

Improving Publicly Funded Substance Abuse Treatment: The Value of Case Management

ABSTRACT

Objectives. This study evaluated the impact of case management on client retention in treatment and short-term relapse for clients in the publicly funded substance abuse treatment system.

Methods. A retrospective cohort design was used to study clients discharged from the following four modalities in 1993 and 1994: short-term residential (3112 clients), long-term residential (2888 clients), outpatient (7431 clients), and residential detox (7776 clients). Logistic regression models were used to analyze the impact of case management after controlling for baseline characteristics.

Results. The odds that case-managed clients reached a length of stay previously identified as associated with more successful treatment were 1.6 (outpatient programs) to 3.6 (short-term residential programs) times higher than the odds for non-case-managed clients. With the exception of outpatient clients, the odds of case-managed clients' being admitted to detox within 90 days after discharge (suggesting relapse) were about two thirds those of non-case-managed clients. The odds of case-managed detox clients' transitioning to post-detox treatment (a good outcome) were 1.7 times higher than the odds for non-case-managed clients.

Conclusions. Case management is a low-cost enhancement that improves short-term outcomes of substance abuse treatment programs. (*Am J Public Health.* 1997;87:1659-1664)

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Introduction

Case management is viewed by many as an important service enhancement for persons in treatment for substance abuse, particularly for low-income clients in the publicly funded treatment system. Though there is some tentative support for the effectiveness of case management in this environment,¹ relatively little hard research underlies the level of policy and programmatic enthusiasm for case management. In this paper, we evaluate the effect of adding 66 case managers to publicly funded substance abuse treatment programs in the city of Boston. Using data from over 20 000 clients across a range of modalities, we analyzed the following question: Was case management effective in keeping clients in treatment and reducing short-term relapse?

The Boston Office for Treatment Improvement, established in the fall of 1990, was one of the original eight national target cities demonstration projects funded by the Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration, to design and implement enhancements to the substance abuse treatment system. The key enhancement characterizing the program in Boston was the establishment of a program-based model of case management. By a program-based model, we mean one in which case managers were hired and supervised directly by the treatment programs and were integrated with existing treatment staff. However, citywide case management protocols were developed, and activities were coordinated and monitored across the city.

A program-based model of case management was proposed by treatment

providers because they believed that the time being spent by clinical staff in meeting ancillary client needs was significantly detracting from available therapeutic time. Further, the resource identification, advocacy, monitoring, and linkage functions provided by case managers were thought to be of value in and of themselves, in addition to freeing clinical time for increased treatment.

Methods

Sample

The publicly funded treatment programs participating in the project consisted of 3 short-term (less than 30 days) residential programs, 19 long-term residential programs, 19 outpatient programs, 4 residential detox programs, 3 acupuncture detox programs, and 5 methadone programs. The sample for this study included clients discharged between January 1993 and December 1994 from the short-term residential programs, long-term residential programs, outpatient programs, and residential detox programs. To avoid problems with correlated observations, we included only the last discharge of a client from each treatment modality, resulting in the following sample sizes (the number in parentheses is the percent-

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age of clients in the sample relative to the total number of discharges from the modality over the 2-year period): short-term programs, 3112 (81% of total discharges); long-term programs, 2888 (87% of total discharges); outpatient programs, 7431 (87% of total discharges); and residential detox programs, 7776 (53% of total discharges, a lower percentage than for the other modalities because of the much higher rates of readmission to detox).

Information on Clients

The project's management information system used the admission and discharge forms from the Massachusetts Bureau of Substance Abuse Services management information system as its core.² The admission form collects standard sociodemographic information, employment information, information on living situation, public assistance and health insurance status, treatment service history, and patterns of substance abuse. Relevant variables from the discharge form were discharge date and whether the client completed the program. Submission of the admission form is necessary for state reimbursement, with the result that most admissions are recorded. Discharge data are less reliably submitted, particularly for clients in outpatient treatment. For short-term residential programs and detox programs, over 97% of admissions had discharge forms. For long-term residential programs, over 88% of admissions had discharge forms. However, for outpatient programs, only 65% of admissions had completed discharge forms. Both forms have an encrypted client code that allows linkage of admission and discharge records over time. To track out-of-Boston admissions, we merged our data with data from the state Bureau of Substance Abuse Services management information system, which uses the same encrypted client identification number as used in the Boston Office of Treatment Improvement management information system.

The specific variables from the admission form that we used as potential covariates in multivariate models were the following: gender; race/ethnicity (White, Black, Hispanic, Asian, other); age; employment (coded yes/no); income (coded as under or over \$1000 per year); education (college graduate, high school graduate only, not high school graduate); residence (shelter/street, institution/boarded house, private residence); living situation (living with child, living with other adult but no child, living alone); insurance

(no insurance, Medicaid, private, other); prior mental health treatment (coded as yes/no); primary drug (alcohol, cocaine, crack, heroin, or marijuana); and substance abuse treatment history (prior detox, prior residential, prior outpatient, prior methadone, prior drunk driving, prior other—all coded as yes/no based on any past use of these programs).

We created two additional variables for each client from the admission data: number of admissions to each modality in the year preceding each index admission (determined from the management information system by linking admission records on the same client and coded as 0, 1, or 2 or more) and drug severity. As described by Shwartz et al.,³ the drug severity score was developed by assigning points to responses to the following three questions on the admission form: age at first use, time of last use, and frequency of last use. The score was calculated by summing up the points assigned to responses for each major drug used (alcohol, cocaine, crack, heroin, and marijuana). It should be noted that the drug severity score was used only as a measure of relative drug severity of clients in the Boston system, and its external validity has not been analyzed.

Outcome Measures

Though we would have liked to include measures of long-term impact of treatment on multiple dimensions of clients' lives, such data are extremely difficult and expensive to obtain, particularly for our client population, and are outside the scope of this study. For each client discharge, we used three intermediate measures related to treatment success: (1) staying in treatment long enough to reach a "long length of stay" category, a measure discussed in the next paragraph; (2) transitioning to another treatment modality within 30 days of discharge, which was viewed as a successful outcome for those in detox, probably a successful outcome for those in short-term residential programs (often an intermediate modality in a treatment trajectory), and not a successful outcome for those in long-term and outpatient programs, modalities nearer the end of the continuum of care; and (3) being admitted to detox within 90 days of discharge, which suggests relapse.

In an earlier study, we used the relationship between length of stay in treatment and program completion status to develop length-of-stay categories for each treatment modality such that clients

in the long-stay category had high and relatively constant program completion rates.³ The long-stay categories were defined as follows: short-term residential, 26 or more days; long-term residential, 120 or more days; outpatient programs, 140 or more days; detox programs, 6 or more days. Clients who stayed for these lengths of time had completion rates of over 90% in short-term programs, around 80% in long-term programs, 30% in outpatient programs (which was high only in relation to shorter-stay patients, whose completion rate was around 5%), and around 85% in detox programs. Once the cutoff time had been reached, staying longer in the modality bought little in terms of increased likelihood of completion. Also, future utilization patterns of clients in the long-stay category were consistent with more successful treatment. For example, clients in the long-stay category were much less likely to be readmitted to detox in the 2 years following discharge from the program and, with the exception of detox, much less likely to be readmitted for further treatment over the subsequent 2 years. Detox clients in the long-stay category were more likely to be admitted to post-detox treatment, consistent with the role of detox as a stepping stone into treatment.

Statistical Analysis

Chi-square tests were used to analyze the statistical significance of the relationship between individual variables from the admission form and the likelihood of case management, as well as the relationship between case management and each of the outcome variables: reaching the long-stay category, transitioning to another treatment within 30 days following discharge, and being admitted to detox within 90 days following discharge.

Logistic regression models were used to analyze the association of case management with the outcome variables after adjusting for differences in baseline characteristics. Three separate models were run for each modality, one for each of the three outcome variables. Independent variables were those from the admission form listed above, a dummy variable for case management status, and dummy variables for each program. Program dummy variables were included as potential covariates to correct for the possibility that programs providing case management to a larger number of clients may have had more favorable outcomes for all

clients. Stepwise regression was used to build the models. Case management status was forced into the model and other variables significant at the .05 level stepped in. We report the odds ratios and 95% confidence intervals for the case management variable.

In addition to considering the distinction between case management and no case management, we also examined level of case management, using two measures: (1) the total amount of case management time spent per client (time spent on various client activities was recorded in case management logs) and (2) time per client divided by length of stay in treatment. The second measure adjusts for the fact that a case-managed client who stays in treatment longer is likely to receive more total case management time. For each measure, the group of case-managed clients in each modality was divided into approximate thirds, representing low, medium, and high intensity. We then examined the relationship between the level of case management intensity and our three outcome measures.

We also performed the analyses after eliminating all cases in which case management did not begin by the midpoint of the short-length-of-stay category in each modality (7 days for short-term programs, 60 days for long-term programs, 35 days for outpatient programs, and 2 days for detox programs). Our intent in this analysis was to eliminate a potential bias: If case managers are assigned later in a client's stay to those clients who, because of need, were not discharged early, there will be a correlation between case management and length of stay that is not causal; that is, clients are not staying longer because of case management but receive case management because they are still in treatment. However, early-assignment clients were not used as the sample for the main analyses because of the following competing hypothesis about the significance of later assignment: These were clients for whom treatment was not progressing satisfactorily, and, in the absence of the late assignment of a case manager, they would have dropped out of treatment prematurely. Under this hypothesis, case management had an impact, despite its initiation later in the course of treatment.

Results

Table 1 shows selected characteristics of the client population, by modality and by case management status. Overall,

TABLE 1—Characteristics of Clients Discharged from Publicly Funded Substance Abuse Treatment Programs between January 1993 and December 1994, by Treatment Modality and Case Management (CM) Status

	Short-Term Residential (n = 3112)		Long-Term Residential (n = 2888)		Outpatient (n = 7431)		Detox (n = 7776)	
	CM	No CM	CM	No CM	CM	No CM	CM	No CM
CM status, %	45	55	68	32	10	90	16	84
Female, %	48	33*	14	14	35	27*	38	28*
Race/ethnicity, %								
White	49	46	57	67*	62	45*	30	43*
Black	44	46	30	26*	22	41*	59	43*
Hispanic	6	8*	12	6*	16	13*	10	12
Unemployed, %	60	63*	62	58*	54	55	91	88*
Not high school graduate, %	42	42	43	38*	38	44*	43	44
Living in shelter or on the streets, %	20	24*	20	19	7	6	30	30
In institution, %	6	7	9	13*	14	10*	3	4
Living with child, %	16	12*	14	10*	20	17*	10	9
No insurance, %	69	69	74	74	50	58*	66	63
With Medicaid, %	21	21	12	12	29	21*	27	29
With prior mental health treatment, %	16	16	13	18*	31	18*	11	14*
Primary drug, %								
Alcohol	34	35	40	46*	53	45*	34	42*
Cocaine	18	21*	20	24*	20	19	17	14*
Crack	28	21*	15	8*	6	7	27	16*
Heroin	18	21*	20	19	13	14	21	27*
Utilization in last year, %								
Detox 1 ^a	14	17*	12	16*	10	8	14	14
Detox 2+ ^b	12	15*	12	16*	6	6	7	8
Short-term 1 ^a	4	4	7	7	4	4	23	16*
Long-term 1 ^a	32	28*	7	10*	8	9	20	14*
Outpatient 1 ^a	23	17*	21	14*	11	11	17	13*
Average drug severity score ^c	31.5	29.7*	32.5	31.5*	21.9	21.6	28.9	27.2*

^aOne admission in last year. (If the 2+ category is not listed, less than 5% of the sample was in this category.)

^bTwo or more admissions in last year.

^cSee Shwartz et al.³

*Difference is statistically significant at .05 level.

more than half of the clients were minorities. Many were unemployed with no insurance, and more than 40% had not graduated from high school. Higher percentages of clients received case management in short-term and long-term residential facilities (45% and 68%, respectively) than in outpatient and detox programs (10% and 16%). In general, women and clients living with children were more likely to receive case management, consistent with the project's priorities. Case-managed clients were more likely to use crack as their primary drug and somewhat less likely to use heroin. They were less likely to have been in detox in the last year and more likely to have been in outpatient programs. However, with the exception of those in outpatient treatment, case-managed clients had a higher drug sever-

ity score than non-case-managed clients. Though there were other statistically significant differences between case-managed and non-case-managed clients, there were few other consistent differences across modalities. Further, many of the statistically significant differences were small and were the result of the large sample sizes.

Across all modalities, the percentage of clients reaching the long-stay category was at least 30% higher among case-managed than non-case-managed clients (Table 2). With the exception of outpatient treatment, case-managed clients were 25% to 30% less likely to enter detox within 3 months of discharge. Over 65% more case-managed clients than non-case-managed clients in detox entered a post-detox treatment program within 30 days.

TABLE 2—Percentage of Clients Experiencing Indicated Outcomes as a Function of Case Management (CM) Status within Treatment Modality, for Clients Discharged from Publicly Funded Substance Abuse Programs between January 1993 and December 1994

Treatment Modality	CM Status ^a	CM Intensity ^b	Outcome		
			Long Length of Stay	Transition to Treatment within 30 days	Admission to Detox within 90 days
Short-term residential	No CM	...	18.3*	33.9	17.3*
	CM	.243	46.4	36.5	11.9
	LICM	.024	60.5	44.7	15.4
	MICM	.095	42.9	30.8	10.8
	HICM	.666	32.9	32.5	8.6
Long-term residential	No CM	...	27.2*	8.9	19.5*
	CM	.218	35.9	7.3	13.9
	LICM	.012	48.1	10.0	17.5
	MICM	.104	35.2	5.6	10.4
	HICM	.586	23.0	6.2	13.7
Outpatient	No CM	...	49.8*	9.5*	5.4
	CM	.090	68.8	3.7	6.1
	LICM	.003	88.7	4.3	7.8
	MICM	.013	69.8	2.9	4.9
	HICM	.275	44.8	4.0	5.4
Residential detox	No CM	...	46.8*	22.9*	15.9*
	CM	.528	74.0	38.0	11.6
	LICM	.040	89.0	51.0	9.5
	MICM	.136	63.9	30.4	14.1
	HICM	1.461	66.0	29.7	11.6

^aLICM = low-intensity case management; MICM = middle-intensity case management; HI = high-intensity case management.

^bIntensity was calculated as total hours spent per client divided by client's length of stay in treatment.

*For comparison of No CM with CM, $P < .01$.

For clients discharged from outpatient treatment, a low-intensity modality usually at the end of the treatment continuum, the percentage of case-managed clients admitted for further treatment within 30 days was 40% of the percentage of non-case-managed clients.

No clear picture of the relationship between case management intensity and outcomes emerged. Low-intensity case-managed clients were the most likely to stay in treatment long enough to reach the long-stay category and the most likely to transition to treatment. However, with the exception of clients in detox, they were also the most likely to be admitted to detox within 90 days. When level of case management was measured by total time spent in case management (rather than time divided by length of stay), a high level of case management was associated with longer stay. However, for the other outcomes, the relationship between case management level and outcome was similar to that shown in the table.

Table 3 shows the unadjusted odds ratios associated with case management status for all clients (derived from the probabilities in Table 2) and for early-assigned clients, and the adjusted estimates of case management impact from the multivariate models for all clients. When only early-assigned clients were considered in the analysis, the odds of reaching the long-stay category were reduced, though in all cases they were larger than 1.00. However, with the exception of transition to 30-day treatment among residential detox clients, the odds ratios for the outcome measures not related to length of stay were minimally affected by restricting attention to early-assigned clients.

In all cases where case management was statistically significant in the univariate analyses (all-client analyses), it remained statistically significant in the multivariate analyses. In two cases (30-day transitions to treatment for short-term and long-term residential clients), adjust-

ing for the effect of other independent variables affecting outcomes and for programs in which clients were enrolled resulted in a statistically significant effect for case management. In both cases, the odds ratio associated with case management was less than 1.00. For short-term clients, further treatment may be desirable. Hence, attributing benefit to case management may not be warranted. For long-term clients, the lower odds ratio is more clearly consistent with benefit.

The value of case management is apparent from Table 3. Across modalities, the odds of reaching the long-stay category were 1.63 times (outpatient) to 3.56 times (short-term residential) higher for case-managed clients; with the exception of outpatient treatment (where there was no difference), the odds of admission to detox within 90 days of discharge for case-managed clients were about two-thirds the odds of non-case-managed clients. The odds of a case-managed detox client entering a post-detox treatment program were 1.66 times higher than the odds for a non-case-managed client.

Discussion

Across all four treatment modalities, case-managed clients did better along our outcome measures. They were more likely to remain in treatment long enough to reach a length of stay associated with more successful treatment; less likely to be admitted to detox within 90 days of discharge (with the exception of outpatient treatment, where results were not statistically significant); and, in the case of detox clients, more likely to transition to post-detox treatment within 30 days of discharge from detox.

A large percentage of the outpatient clients (35%) did not have a completed discharge form and thus were not included in the analysis. Even among those with a completed discharge form, the reliability of the discharge date is much more suspect for outpatients than for clients from residential programs. Often, a client is discharged only after failing to show up for some number of scheduled appointments. Thus, conclusions about the impact of case management on outpatients are more tentative than those for clients in the other modalities.

Our treatment outcomes were only intermediate. However, we have shown that clients who remained in treatment long enough to reach the long-stay category made less use of the treatment system over a 2-year period.³ The longer

periods of abstinence suggested by these utilization patterns are likely to be associated with improvements in psychosocial functioning, employment, and involvement with the legal system, benefits that we were not able to measure. However, it has been shown⁴ that among homeless substance abusers, there were significant differences in scores on five of the seven Addiction Severity Index dimensions⁵ between those readmitted to detox and those not readmitted. This lends some validity to the use of detox admissions as an outcome measure.

The above analysis assumes that case management was the factor responsible for the improvement in outcomes. Though the multivariate analyses, which control for a range of factors, were consistent with benefit from case management, there were a number of important factors we did not measure. For example, readiness for treatment, a factor that has a major impact on the likelihood of good outcomes, may be associated with the likelihood of a client's receiving case management, with the result that this variable could be a serious confounder. Clients who are assessed as ready for treatment may be more likely to receive case management and, independent of case management, more likely to do better. Only a randomized controlled trial can guard against the possible effect of these unmeasured confounders.

One of the important needs in research on case management is to more explicitly describe the nature of the intervention and to identify those aspects of case management that account for favorable outcomes.¹ Though we know the general areas of focus of case management activities, the general types of activities performed, and the amount of time spent, we know little that can help determine what aspects of case management accounted for apparent impact. Was it meeting client needs in particular non-treatment-related domains (e.g., housing), the additional psychological support provided by someone who cares, or the fact that clinical time was increased as a result of removing certain time demands on the clinical staff? No doubt, for certain clients, all of these factors were important.

What our data suggest is that for many clients, even small amounts of case management time are valuable. Further, it turns out that a large percentage of total case management time was often devoted to a relatively few clients. Large disparities in time spent per client emphasize the

TABLE 3—Odds Ratios (ORs) (with 95% Confidence Intervals [CIs]) for Effect of Case Management on Outcome Measures for Clients Discharged from Publicly Funded Substance Abuse Programs between January 1993 and December 1994, by Treatment Modality

Treatment Modality and Outcome	All Clients	Early-Assigned Clients	All Clients
	Unadjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Short-term residential			
Long length of stay	3.88 (3.30, 4.56)	3.20 (2.70, 3.79)	3.56 (2.99, 4.24)
Transition to treatment within 30 days	1.12 (0.96, 1.30)	1.01 (0.87, 1.18)	0.79 (0.64, 0.97)
Admission to detox within 90 days	0.64 (0.52, 0.79)	0.64 (0.51, 0.79)	0.67 (0.54, 0.83)
Long-term residential			
Long length of stay	1.50 (1.26, 1.78)	1.47 (1.24, 1.75)	1.83 (1.51, 2.23)
Transition to treatment within 30 days	0.81 (0.61, 1.07)	0.81 (0.61, 1.08)	0.66 (0.47, 0.94)
Admission to detox within 90 days	0.66 (0.54, 0.82)	0.67 (0.54, 0.82)	0.72 (0.58, 0.91)
Outpatient			
Long length of stay	2.23 (1.89, 2.63)	1.62 (1.36, 1.92)	1.63 (1.34, 1.99)
Transition to treatment within 30 days	0.37 (0.25, 0.54)	0.34 (0.22, 0.54)	0.56 (0.34, 0.91)
Admission to detox within 90 days	1.14 (0.83, 1.58)	1.11 (0.77, 1.59)	1.31 (0.86, 2.00)
Residential detox			
Long length of stay	3.24 (2.82, 3.71)	2.24 (1.93, 2.59)	2.77 (2.40, 3.21)
Transition to treatment within 30 days	2.06 (1.81, 2.34)	1.63 (1.40, 1.89)	1.66 (1.34, 2.06)
Admission to detox within 90 days	0.69 (0.57, 0.83)	0.73 (0.59, 0.90)	0.67 (0.53, 0.85)

importance of further research to learn more about the relative benefit of case management for different types of clients.

Our case management intervention was a systemwide intervention, adding case managers to over 40 programs in the city. Case managers were hired and supervised by the programs. Though there were systemwide protocols, the actual activities of the case managers reflected the philosophies and needs of the different programs. Thus, the distinguishing characteristic of our intervention was not any particular model of case management, or any set of specific activities undertaken by the case managers, but that it was a program-based model of case management.

Despite its limitations—primarily its inability to measure longer-term outcomes and biases inherent in an observational design—this study is an important contribution to our understanding of the value of case management in a community-based treatment setting. Evidence suggests that the program-based model of case management implemented in the

Boston Office of Treatment Improvement did have a favorable impact on treatment outcomes. □

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