Cost-Effectiveness Evaluation of Three Approaches to Case Management for Homeless Mentally Ill Clients

Nancy Wolff, Ph.D., Thomas W. Helminiak, Ph.D., Gary A. Morse, Ph.D., Robert J. Calsyn, Ph.D., W. Dean Klinkenberg, Ph.D., and Michael L. Trusty, Ph.D.

Objective: *In this study the authors compared the cost-effectiveness of three approaches to case management for individuals with severe mental illness who were at risk for homelessness: assertive community treatment alone, assertive community treatment with community workers, and brokered case management (purchase of services).* *Method:* *Individuals were randomly assigned to the three treatment conditions and followed for 18 months. Eligibility requirements included a severe DSM-III axis I diagnosis, such as schizophrenia, and either current homelessness or risk for homelessness based on prior history of homelessness. Participants were recruited from the emergency rooms and inpatient units of local psychiatric hospitals. Data on 85 people were available for analyses: 28 in assertive community treatment alone, 35 in assertive community treatment with community workers, and 22 receiving brokered case management (purchase of services).* *Results:* *Clients assigned to the two assertive community treatment conditions had more contact with their treatment programs, experienced greater reductions in psychiatric symptoms, and were more satisfied with their treatment than clients in the brokered condition. There was no statistically significant difference between treatment conditions in terms of the total costs of treating the participants. However, the assertive community treatment conditions spent less money on inpatient services than brokered case management, but more on case management services and maintenance (i.e., food stamps, housing subsidies, and Supplemental Security Income payments).* *Conclusions:* *Assertive community treatment has better client outcomes at no greater cost and is, therefore, more cost-effective than brokered case management.*

(Am J Psychiatry 1997; 154:341–348)

Approximately one-third of the homeless population suffers from severe mental illness (1). Most practitioners believe that these individuals need case management to navigate the fragmented U.S. human service system (2). In this study we used a randomized experiment to compare the cost-effectiveness of two common case management approaches used with this population, brokered case management (purchase of services) and assertive community treatment. Developing cost-effective approaches to assist these needy individuals in the current environment of scarce resources and pressures for efficiency from managed care programs is especially critical.

The case manager's role in brokered case management is to assess client needs and then arrange for needed services through purchase of service contracts with various service providers. Case managers in brokered case management typically have caseloads of 50–100 clients and rarely see their clients outside of the office. The case manager monitors client progress through reports from service contractors. In contrast, assertive community treatment teams have caseloads averaging 10–15 clients per staff member, frequently meet with their clients outside of the office, and do not limit the duration of treatment (3). In addition to providing or arranging for traditional psychiatric services, assertive community treatment staff serve as advocates for their clients in helping them secure resources, such as entitlements and housing. Assertive community treatment teams also provide supportive services, including 24-hour emergency services, medication and money management, and assistance with activities of daily living.

Received Jan. 11, 1996; revision received July 10, 1996; accepted Aug. 16, 1996. From Community Support Systems, St. Louis. Address reprint requests to Dr. Wolff, Institute for Health, Health Care Policy, and Aging Research, Rutgers University, 30 College Ave., New Brunswick, NJ 08903; nwolff@rci.rutgers.edu (e-mail).

Supported by NIMH grant MH-46160. The conclusions of this article are the sole responsibility of the authors and do not necessarily reflect NIMH policy.

The authors thank the individuals interviewed for this project; Dorothy Gano for word processing and editorial assistance; Laeeq Ahmad, Felice Gerber, Ruth Smith, and Betty Tempelhoff for conducting the interviews; and the Missouri Department of Mental Health and its staff who cooperated with this study.

TABLE 1. Characteristics of 85 Homeless Persons With Serious Mental Illness in Study of Three Types of Case Management

Variable	Data	
	N	*%*
Sex		
Male	50	58.8
Female	35	41.2
Race		
African American	47	55.3
Anglo American	38	44.7
Never married	56	65.9
DSM-III-R diagnoses		
Axis I		
Schizophrenia	57	67.1
Delusional or paranoid disorder	3	3.5
Psychosis not otherwise specified	13	15.3
Bipolar disorder	12	14.1
Major depression	10	11.8
Axis II disorder present	26	30.6
Substance use disorder present	22	25.9
	Mean	*SD*
Age (years)	33.6	10.3
Education (years)	11.1	2.3
Months since respondent last had permanent place to stay	29.5	54.1
Housing in 30 days before intake		
Days in stable housing	5.91	11.48
Days in unstable housing		
Emergency shelters or on the street	16.42	11.78
Institutional housing or home of a friend	7.67	11.55

A growing body of literature indicates that assertive community treatment produces better outcomes than do other treatments for individuals with severe mental illness (4, 5), including those who are homeless (6, 7). However, to our knowledge only one study has directly compared the efficacy of assertive community treatment with that of brokered case management (8). In that study, assertive community treatment produced better outcomes in terms of hospitalization and mental health costs than did brokered treatment; there were no differences between groups in terms of medication compliance and quality of life. The present study compared brokered case management and two different assertive community treatments in regard to costs and client outcomes for individuals with severe mental illness who were homeless or at risk for homelessness. One assertive community treatment program (assertive community treatment only) operated in a manner identical to that of the program developed by Morse et al. (7), which adapted the Program of Assertive Community Treatment (PACT) (9) to homeless individuals. The other program (assertive community treatment with community workers) operated similarly but had community workers who also worked with the clients. The community workers were lay citizens who, after training, assisted in advocacy, activities of daily living, and leisure activities.

This study also compared the costs of brokered case management and of assertive community treatment in treating individuals with severe mental illness who were at risk for homelessness. Prior research indicates that assertive community treatment is no more expensive, and sometimes less expensive, than other treatments in assisting individuals with severe mental illness (4, 10). However, many of the prior cost studies were flawed because they failed to estimate costs incurred outside of the mental health system. This is a particularly serious issue in the evaluation of programs aimed at homeless or other low-income individuals. These individuals frequently receive Supplemental Security Income (SSI) payments, food stamps, and housing subsidies and use other community services, such as emergency shelters. Thus, for this study we adapted the comprehensive costing approach initially developed by Weisbrod et al. (11) and refined by us (12).

In general, we predicted that the two assertive community treatment programs would be more cost-effective than the brokered condition. More specifically, we hypothesized that both of the assertive community treatment programs would produce better client outcomes in terms of stable housing, psychiatric symptoms, and client satisfaction. We also predicted that the additional direct treatment costs associated with assertive community treatment would be offset by decreased costs in other areas, particularly inpatient psychiatric care. Finally, we predicted that the assertive community treatment with community workers would be the least expensive program because of the cost savings associated with using lay citizens rather than professional staff to provide some community support activities.

METHOD

Participants

Initially 325 people were screened for possible inclusion in the study; approximately one-half were screened in emergency rooms, and one-half were screened on various inpatient units of local psychiatric hospitals. The eligibility requirements are described in detail elsewhere (13) but included: 1) current homelessness or risk for homelessness; 2) serious DSM-III-R axis I diagnosis; 3) no recent convictions for rape, homicide, or serious assault; and 4) willingness to receive services and participate in a longitudinal study. Lack of risk for homelessness (N=45) and absence of serious psychiatric diagnosis (N=38) were the principal reasons that 121 people were found to be ineligible. Of the 204 eligible participants, 26 refused to participate and 13 failed to complete the baseline interview.

The remaining 165 individuals were randomly assigned to the three treatment conditions. However, only 85 people were included in this cost-effectiveness study. Thirty clients had been eliminated from earlier analyses (13) because they could not be located for the follow-up interview. Seventeen additional clients were eliminated from the cost-effectiveness analysis because they entered the study too late in the grant period. Another 33 clients did not sign consent forms allowing access to their service utilization, Social Security, or Medicaid records.

Characteristics of the 85 final participants are presented in table 1. Two-thirds had an axis I diagnosis of schizophrenia. In addition, nearly one-third also had an axis II personality disorder, and one-quarter also had some type of substance use disorder. The average respondent had not had a permanent place to stay for nearly 30 months.

Procedure

Potential participants were screened by master's-level psychologists and social workers, who explained the nature of the study, ob-

TABLE 2. Outcomes of Three Types of Case Management for 85 Homeless Persons With Serious Mental Illness

	Assertive Community Treatment With Community Workers (N=35)				Assertive Community Treatment Only (N=28)				Brokered Case Management (N=22)			
	Baseline		18 Months		Baseline		18 Months		Baseline		18 Months	
Dependent Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Program contact (days/month)			6.95	4.91			8.29	7.51			0.30	0.49
Client satisfaction (range=0–8)			3.12	0.57			3.27	0.42			2.74	0.68
Stable housing (days in preceding 30 days)	4.94	11.08	17.54	14.45	6.36	11.71	21.75	12.76	7.18	12.38	16.00	14.86
BPRS total symptom score	57.97	20.29	38.77	12.23	53.54	15.54	39.96	12.25	50.60	14.31	51.60	16.70

tained written informed consent, and informed participants that they could discontinue participation in the study at any time without jeopardizing treatment. The people who agreed to participate in the study were randomly assigned to the treatment conditions and were each given an information sheet that told the participant how to contact the assigned program. The participants were interviewed monthly and paid $5–$10, depending on the length of the interview. Most interviews occurred in the research office, although some interviews were conducted in hospitals, emergency shelters, and the participants' apartments.

Treatment Programs

Because descriptions of the three treatment conditions appear elsewhere (13), only brief synopses are provided here. In the brokered case management condition the case manager assessed the client's needs, developed a service plan, arranged for purchase of mental health and psychosocial rehabilitation services from a number of vendors, and monitored the client's progress. Case managers in this condition saw their clients infrequently and rarely made home visits or engaged in outreach. Each case manager had approximately 85 clients.

The condition providing assertive community treatment only was a replication of the program developed by Morse et al. (7). The services, which were offered for an unlimited period of time, included outreach, 24-hour emergency services, assistance in obtaining entitlements and other resources, transportation, skill training and assistance in activities of daily living, symptom management, supportive counseling, and traditional mental health services. The services were frequently offered in the client's natural environment, rather than in an office setting. One difference between this condition and the original Program of Assertive Community Treatment (9) involved staffing. The team in this study did not have an assigned psychiatrist and nurse; they had to rely on the local community mental health center for these services.

The condition involving assertive community treatment with community workers was identical to assertive community treatment only, with one exception. Each client in this condition was also assigned a community worker, whose role was to involve the client in "normalizing" activities, which included participation in individual and community leisure activities. Some community workers also supplemented the work of the assertive community treatment staff by assisting clients with activities of daily living, although this usually occurred only on a limited basis. Typically, the community worker became more involved with the client in the latter phases of treatment, after the case manager was able to stabilize the client. Approximately one-half of the community workers performed duties on a voluntary basis; the other half were paid the minimum wage.

Client Outcomes

Program contact, client satisfaction, stable housing, and psychiatric symptoms were the four client outcomes measured in this study. Program contact was defined as the average number of days per month (averaged over the entire 18 months) that a participant reported having contact with a case manager or community worker from the assigned program.

Client satisfaction was assessed on an eight-item scale (14). Clients answered these questions only if they had had contact with their assigned programs within the previous 3 months. To maximize the number of subjects assessed, the dependent variable in this study is the average satisfaction score across the entire 18 months. Thus, for some clients this score is the rating from only one assessment, while for other clients the satisfaction score is an average of six assessments.

Days in stable housing was assessed at baseline and at 18 months. The measure focused on the previous 30-day period and excluded all days in which the respondent slept on the street, in a public place (e.g., park or bus depot), in an emergency shelter, in an institution (psychiatric or criminal justice), or in the home of a friend or relative on a temporary basis. Market-rate apartments, subsidized apartments, and boarding homes were the typical residences of clients who had stable housing.

Psychiatric symptoms were assessed at baseline and after 18 months by research interviewers, using the 24-item Brief Psychiatric Rating Scale (BPRS) (15, appendix A). The interviewers rated each item on a seven-point scale, on which a score of 7 indicated greater severity. The total symptom severity score was used for this study.

Service Utilization and Cost Data

Detailed service utilization and cost information were collected for each participant for 18 months after the initiation of treatment and for the 6-month period immediately preceding random assignment by using procedures developed by us earlier (12). Services were valued at their average costs, which were based on a full cost accounting of the resources used to produce these services. Total costs are expressed in fiscal year 1992 dollars.

All three treatment programs were part of the St. Louis Mental Health Center. Thus, all participants were eligible to receive psychiatric services from this agency. In addition, the additional costs associated with the two assertive community treatment conditions were estimated. The value of the time contributed by the community workers was based on the minimum wage.

To determine the costs of services for other mental health and physical health needs, we used the management information systems of federal, state, and local facilities to determine the amount of inpatient and outpatient services received by the study participants. Medicare and Medicaid claims data were used to identify services delivered to these clients by facilities located in and around St. Louis. These records were also used as a reliability check on the data obtained from local facilities.

From several private and public agencies we collected information regarding educational assistance (e.g., Graduate Equivalency Diploma), skill training classes, and employment programs provided to the study participants.

We also compiled data on housing costs. The respondents reported monthly on how many nights that they had spent in emergency shelters. Detailed costing information provided by one of the largest shelters in the area was used to estimate the average cost of housing a participant per night. We also collected service utilization and cost (including subsidy) information for a supported community living program operated by the Missouri Department of Mental Health and for other housing programs (e.g., U.S. Department of Housing and Urban Development Section 8). Finally, cost and utilization data were

obtained from the local daytime drop-in center that serves homeless mentally ill clients.

Payments to the study participants from income assistance programs, such as SSI and food stamps, and transportation subsidies (bus passes) were also calculated.

RESULTS

Attrition

Because only 85 of the 165 participants originally assigned to the three treatment conditions provided data for the cost-effectiveness study, it was necessary to analyze the impact of attrition. There was a significant difference between treatment conditions in the rates of attrition (χ^2=10.50, df=4, p<0.05). The proportion of clients missing from these analyses was significantly greater for the brokered condition (63%) than for assertive community treatment only (44%) or assertive community treatment with community workers (33%).

We also compared the clients who remained in the study with those who dropped out on demographic characteristics and baseline values on the outcome measures. There were no significant differences at the 0.05 level between the clients who dropped out of the study and those who remained in any of the demographic variables (age, race, gender, marital status, and education). In addition, there were no significant differences between these groups in the baseline values on the outcome measures.

TABLE 3. Utilization of Services, by 6-Month Period, for 85 Homeless Persons

	Assertive Community Treatment With Community Workers (N=35)							
	Prior 6 Months		Months 1–6		Months 7–12		Months 13–18	
Category of Service	N	%	N	%	N	%	N	%
Mental health								
Inpatient								
Private	9	25.7	8	22.9	11	31.4	10	28.6
Public	14	40.0	11	31.4	4	11.4	4	11.4
Outpatient								
Hospital based	8	22.9	9	25.7	13	37.1	13	37.1
Other outpatient	30	85.7	32	91.4	32	91.4	29	82.9
Drop-in center	9	25.7	12	34.3	4	11.4	9	25.7
Substance abuse	3	8.6	2	5.7	2	5.7	2	5.7
Physical health								
Inpatient	1	2.9	2	5.7	2	5.7	0	0.0
Outpatient	12	34.3	17	48.6	21	60.0	12	34.3
Vocational								
General Equivalency								
Diploma	0	0.0	2	5.7	1	2.9	2	5.7
Skills training	1	2.9	3	8.6	4	11.4	4	11.4
Residential								
Emergency shelter	—	—	22	62.9	12	34.3	9	25.7
Housing subsidy	3	8.6	7	20.0	9	25.7	11	31.4
Maintenance								
Supplemental Security								
Income	22	62.9	29	82.9	29	82.9	30	85.7
Food stamps	12	34.3	20	57.1	21	60.0	16	45.7

Client Outcomes

Table 2 contains the client outcome measures for the three treatment groups. There was a significant effect of treatment group on program contact (F=44.19, df=2, 82, p<0.001). Post hoc analyses using the Newman-Keuls procedure indicated that the clients in the two assertive community treatment conditions reported significantly (p<0.05) more contact with their case managers than did consumers in the brokered condition. (A square-root transformation was performed on the program contact variable before the statistical analysis because of unequal variances among conditions.) There was also a significant difference between treatment groups in client satisfaction (F=4.50, df=2, 74, p<0.01). Post hoc analyses indicated that the clients in the two assertive community treatment conditions were significantly more satisfied with their treatment programs than were clients in the brokered condition.

Analysis of covariance (ANCOVA), with the baseline score on stable housing used as the covariate, revealed no significant effect of treatment group on stable housing at 18 months (F=1.17, df=2, 81, p<0.31). However, when the baseline BPRS total symptom score was used as the covariate, ANCOVA did indicate a significant treatment group effect on the BPRS total score at 18 months (F=8.12, df=2, 78, p=0.001). Post hoc analysis indicated that clients in both assertive community treatment conditions had fewer symptoms at 18 months than clients in the brokered condition.

Service Utilization

Table 3 indicates the percentage of clients in each treatment group who received at least one unit of service in each category across four time periods: the 6 months prior to the initiation of the study, months 1–6, months 7–12, and months 13–18; more detailed information on average service intensity is available from the first author. Analysis of variance with repeated measures was used to analyze the data in table 3. There were several significant main effects of time on service utilization. The most notable of these was the reduction in the use of public inpatient psychiatric care over time (F=14.69, df=3, 246, p<0.001). More consumers also received housing subsidies (F=11.87, df=3, 246, p<0.001), SSI (F=15.71, df=3, 246, p<0.001), and food stamps (F=6.42, df=3, 246, p<0.001) over time.

Fewer differences in service utilization between treatment conditions reached statistical significance. Clients in the two assertive community treatment conditions were more likely to receive housing subsidies than were clients in the brokered condition; however, the difference was only statistically significant during months 13–18 (F=1.33, df=2, 82, p<0.05). Client utilization of the local drop-in center varied considerably among treatment con-

With Serious Mental Illness Who Received Three Types of Case Management

Assertive Community Treatment Only (N=28)								Brokered Case Management (N=22)							
Prior 6 Months		Months 1–6		Months 7–12		Months 13–18		Prior 6 Months		Months 1–6		Months 7–12		Months 13–18	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
7	25.0	5	17.9	6	21.4	10	35.7	6	27.3	5	22.7	3	13.6	4	18.2
14	50.0	12	42.9	4	14.3	3	10.7	10	45.5	11	50.0	7	31.8	5	22.7
8	28.6	10	35.7	9	32.1	13	46.4	7	31.8	6	27.3	8	36.4	7	31.8
25	89.3	26	92.9	23	82.1	21	75.0	19	86.4	18	81.8	18	81.8	18	81.8
3	10.7	2	7.1	2	7.1	1	3.6	5	22.7	8	36.4	5	22.7	3	13.6
1	3.6	2	7.1	1	3.6	1	3.6	2	9.1	4	18.2	1	4.5	1	4.5
2	7.1	2	7.1	2	7.1	0	0.0	3	13.6	0	0.0	1	4.5	1	4.5
11	39.3	18	64.3	14	50.0	11	39.3	7	31.8	13	59.1	7	31.8	10	45.5
0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1	3.6	4	14.3	3	10.7	3	10.7	0	0.0	7	31.8	4	18.2	2	9.1
—	—	12	42.9	3	10.7	6	21.4	—	—	9	40.9	6	27.3	7	31.8
1	3.6	8	28.6	8	28.6	13	46.4	1	4.5	3	13.6	2	9.1	3	13.6
12	42.9	19	67.9	20	71.4	22	78.6	14	63.6	16	72.7	19	86.4	19	86.4
9	32.1	18	64.3	20	71.4	20	71.4	9	40.9	9	40.9	8	36.4	10	45.5

ditions over time. The clients receiving assertive community treatment only were the least likely to use the drop-in center. Their use of the drop-in center was significantly less than that of the clients in the other two conditions during months 7–12 ($F=4.07$, $df=2, 82$, $p<0.05$), and it also was less than that of the clients receiving assertive community treatment with community workers during months 13–18 ($F=3.09$, $df=2, 82$, $p<0.05$).

Finally, there were differences in terms of inpatient psychiatric services, although these differences did not reach statistical significance. Clients in the two assertive community treatment conditions were more likely to receive inpatient treatment in general hospitals, which typically have shorter stays, whereas clients in the brokered condition were more likely to receive treatment in a specialized psychiatric hospital, usually a facility operated by the Missouri Department of Mental Health (data not shown). This difference in utilization of inpatient facilities was particularly evident during months 7–18.

Costs

The total costs over the 18-month study period for the average client in each treatment condition were as follows: assertive community treatment only, $49,510; assertive community treatment with community workers, $39,913; brokered case management, $45,076. Table 4 displays the costs of each program by service category during each 6-month period. To determine whether there were significant differences among the treatment conditions in total costs, a regression equation predicting total cost over the 18-month study period was estimated. Three predictor variables were included in the equation: 1) a dummy variable comparing assertive community treatment with community workers to the other two conditions, 2) a dummy variable comparing assertive community treatment only to the other two conditions, and 3) each individual's total costs for the 6 months before treatment. This third measure indicates how much of the variation in costs over the 18-month study can be explained by individual client differences before the beginning of the study; this measure also controls for any pretreatment differences among treatment conditions. The full model was not statistically significant ($F=1.88$, $df=3, 81$, $p<0.14$, $R^2=0.07$). However, the estimate of the effect of an individual client's costs in the 6 months before treatment was statistically significant ($t=1.98$, $df=84$, $p<0.05$); clients who had the highest costs during this study were also more costly to serve in the 6 months before the initiation of the study. Neither the estimate of the effect of assertive community treatment with community workers ($t=–0.30$, $df=84$, $p<0.77$) nor the estimate of the effect of assertive community treatment only ($t=0.76$, $df=84$, $p<0.45$) was statistically significant, indicating that differences between treatment conditions in terms of total costs during the study period were not statistically significant after differences in clients' costs before treatment were controlled for.

Although there were no significant differences among treatment conditions in total costs over the 18-month period, there were major differences among programs in the

percentage of total costs associated with each cost category. The most dramatic differences among treatment conditions occurred for inpatient mental health costs during the first 6 months of the project. When compared to the prior 6-month period, the average cost for inpatient services decreased by $1,315 for assertive community treatment with community workers, increased by $4,484 for assertive community treatment only, and increased by $8,073 for the brokered condition. The inpatient costs for assertive community treatment with community workers during months 7–18 were still somewhat less than for the other two conditions, although the differences were not as dramatic as they were during the first 6 months.

TABLE 4. Estimated Average Cost, by 6-Month Period, of Three Types of Case Management for 85

	Estimated Cost (1992 dollars) for Clients Receiving Assertive Community Treatment With Community Workers (N=35)							
	Prior 6 Months		Months 1–6		Months 7–12		Months 13–18	
Category of Service	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mental health	8,008	9,070	10,222	6,720	8,759	8,683	7,941	6,534
Inpatient	6,875	8,957	5,560	6,563	4,194	8,217	3,377	5,791
Outpatient	1,133	911	1,563	1,348	1,466	1,195	1,465	1,096
Assertive community treatment case management	0	0	3,099	0	3,099	0	3,099	0
Physical health	255	420	488	720	541	613	387	503
Inpatient	64	220	137	435	107	349	35	179
Outpatient	191	318	351	445	434	482	352	450
Vocational and educational	44	259	99	533	393	1,496	727	2,747
Residential	265	559	1,257	1,571	1,142	1,749	1,093	1,505
Maintenance	1,457	1,160	2,057	1,165	2,265	1,233	2,542	1,269
Cash support	1,357	1,136	1,883	1,143	2,061	1,138	2,402	1,208
In-kind support	100	151	174	223	204	304	140	376
Total	10,029	9,679	14,123	7,237	13,100	8,286	12,690	8,367

In general, the three programs did not differ significantly in the amount of expenditures for outpatient mental health treatment, physical health services, or vocational and educational assistance. However, during months 13–18 of the project, the costs for vocational assistance were considerably greater for the clients receiving assertive community treatment only than for clients in the other two conditions. Consistent with the service utilization differences, the average maintenance costs and housing subsidy costs were greater for the two assertive community treatment conditions than for the brokered condition.

Finally, it is also important to note that it cost an average of more than $3,000 per 6-month period for the two assertive community treatment conditions to provide the intensive case management services, which resulted in increases in financial assistance (vocational/educational, residential, and maintenance assistance) and decreases in costs for inpatient psychiatric services.

DISCUSSION

The results generally support the study's predictions. Our data indicate that the assertive community treatment conditions were more effective than brokered case management on three of the four outcome variables: service contact, psychiatric symptoms, and client satisfaction. The lack of a significant difference in stable housing was unexpected and was contrary to prior findings on assertive community treatment programs (5, 7). We believe that the failure to find a significant difference in stable housing in this study is an artifact of the smaller groups and reduced statistical power of the analysis; a significant difference in stable housing in favor of the group receiving assertive community treatment only occurred in the analysis of the full study group (13), and the mean values for the treatment groups in this subset of the full study group (table 2) indicate a similar trend. The significantly lower attrition rates for the two client groups receiving assertive community treatment indicates that assertive community treatment is more effective in approaching and maintaining contact with a homeless and difficult-to-treat severely mentally ill population than is brokered case management.

The total costs over the 18-month study period were not statistically different among the three programs; again, this failure to find significance may be in part attributable to a small study group, limited statistical power, and baseline cost differences, which may reflect differential attrition and study group biases. Although the cost differences did not reach statistical significance, there may well be administrative importance in the lower total dollar costs associated with assertive community treatment involving community workers. The inclusion of lay citizens may indeed increase cost efficiency. Quivlivan et al. (16), for example, found that an intensive case management program that included paraprofessionals was more effective in reducing inpatient costs than was traditional case management. Further research with a large study group that has less attrition is needed to reexamine this issue.

Although there were no significant differences among treatment conditions in terms of total cost, there were important differences in the pattern of expenditures between brokered case management and assertive community treatment. First, it is important to acknowledge that the costs of case management in the two assertive community treatment conditions averaged $6,317 more per year for each client than did brokered case management. In the brokered condition, far more cost shifting to other parts of the system occurred, particularly to inpatient facilities. Although the differences did not reach statistical significance, the inpatient mental health costs were less in both of the assertive commu-

Homeless Persons With Serious Mental Illness

Estimated Cost (1992 dollars) for Clients Receiving Assertive Community Treatment Only (N=28)								Estimated Cost (1992 dollars) for Clients Receiving Brokered Case Management (N=22)							
Prior 6 Months		Months 1–6		Months 7–12		Months 13–18		Prior 6 Months		Months 1–6		Months 7–12		Months 13–18	
Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
8,446	9,332	16,515	19,620	7,703	8,690	10,271	13,781	9,581	10,247	18,181	20,656	8,466	12,903	7,895	16,709
7,406	9,225	11,890	19,573	3,059	8,519	5,559	13,675	8,153	9,919	16,226	21,068	6,901	11,693	6,707	16,095
1,040	620	1,408	869	1,427	1,164	1,495	1,719	1,428	1,535	1,955	1,930	1,565	1,896	1,188	1,599
0	0	3,217	0	3,217	0	3,217	0	0	0	0	0	0	0	0	0
1,319	5,164	750	2,279	510	884	416	506	1,750	5,135	465	550	723	1,041	412	456
1,119	5,090	496	2,267	175	768	20	67	1,515	5,001	8	37	415	1,244	35	119
200	511	254	327	335	352	396	504	235	403	457	543	308	583	377	449
10	45	97	433	225	826	2,181	10,450	123	418	212	887	144	465	51	180
89	277	1,111	1,753	830	1,414	1,170	1,652	343	1,040	728	1,518	496	849	514	801
1,517	2,435	2,218	2,313	2,521	2,344	2,992	2,499	1,775	1,890	1,908	2,129	2,337	1,882	2,544	1,492
1,399	2,457	1,981	2,314	2,305	2,358	2,708	2,575	1,596	1,765	1,664	1,724	2,084	1,694	2,310	1,547
118	265	237	275	216	216	284	302	179	256	244	628	253	358	234	346
11,381	10,134	20,691	19,261	11,789	9,270	17,030	17,208	13,572	13,676	21,494	20,313	12,166	13,816	11,416	16,830

nity treatment conditions than in the brokered condition, a finding that is consistent with those in prior studies (5). Part of the success of assertive community treatment in lowering hospital costs is associated with its greater use of general hospitals, which typically have shorter stays than do state psychiatric facilities. The case managers using assertive community treatment stayed in contact with the clients during hospitalization and helped to facilitate discharge. Case managers in the brokered condition were much less involved in the hospitalization of their clients; clients in this condition were frequently brought to the state hospital by the police. It is also important to note that more money was spent on vocational assistance or went directly into the hands of the clients (e.g., housing subsidies, food stamps, and SSI) in the two assertive community treatment conditions than was supplied to clients in the brokered condition.

In summary, the results supported the main prediction of the study: the assertive community treatment approach is more cost-effective than brokered case management in serving people with severe mental illness; i.e., the total cost of treating clients through assertive community treatment is no greater than the cost with brokered case management, and clients receiving assertive community treatment have better outcomes than do clients in brokered case management. To our knowledge, this is the first published evaluation of the cost-effectiveness of services for people who are homeless.

Limitations of Study

Attrition is the greatest potential threat to the internal validity of this study. Nearly one-half of the participants originally assigned to the various treatment conditions were not included in this cost-effectiveness study. Moreover, a higher percentage of clients in the brokered condition than in either of the two assertive community treatment conditions dropped out of the study. Although pretreatment values for both the effectiveness variables and the cost variables were used to control for any initial differences among groups, it is still possible that attrition could have resulted in an unknown bias that compromised the conclusions of our analyses.

In addition, we did not have sufficient resources to measure the criminal justice and family burden costs associated with assisting this group of clients. Prior research with similar populations estimated the annual criminal justice costs (in 1988 dollars) at $1,555 and the annual family burden costs at $3,103 (12). Thus, the absolute "social" cost associated with serving these clients was underestimated by the exclusion of criminal justice and family burden costs. However, we do not believe that there were differences in family burden and criminal justice costs among the three treatment groups. Although family contact was not measured in this study, we did assess contact with the criminal justice system. There were no significant differences among the treatment groups in the clients' self-reported contacts with the criminal justice system (not reported in this article).

Finally, one needs to be somewhat cautious in generalizing the study results to other homeless mentally ill populations because of the relatively large number of participants who either dropped out of the study or refused to grant access to their records. Similarly, the cost estimates reported in this study reflect the cumulative effects of many independent factors: a carefully structured research design and treatment intervention based on the assertive community treatment philosophy; the local demographic and socioeconomic characteristics of the population; local clinical and treatment standards; the peculiarities of the local mental health, human service, and welfare systems; staff enthusiasm for the assertive community treatment programs; and other local community idiosyncrasies. Because observed cost outcomes are a result of local conditions and philoso-

phies, we strongly doubt that any one community is representative of the country as a whole. However, the estimates for St. Louis demonstrate the relative and absolute magnitude of costs associated with assertive community treatment in a large, urban setting.

Policy Implications

While it is prudent to consider the study's limitations, it is also important to recognize its fundamental policy and treatment conclusion: homelessness among people who are severely mentally ill can be prevented or substantially reduced in a cost-effective manner with assertive community treatment. This finding is consistent with most of the literature on the cost-effectiveness of assertive community treatment with nonhomeless severely mentally ill populations (4, 10).

The study's cost-effectiveness results are especially relevant in the contemporary environment of scarce governmental resources and the trend toward managed care, including in the public sector. Specifically, managed care companies and the policy makers who design benefit packages would be wise to ensure that assertive community treatment is available within managed care programs and not simply rely on traditional brokered case management. It will also be important for policy makers and managed care organizations to ensure the fidelity of assertive community treatment services. Specifically, the benefit package should be designed to include, with definitions of medical necessity, many of the nontraditional services that are essential components of assertive community treatment, such as home visits, supportive services and skill training, transportation, and advocacy in obtaining entitlements and other needed resources. Such services are common features of the best assertive community treatment programs (3) and appear to be the critical ingredients that produce positive client outcomes, including reduced psychiatric symptoms and more days in the community (17).

The cost of care for people with severe mental illness in general, and assertive community treatment in particular, will not necessarily be inexpensive, as the descriptive data on costs presented earlier indicate. However, such expenses are necessary in order to decrease symptom-related suffering, prevent homelessness, and avoid the wasteful cost shifting to hospitals and other community institutions. Meanwhile, a challenge remaining for future researchers and clinicians is to define which client groups are most cost-effectively served by intensive interventions such as assertive community treatment and how assertive community treatment may be adapted, modified, or combined with other treatments to further enhance its cost-effectiveness.

REFERENCES

1. Dennis DL, Buckner JC, Lipton FR, Levine IS: A decade of research and services for homeless mentally ill persons: where do we stand? Am Psychol 1991; 46:1129–1138
2. Torrey EF: Continuous treatment teams in the care of the chronic mentally ill. Hosp Community Psychiatry 1986; 37:1243–1247
3. McGrew JH, Bond GR: Critical ingredients of assertive community treatment: judgments of the experts. J Ment Health Administration 1995; 22:113–125
4. Burns BJ, Santos AB: Assertive community treatment: an update of randomized trials. Psychiatr Serv 1995; 46:669–675
5. Solomon P: The efficacy of case management services for severely mentally disabled clients. Community Ment Health J 1992; 28: 163–180
6. Dixon LB, Krauss N, Kernan E, Lehman AF, DeForge BR: Modifying the PACT model to serve homeless persons with severe mental illness. Psychiatr Serv 1995; 46:684–688
7. Morse GA, Calsyn RJ, Allen G, Tempelhoff B, Smith R: Experimental comparison of the effects of three treatment programs for homeless mentally ill people. Hosp Community Psychiatry 1992; 43:1005–1010
8. Bond GR, Miller LK, Krumwied RD, Ward RS: Assertive case management in three CMHCs: a controlled study. Hosp Community Psychiatry 1988; 39:411–418
9. Stein LJ, Test MA (eds): The Training in Community Living Model: A Decade of Experience: New Directions for Mental Health Services 26. San Francisco, Jossey-Bass, 1985
10. Taube CA, Morlock L, Burns BJ, Santos AB: New directions in research on assertive community treatment. Hosp Community Psychiatry 1990; 41:642–647
11. Weisbrod BA, Test MA, Stein LI: Alternative to mental hospital treatment, II: economic benefit-cost analysis. Arch Gen Psychiatry 1980; 37:400–405
12. Wolff N, Helminiak TW, Diamond RJ: Estimated societal costs of assertive community mental health care. Psychiatr Serv 1995; 46:898–906
13. Morse GA, Calsyn RJ, Klinkenberg WD, Trusty ML, Gerber F, Smith R, Tempelhoff B, Ahmad L: An experimental comparison of three types of case management. Psychiatr Serv (in press)
14. Larsen D, Attkisson C, Hargreaves W, Nguyen T: Assessment of client/patient satisfaction: development of a general scale. Evaluation and Program Planning 1979; 2:197–207
15. Lukoff D, Liberman RP, Nuechterlein KH: Symptom monitoring in the rehabilitation of schizophrenic patients. Schizophr Bull 1986; 12:578–602
16. Quivlivan R, Hough R, Crowell A, Beach C, Hofstetter R, Kenworthy K: Service utilization and costs of care for severely mentally ill clients in an intensive case management program. Psychiatr Serv 1995; 46:365–371
17. Morse GA, Calsyn RJ, Allen G, Kenny DA: Helping homeless mentally ill people: what variables mediate and moderate program effects? Am J Community Psychol 1994; 22:661–683