not analyzed their medical costs. Furthermore, current information about the prevalence of substance abuse among welfare recipients is sparse (Metsch and Pollack 2005). In sum, the lack of cost offset studies for welfare clients represents a significant gap in the literature.

Our study evaluated the economic impact of substance abuse treatment on medical expenditures, primarily Medicaid expenses, for General Assistance (GA) welfare clients in Washington State. As a secondary analysis, we examined the changes in expenditures for mental health services and for adult services, which included in-home assisted living services and nursing home care. Our study addressed the following questions:

- What is the occurrence of substance abuse among GA clients as measured by such indicators as having a clinical diagnosis of drug or alcohol dependence or using detoxification services?
- Do GA clients who receive substance abuse treatment have lower medical expenses than do GA clients who need treatment but do not receive it?
- Do GA clients who receive substance abuse treatment have lower expenses for mental health services and other social services than do GA clients who need treatment but do not receive it?

The data analyzed for this study span a four-year period representing Washington State's fiscal years (FY) 1999 through 2002 covering the period from July 1, 1998, through June 30, 2002. This study is part of a larger research project directed at better understanding the effects of substance abuse treatment for GA clients. Future reports will examine the nature and scope of unmet need for substance abuse treatment among GA clients, the effect of treatment on criminal activity, the impact of treatment on employment outcomes, and the effect of treatment on mortality.

Methods

Study Population: General Assistance—Unemployable Clients

General Assistance (GA) programs provide cash and in-kind assistance and are administered entirely by the state or county in which they operate. GA programs are designed to meet the short-term or ongoing needs of low-income persons ineligible for (or awaiting approval for) federally funded cash assistance such as Temporary Assistance for Needy Families (TANF) or Supplemental Security Income (SSI) (Gallagher et al. 1999). National survey data gathered by the Urban Institute indicate that in 1998 thirty-five states had some type of GA program (Gallagher et al. 1999) and that twenty-four of these states, including Washington, had statewide GA programs with uniform eligibility rules.

In Washington, the General Assistance—Unemployable (GA-U) program serves the largest number of clients. The basic eligibility criterion for GA-U is having a physical or mental disability lasting at least ninety days that renders the client unemployable. Under the state's Medical Assistance Administration's Medical Services Program, GA-U clients become eligible for medical benefits, including inpatient and outpatient hospital care, physicians' services, prescription drugs, and nursing home care. The average monthly cash grant in FY 2001 was \$305, and the monthly GA-U caseload in FY 2001 was approximately 12,000 persons. The majority of GA-U clients receive support for only a limited time, because they transfer from GA-U to other GA programs that serve clients with more severe, long-term disabilities. Approximately 75 percent of the clients who initially became eligible for GA-U during the study

interval received support for one year or less. Sixty percent of GA-U clients transferred to a GA program known as General Assistance—Expedited Medical Disability (GA-X), which supports clients with more serious disabilities who have pending applications for SSI.

Data and Study Groups

The data for our study came from several sources, principally the Research and Data Analysis (RDA) Division of the Washington State Department of Social and Health Services. RDA constructed the data set used for this analysis as part of an earlier project designed to evaluate the economic impact of mental health services offered to GA-U clients. Those agencies that provided data for this project were the Medical Assistance Administration (MAA), the Division of Mental Health, the Division of Adult Services, the Division of Alcohol and Substance Abuse (DASA), Economic and Administrative Services, and the Department of Employment Security. The RDA data set contained 57,363 records representing all persons in Washington who were supported for at least one month by GA-U during FYs 1999 through 2002 (July 1, 1998, through June 30, 2002) and also representing several variables, including length of time on GA-U (and other GA programs), health care expenditures, risk adjustment variables, detailed substance abuse treatment data, demographic information, and employment data.

To be included in the treatment group, clients had to be supported by GA-U for at least one month during 1999 or 2000, which reduced the number of eligible cases from 57,363 to 32,946 (some clients did not become eligible for GA-U until 2001 or 2002). Also, the client had to have entered substance abuse treatment during FY 2000 or 2001—with FY 1999 designated as the pretreatment baseline year—and to have completed treatment by the end of FY 2001 unless he or she was receiving methadone maintenance. These criteria resulted in the following treatment cohorts: (1) inpatient treatment with or without outpatient follow-up treatment ($n = 1,409$), (2) outpatient treatment only ($n = 1,473$), and (3) methadone maintenance treatment ($n = 353$).

Clients often receive several separate treatments either as part of a planned continuum (inpatient treatment followed by outpatient treatment) or because they leave treatment early and then return. We defined treatment in terms of episodes of care. If the treatments were given

within thirty days, they were considered part of the same episode. We defined the first treatment episode after the beginning of FY 2000 (July 1, 1999) as the index episode and assigned the client to the corresponding treatment cohort.

We relied on three indicators of substance abuse to create a comparison group for our analysis: the client (1) had a clinical diagnosis of (a) drug or alcohol dependence or (b) drug or alcohol psychosis, (2) received detoxification services (but no further treatment), or (3) was referred for a DASA drug/alcohol assessment. Clients who were on GA-U for at least one month during FY 1999 or 2000, who received no substance abuse treatment during the four-year observation period, and who had one of the preceding three indicators were eligible for inclusion in the comparison group. The 4,836 clients who fulfilled these criteria were assigned to the comparison group.

Measures

The primary dependent variable we analyzed for this study was a measure representing FY 2002's medical expenditures, which consisted of 75 percent Medicaid expenses and 25 percent other state-supported medical expenses. Although GA-U clients do not qualify for Medicaid, GA-X clients do. Approximately 35 percent of the clients on GA-U in our study population ($n = 8,098$) initially became eligible for GA-X and hence eligible for Medicaid. Since our purpose was to capture all the medical expenses incurred by persons receiving GA-U at some time during 1999 or 2000, we did not distinguish among the different public assistance programs when constructing our expenditure measures.

For the outcome (FY 2002) and baseline (FY 1999) years, we summed the expenditures on the medical care services for which GA clients were eligible, including inpatient and outpatient hospital services, physician services, and prescription drugs. We then divided this summed figure by the total number of months of eligibility for different public assistance programs to create a per-member-per-month expense measure. We adjusted this expenditure measure using the Consumer Price Index (CPI) to reflect (July) 2005 prices and repeated this same procedure for mental health and adult services expenditures.

The data set contained a number of variables that we used as covariates in our multivariate analysis. We included three demographic measures representing gender, race (white versus nonwhite), and age

as of FY 2000. Two risk adjustment variables, based on FY 1999 and constructed so as to represent the working-age disabled state Medicaid population, also were part of the analysis. The first variable was a diagnosis-based risk adjustment measure created by Kronick and colleagues (2000), and the second was a pharmacy-based risk adjustment measure created by Gilmer and colleagues (2001). To control for differences in mental health status, we included a binary variable set equal to one if a client had a clinical diagnosis of depression, psychosis, or mania-bipolar (based on claims data) at any time between 1999 and 2002, and zero otherwise. We also included in our statistical model a measure of the relevant expenditure in the baseline period (medical, mental health, or adult services expenditures) to control for differences in pretreatment utilization. Finally, we computed a measure of average annual earnings between 1995 and 1999, which we used as a proxy measure to partially control for differences in the client's pretreatment health status and well-being.

Statistical Techniques

To evaluate the effects of substance abuse treatment on health expenditures, we used bivariate techniques to examine differences in the treatment group's and comparison group's baseline characteristics and multiple linear regression to examine the effect of treatment on medical expenditures. Our medical expenditure measure exhibited the typical pattern of upward skewness, with a sizable portion (approximately 35 percent) of the observations having zero because no expenditures were incurred in the outcome (2002) year. The assumption of normality, given a sufficient number of cases (>500), is not required to generate valid parameter estimates (Diehr et al. 1999; Lumley et al. 2002) as long as the equal-variance (homoscedasticity) assumption is met. Given the sample size ($>6,000$) and results from the Breusch-Pagan (1980) specification test indicating that our model met the assumption of equal variance, we estimated the linear regression models using the full sample of cases. We weighted the data (by the square root of the number of months of eligibility in 2002) following Ellis and Ash (1996) so that those cases having more months of GA eligibility in the outcome year were weighted somewhat more heavily.

We tested the robustness of our results by estimating other models, including a two-part (semilog) regression model (Duan 1983) and a

difference-in-differences model. For the analysis of mental health expenditures and adult services expenditures, we estimated a standard two-part model, first examining the association between treatment and any use of mental health services or adult services and then examining the relationship of the users' treatment to expenditures on these services. We used the two-part model because only 6 percent of the study population used inpatient mental health services and 4 percent used adult services.

Results

Occurrence of Substance Abuse and Client Characteristics

As a beginning analysis, we examined the occurrence of substance abuse among the 32,946 clients who received a cash grant through GA-U for at least one month during 1999 or 2000. For this analysis, we used the three substance abuse indicators just described: (1) having a clinical diagnosis of alcohol or drug dependence or alcohol or drug psychosis, (2) receiving detoxification services (but no further treatment), or (3) being referred for a DASA drug/alcohol assessment. For each of the four study years (1999 through 2002), we determined the proportion of clients with each of the preceding indicators. We then averaged these values across the four years to derive "prevalence" figures representing annualized estimates of the occurrence of substance abuse. On average, 9.7 percent of the 32,946 GA-U clients had a clinical diagnosis of drug or alcohol dependence; 8.7 percent were referred for a drug or alcohol assessment; and 3.3 percent received detoxification services. The three indicators combined accounted for 15.6 percent of the GA-U study population (the indicators were not mutually exclusive).

Table 1 provides information about the clients' characteristics, comparing the overall treatment group consisting of the three individual treatment cohorts ($n = 3,235$), the comparison group ($n = 4,863$), and a third group consisting of other all other GA-U clients ($n = 24,848$) who were not in treatment and whose client record did not show evidence of a substance abuse problem based on the indicators described earlier. Compared with other GA-U clients, the clients in the two substance abuse study groups (treatment and comparison groups) had a greater proportion of males ($p < .001$) and a greater proportion of clients with a

TABLE 1
Profile of GA-U Client Study Groups

Measure	Substance Abuse Treatment Group ^a (<i>n</i> = 3,235)	Untreated Clients (Comparison Group) (<i>n</i> = 4,863)	Other GA-U Clients (<i>n</i> = 24,848)	<i>p</i> -Value
Percent male	62.5%	67.7%	55.9%	<.001
Percent nonwhite	25.5%	24.5%	23.9%	.12
Mean age	38.4 (8.9) ^b	40.4 (10.0)	42.0 (11.6)	<.01
Proportion of clients in 12-month period with a mental health diagnosis (compared between 1999 and 2002)				
Recurrent depression	11.5%	8.9%	6.0%	<.001
Psychosis	3.0%	3.4%	1.5%	<.001
Mania-bipolar	4.9%	3.9%	2.0%	<.001
Diagnosis-based risk score (1999)	0.65 (0.71)	0.79 (1.00)	0.63 (0.79)	<.001
Pharmacy-based risk score (1999)	0.61 (0.62)	0.68 (0.76)	0.60 (0.63)	<.01
Annual mean wage, 1995–1999 ^c	\$4,076 (\$8,309)	\$3,886 (\$8,181)	\$4,612 (\$12,130)	<.001
Percent clients with no earnings, 1995–1999	38%	42%	41%	<.01
Mean medical expenses per member per month, 1999	\$320	\$572	\$347	<.01

Notes: ^aTreatment group includes clients who received inpatient treatment (*n* = 1,409), outpatient treatment only (*n* = 1,473), and methadone maintenance (*n* = 353).

^bStandard deviation shown in parentheses.

^cMean wages are based on all clients, including those with no wages.

mental health diagnosis of depression, psychosis, or mania-bipolar ($p < .001$). The most commonly diagnosed condition was depression, which accounted for 11.5 percent of the treatment-group clients, 8.9 percent of the comparison-group clients, and 6.0 percent of other GA-U clients. The average annual wage of clients in the five-year period preceding their becoming eligible for GA-U varied from \$3,886 (comparison-group clients) to \$4,612 (other GA-U clients). These wage figures are based upon all cases in the respective group. Approximately 40 percent of the GA-U clients had no reported earnings in the five years before becoming eligible for GA-U. Finally, as shown, the three groups' baseline (1999) medical expenses per member per month differed. The comparison-group clients had the highest expenses (\$572), and treatment-group clients had the lowest expenses (\$320).

Table 2 lists some of the characteristics of the 3,235 GA-U clients who received substance abuse treatment. Almost half (46.5 percent) of the clients reported using alcohol as their primary substance of abuse, 19.4 percent heroin or other opiates, 11.9 percent cocaine, and 10.4 percent methamphetamines. More than 60 percent of the treatment group reported using drugs or alcohol daily or several times per week. Almost 60 percent of the treatment group had a high school degree, with an additional 13 percent having some post-high school training or education. Thirty percent of the clients were on probation when they began their treatment, and almost 90 percent of the clients were single, divorced, or separated when they began treatment.

Expenditures and Treatment Patterns

Table 3 outlines the FY 2002 expenditures for medical care, mental health services, and adult services (assisted living services and nursing home care) for the three client treatment groups and the comparison group. The expenditures per member per month for medical care ranged from \$398 for outpatient clients to \$607 for clients on methadone maintenance. The cost of mental health services was substantially lower, from \$70 per member per month for methadone maintenance clients to \$199 per member per month for inpatient clients, and the cost of adult services was even lower, from \$19 per member per month to \$56 per member per month.

The figures shown in table 3 reflect many cases with zero costs. Only 4 percent of the cases had positive expenses for adult services, whereas

TABLE 2
Some Characteristics of GA-U Clients Who Received Substance Abuse
Treatment ($n = 3,235$)

Measure	Percent
Primary substance of abuse	
Alcohol	46.5
Heroin or other opiates	19.4
Cocaine	11.9
Methamphetamine	10.4
Other drugs	11.8
Frequency of use	
Low (0 to 3 times last 30 days)	28.3
Moderate (weekly)	9.9
High (daily or several times per week)	61.8
Needle use (among drug abusers only)	62.1
Education	
No high school degree	27.6
High school degree	59.3
Post-high school degree or training	13.1
On probation	30.4
Marital status	
Never married	43.3
Married	7.1
Divorced/separated	45.8
Other	3.8
Living arrangement	
Alone	42.5
With roommates	11.0
With spouse or partner	15.5
With parents or other family members	19.1
Other	11.9

Note: Includes 1,409 clients who received some inpatient treatment, 1,473 clients who received outpatient treatment only, and 353 clients who received methadone maintenance.

28 percent had positive expenses for any mental health service. Limiting the cases to clients with positive medical expenditures in 2002 would increase the medical expenditure per member per month figures for the inpatient, outpatient, and methadone maintenance treatment groups and the comparison group, respectively, to \$623, \$602, \$714, and \$942 ($p < .001$). Similarly, limiting cases to clients who used mental health

TABLE 3
Average Expenditures per Member per Month on Medical Care and Related Services, FY 2002

Health Service	Inpatient Treatment (<i>n</i> = 1,409)	Outpatient Treatment (<i>n</i> = 1,473)	Methadone Maintenance (<i>n</i> = 353)	Comparison Group (<i>n</i> = 4,863)	<i>p</i> -Value
Medical care services	\$432 (\$987) ^a	\$398 (\$1,212)	\$607 (\$1,469)	\$540 (\$1,891)	.002
Adult services, including nursing home services	\$23 (\$329)	\$21 (\$200)	\$19 (\$110)	\$56 (\$347)	<.001
Mental health services ^b	\$199 (\$960)	\$141 (\$754)	\$70 (\$219)	\$135 (\$748)	.006

Notes: ^aStandard deviation in parentheses.
^bIncludes community-based residential and outpatient care and state inpatient institutional care.

TABLE 4
Distribution of Treatment-Group Cases by Year of Admission and Completion

Year of Admission	Year of Treatment Completion			Total
	2000	2001	2002 or Later	
Inpatient (<i>n</i> = 1,409)				
2000	804 (79%)	209 (21%)	0	1,013
2001	—	396 (100%)		396
Outpatient (<i>n</i> = 1,473)				
2000	787 (73%)	297 (27%)	0	1,084
2001	—	389 (100%)	0	389
Methadone maintenance (<i>n</i> = 353)				
2000	89 (37%)	81 (33%)	72 (30%)	242
2001	—	48 (43%)	63 (57%)	111
Total	1,680 (52%)	1,420 (44%)	135 (4%)	3,235

services would increase the mental health expenditures for the four groups, respectively, to \$598, \$423, \$224, and \$484 ($p < .05$).

Table 4 shows the distribution of treatment-group clients according to the year that their treatment began and ended, with the majority of inpatient and outpatient clients both starting and ending treatment in 2000. Of those clients in both groups that started in 2000, more than 70 percent ended treatment the same year. But not all these clients actually completed the full regimen of recommended treatment. Although not shown in table 4, approximately 47 percent of inpatient and outpatient treatment clients completed the recommended course of treatment. Of the 242 methadone maintenance clients that started in 2000, 37 percent (89) ended treatment that same year; 33 percent (81) ended it the next year; and 30 percent (72) ended it in 2002 or later. Of the 111 methadone maintenance clients that started treatment in 2001, 43 percent (48) ended treatment that same year, and 57 percent (63) ended it in 2002 or later.

Substance Abuse Treatment in Relation to Medical Expenditures

Table 5 shows the results of our multivariate analysis examining the relationship between the substance abuse treatment received by clients

TABLE 5
Regression Estimates of Relationship between Client and Treatment Factors and Medical Care Expenditures per Member per Month, FY 2002

Measure	Inpatient (<i>n</i> = 6,272)		Outpatient (<i>n</i> = 6,336)		Methadone Maintenance (<i>n</i> = 5,216)	
	B (S.E.) ^a	(95% C.I.) ^b	B (S.E.)	(95% C.I.)	B (S.E.)	(95% C.I.)
Constant	-173.2 (150.8)	(-468.8 - 122.5)	-207.6 (151.3)	(-504.2 - 88.9)	-233.6 (178.9)	(-584.5 - 117.3)
Age	11.4** (2.5)	(6.6 - 16.3)	12.4** (2.5)	(7.6 - 17.2)	11.6** (2.9)	(5.9 - 17.3)
Gender (female)	-39.6 (49.1)	(-135.8 - 56.7)	-1.1 (48.9)	(-97.0 - 94.9)	-2.7 (57.9)	(-116.3 - 110.9)
Race (nonwhite)	155.8** (54.9)	(48.1 - 263.3)	112.8* (54.3)	(6.4 - 219.3)	162.5* (64.8)	(35.5 - 289.5)
Baseline (diagnosis-based) risk score	149.2** (35.3)	(80.0 - 218.4)	160.8** (35.1)	(92.0 - 229.6)	134.5** (39.3)	(57.3 - 211.7)
Baseline (pharmacy-based) risk score	110.4** (41.6)	(28.9 - 191.9)	110.8** (41.1)	(30.2 - 191.3)	131.3** (46.5)	(40.1 - 222.5)
Mental health diagnosis	243.5** (50.5)	(144.4 - 342.5)	228.4** (50.5)	(129.4 - 327.4)	219.4** (59.4)	(102.9 - 335.8)
Had reported earnings 1995 - 1999	-16.1 (47.5)	(-109.2 - 77.1)	-36.6 (47.7)	(-130.1 - 56.9)	-25.0 (55.9)	(-134.7 - 84.6)
Baseline (1999) medical care expenditures per member per month	0.46** (0.14)	(0.18 - .75)	0.04** (0.01)	(0.01 - 0.06)	0.05** (0.02)	(0.02 - 0.08)
Treatment	-173.9** (55.0)	(-281.7 - -66.0)	-215.6** (54.4)	(-322.3 - -106.9)	-230.5* (97.2)	(-420.9 - -39.7)

Notes: ^aStandard error.
^b95% confidence interval.
* *p* < .05 (two-tailed test).
** *p* < .01 (two-tailed test).

in 2000 and 2001 and the medical care expenditures per member per month in 2002. Note that the number of cases shown in table 5 for each equation represents the combined cases for the comparison group (4,863) and the given treatment cohort.

Some of the clients' characteristics were found to be associated with medical expenditures (see table 5). The estimated coefficients for these factors were fairly stable across the three equations. For illustrative purposes, we will concentrate on the inpatient equation. In 2002, age was strongly ($p < .001$) and positively related to medical expenditures. The estimated coefficient (11.4) implies that for each year of age, the cost per member per month rose, on average, by approximately \$11.50. In addition, the cost per member per month for nonwhite clients was, on average, \$156 more than for white clients. Both baseline risk score measures were strongly ($p < .001$) and positively related to expenditures, as were baseline (1999) medical expenditures. On average, those clients who had a diagnosis of one of three mental health conditions (depression, mania-bipolar, or psychosis) had substantially higher expenditures (\$243 per member per month) than did those clients without one of these diagnoses ($p < .001$).

Even after controlling for the characteristics shown in table 5, substance abuse treatment was found to have a meaningful and statistically significant association with lower medical care expenditures. The estimated coefficient shown in table 5 for the inpatient equation implies that the cost for those clients who received inpatient substance abuse treatment was, on average, \$174 less per member per month ($p < .001$) than that for clients who needed treatment but did not receive it, or \$2,088 less each year. The estimated coefficients for outpatient treatment and methadone maintenance also were statistically significant ($p < .01$) and somewhat larger in magnitude. The proportion of variance explained (R^2) by the models shown in table 5 was in the range of 3 to 13 percent. Although low, these R^2 values are generally consistent with analyses of cross-sectional, person-level expenditure data (Newhouse et al. 1989).

We conducted additional analyses to test the robustness of these findings. First, we reestimated the models using ordinary least squares (OLS) regression but restricting the cases to clients who had at least three months of GA eligibility. This analysis yielded estimated treatment coefficients for medical care expenditures that were modestly larger (in absolute value) than the coefficients presented in table 5. For example,

the estimated inpatient treatment coefficient for medical care expenditures changed from -174 to -211 , while the outpatient treatment coefficient changed from -215 to -253 . Second, we estimated two-part semilog regression models. These models also yielded results consistent with the estimates shown in table 5. For example, for clients with some positive medical expenses, the semilog model suggested that outpatient treatment was associated with a 20 percent decrease ($p < .01$) in medical expenses, or roughly \$190 per member per month. Third, we recoded the dependent variable to reflect a change in medical expenditures (between FY 2002 and FY 2000) at the individual client level and then estimated a difference-in-differences model. This model in effect compared the change in expenditures for the treatment-group clients with those for the comparison-group clients, controlling for the covariates described earlier. The estimated difference in cost for the three treatment modalities combined ($\beta = -127$, $p = .02$), though less than the estimated treatment coefficients reported in table 5, was well within the confidence intervals of these estimates.

Secondary Analysis: Effects of Treatment on Mental Health Expenditures and Adult Services Expenditures

As part of our study, we examined the effect of substance abuse treatment on FY 2002 expenditures for mental health services and adult services. We tested a two-part model, first using logistic regression to analyze the relationship between treatment and the likelihood of having any positive expenditures for (1) inpatient mental health services, (2) outpatient mental health services, and (3) adult services. We then used linear regression to assess the association of treatment with the cost for clients with some positive expenditures. We used the same covariates in the models as described earlier. We also created a log transformation of the dependent expenditure measure and estimated semilog regression models. Since there was little meaningful difference in the results, we reported the results from the untransformed model. As discussed earlier, a relatively small percentage of clients used these services. To increase the statistical power of the analysis, we combined the three treatment modalities and tested a single model.

The analysis generated mixed results. Although we found no relationship between the treatment and the use of inpatient mental health

services (odds ratio [OR] = .95), the treatment-group clients who used inpatient mental health services cost, on average, \$709 less per member per month than did the comparison-group clients ($p < .01$). The treatment-group clients were more likely than the comparison-group clients to use outpatient mental health services (OR = 1.25, $p < .01$), and the average expense for treatment-group clients who used these services also was higher ($\beta = \$103$, $p = .01$). In contrast, the treatment-group clients were less likely to use adult services (OR = 0.46, $p < .01$), but those clients who did use these services did not have significantly different expenditures.

Discussion

Because the continued growth in Medicaid costs is placing state (and federal) government budgets under intense cost pressure, we tried to improve our understanding of the impact on Medicaid and other health-related costs of publicly funded substance abuse treatment provided to General Assistance (GA) welfare clients in Washington State.

Our study found evidence of a significant medical care cost offset associated with substance abuse treatment. The cost of medical care for those clients who received inpatient treatment was, on average, approximately \$170 less per member per month than for those clients in the comparison group who needed treatment but did not receive it. The costs for clients who received outpatient treatment or methadone maintenance were, respectively, \$215 and \$230 lower. The (weighted) average cost reduction across the three treatment modalities was approximately \$210 per member per month, or \$2,520 annually.

Estimated Cost Savings in Relation to Medical Care Costs and Treatment Costs

How do our estimated cost savings compare with expected medical care costs? The average (untreated) GA client had medical care expenses in 2002 of \$540 per member per month (table 3) or \$6,480 annually. The estimated cost saving associated with substance abuse treatment represents approximately 35 percent of that expected cost. But this calculation neglects the countervailing effects of treatment on mental health and adult services expenditures (negative effect for inpatient mental health

expenses and positive effect for outpatient mental health expenses). Our data could not determine, however, whether, or the extent to which, the estimated medical cost savings would continue beyond the first year after treatment. It is reasonable to assume, though, that some future savings would continue beyond the initial year.

The estimated medical care savings reported here can also be compared with the cost of the treatment itself. In Washington, the average cost of substance abuse treatment for public clients is approximately \$2,300 per episode. The estimated one-year medical cost offset was \$2,500, implying that the substance abuse treatment “paid for itself” within the year after treatment. As we reported (table 2), GA clients in the treatment group included those with alcohol abuse/dependence problems (46.5 percent), opiate dependence problems (19.4 percent), cocaine abuse (11.9 percent), and methamphetamine abuse (10.4 percent). Left untreated, such clients are likely to develop health problems that may require expensive medical care. The average annual medical cost for comparison-group clients in our study who used medical care was \$11,088.

Our findings are consistent with those of prior studies. Studies of the cost offset associated with alcohol treatment in different treatment settings for different patient populations have consistently shown a measurable offset effect (Holder 1998; Parthasarathy et al. 2001). Although less completely investigated, drug abuse treatment has also shown evidence of a positive cost benefit (Cartwright 2000; Holder 1998; McCollister and French 2003). A recently concluded California study (Ettner et al. 2006), as well, reported positive medical care savings associated with substance abuse treatment.

To our knowledge this study is the most detailed assessment conducted to date of the economic impact of substance abuse treatment on medical care costs for a GA welfare population. Nonetheless, the study has important limitations. Our primary concern here is the observational nature of the data analyzed. The treatment group and comparison group differed in a number of observed characteristics (table 1) and certainly may have differed in unobserved characteristics as well. That these unobserved characteristics influenced the treatment outcomes reflects an unknown degree of bias in our results. Readers therefore should exercise appropriate caution in interpreting the results of this study. Our findings are derived from the treatment system in a single state, and their generalizability is unclear. They reflect the effect of many different individual treatment programs. For practical reasons, we were able to

analyze the data only for broad treatment categories (inpatient, outpatient, and methadone maintenance). Individual treatment programs with proven effectiveness thus may yield larger cost offsets than what we observed. Finally, our study had only one year available for the follow-up. Future studies should use a longer follow-up time to obtain a clearer picture of the durability of treatment effects.

We were able, however, to control for a number of factors, including differences in baseline medical care expenditures, demographic factors, mental health status, and, perhaps most important, differences in health risk. Unlike many other studies, as noted by Kane and colleagues (2004) and Holder (1998), our study incorporated a comparison group consisting of clients for whom need indicators strongly suggested the existence of substance abuse or drug dependence. Our study population also was large, representing more than 8,000 GA welfare clients, including more than 3,000 clients who were treated for substance abuse. Finally, our results were robust to different model specifications (two-part models and difference-in-differences models).

Substance abuse remains an important public health problem. In the face of cost pressures, states may be tempted to reduce either their funding for treatment or access to treatment by imposing restrictive eligibility criteria in order to control costs. Welfare clients are especially vulnerable to these forces. Our study's findings suggest this policy decision may be counterproductive insofar as substance abuse treatment saves Medicaid costs. Furthermore, as Sindelar and colleagues (2004) noted, substance abuse treatment has multiple outcomes, only one of which we reported here. Elsewhere we reported our findings concerning the association between substance abuse treatment and reduction in criminal activity (Wickizer et al. 2006a) and favorable changes in employment (Wickizer et al. 2006b) for GA-U clients.

For several years, Washington State has invested substantial resources in building a data infrastructure that has allowed evaluations and policy studies to be performed (French et al. 2000; Luchansky et al. 2000; Maynard et al. 2000, 2004; McKay et al. 2002; Wickizer et al. 1994, 2000). These studies have helped inform the policy process in the state legislature and have enabled the treatment system to compete effectively for resources and substantially expand access to substance abuse treatment services. What the larger substance abuse treatment system needs is a greater capacity to conduct rigorous evaluations and sound policy research studies that will lead to better evidence-based programs and policy decision making.

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