

## Health Care Costs of Seriously Mentally Ill Patients Enrolled in Enhanced Treatment

Andrea M. Hegedus, PhD  
University of Michigan

Laurel A. Copeland, PhD  
Veterans Administration Medical Center,  
Ann Arbor, Michigan

Kristen L. Barry, PhD, and Frederic C. Blow, PhD  
Veterans Administration Medical Center, Ann Arbor,  
Michigan, and University of Michigan

Patients with psychosis ( $N = 866$ ) were recruited into enhanced or standard Veterans Administration (VA) treatment. Enhanced programs, previously shown to be more effective, were less costly than VA standard care. Adjusted costs fell from \$32,000–\$55,000 (for the 1st year) to \$20,000–\$36,000 (for the 4th year). Costs were associated positively with schizophrenia, living in the Northeast region of the United States, and poorer baseline functioning.

In large health care systems such as the Veterans Administration (VA), a small number of patients are responsible for a disproportionately large percentage of the health care costs. One of the resource-intensive groups, who have a high number of comorbid disorders as well as compromised levels of functioning, are those patients with serious and persistent mental illnesses (Mechanic, 1996). Numerous studies have been dedicated to better understanding how to treat persons with these disorders, in terms of both treatment outcomes and cost containment. Traditionally, persons with serious mental illnesses have been long-term inpatients, but concerns about the high cost and effectiveness of this type of care have led to the development of alternative methods of treatment. It is expected that lower costs would be associated with a move to community-based care.

Over the last 25 years, treatment approaches for the seriously mentally ill have evolved to optimize

effective care. Day treatment centers (DTC), community case management, and sustained treatment and rehabilitation programs for inpatients are three of the alternatives to standard inpatient care. In the VA system, although patients are not billed for these treatment programs, per patient costs are tracked and can be examined.

Research on DTC has shown that this form of treatment generally is less costly than standard inpatient care for most patients (Ehret, Chapko, Hedrick, & Savarino, 1993; Goldberg, 1994; Sledge, Tebes, Wolff, & Helminiak, 1996; Wiersma, Kluiters, Nienhuis, Ruphan, & Giel, 1995). However, lower program costs must be weighed against such varying considerations as appropriateness of care, availability of treatment options, the incremental nature of treatment effects, the type of cost data available for analysis, and patient satisfaction with care. One study (Sledge et al., 1996) that compared day hospital with respite care to inpatient care found that, on average, cost savings per patient in the day hospital–respite program were roughly equal to 20% of total direct costs. Significant differences in costs were found among patient groups, with patients with psychoses having the highest costs in both programs. Whereas direct service staff and capital costs of the two programs were roughly equal, the inpatient program had 51% higher operating costs. Roughly half of the total cost associated with the inpatient program derived from operating costs, compared with one third for the day hospital–respite program.

In a study of patients with affective disorders and schizophrenia, Wiersma et al. (1995) concluded that

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Andrea M. Hegedus, PhD, Department of Psychiatry, University of Michigan; Laurel A. Copeland, PhD, Health Services Research and Development Service, Veterans Administration Medical Center, Ann Arbor, Michigan; Kristen L. Barry, PhD, and Frederic C. Blow, PhD, Serious Mental Illness Treatment Research and Evaluation Center, Health Services Research and Development Service, Veterans Administration Medical Center, Ann Arbor, Michigan, and Department of Psychiatry, University of Michigan.

For reprints and correspondence: Andrea M. Hegedus, PhD, Department of Psychiatry, University of Michigan, 400 East Eisenhower Parkway, Suite 2A, Ann Arbor, Michigan 48108. E-mail: hegedus@umich.edu

day treatment could be considered a cost-effective alternative to inpatient treatment. In a review of economic studies that addressed the treatment of schizophrenia, Goldberg (1994) also concluded that day treatment, often preceded by a short admission, has been shown to be cost effective as an alternative to traditional hospitalization.

In further illustration of the complexity of the issue, the VA Adult Day Health Care (ADHC) Evaluation Study conducted by Ehreth et al. (1993) found that offering ADHC services as developed in their study would actually increase the VA's costs. The three most important factors in determining the level of program costs were the way patients were transported to and from ADHC, the availability of space to house the program, and the staff-to-patient ratio.

Community case management (CCM) is another type of specialized program available to severely mentally ill patients who are high health service users. Several different types of CCM programs have evolved, including intensive psychiatric community care (IPCC) and assertive case management (Stein & Test, 1980). In a 2-year study of IPCC in the Department of Veterans Affairs, Rosenheck, Neale, Leaf, Milstein, and Frisman (1995) concluded that overall, IPCC was more cost effective than standard inpatient care. Although patients in both conditions experienced reduced symptoms and improved social functioning over time, IPCC patients treated at general medical and surgical facilities showed significantly greater benefit on these measures relative to standard care. A similar second study (Rosenheck & Neale, 1998) found that IPCC treatment at acute care hospitals was associated with greater long-term clinical improvement and, when fully implemented, was cost neutral. At long-term hospitals with older, less functional patients, the program was not associated with clinical or functional improvement but generated substantial cost savings. The authors concluded that IPCC thus was beneficial but had somewhat different outcome profiles at different types of hospitals.

In an update of randomized trials of assertive community treatment (ACT), Burns and Santos (1995) concluded that ACT had positive effects. Evidence of the differential effects of program on client-level outcomes was incremental rather than dramatic and was found primarily in reduced hospital use (number of days), with the consequent reductions in inpatient costs and in increased patient and family satisfaction. In another article that describes research on ACT since its inception nearly 30 years ago, Phillips and her colleagues (2001) stated that research has shown this type of program to be effective in reducing

hospitalization, to be no more expensive than traditional care, and to be more satisfactory to consumers and their families than standard care. In summary, they found that greater adherence to a group of core principles produces better outcomes; however, the relationship between specific structural aspects of ACT and outcomes was not always clear. Consideration must be given to such variables as adequate funding, monitoring of fidelity, and adequate training of professional staff.

The Sustained Treatment and Rehabilitation (STAR) II program in the VA is an inpatient program designed to help seriously mentally ill inpatients move out into the community (Ashear et al., 1997). The STAR II program is modeled after the Social and Independent Living Skills Program at the West Los Angeles VA Medical Center (Kuehnel, Liberman, Storzach, & Rose, 1990). As described by Ashear and colleagues (1997), the STAR II program's purpose is to increase the quality of life and decrease inpatient hospitalization for seriously mentally ill veterans by increasing social and living skills as well as level of social support.

Ashear and colleagues (1997) found that during their STAR II program's 6 years of operation, patients showed some fairly dramatic improvements in psychopathology and psychosocial functioning. In addition, the STAR II program was associated with significantly lowered service use for inpatient psychiatric or substance abuse treatment. The average length of stay in the hospital for patients prior to their STAR II admission was 180.1 days, compared with 35.1 days after enrollment in the program, thus reducing their cost of care.

The current study used data from a larger project, the Long-Term Mental Health Project, studying patients with serious mental illness who were being treated by the Veterans Health Administration in one of three specialized treatment conditions—CCM, DTC, and STAR II—or in the standard inpatient care program (Blow et al., 1998, 2000). The larger 5-year evaluation study was undertaken in response to a Congressional mandate to develop and evaluate new and potentially more effective treatment modalities for the seriously mentally ill veteran population. Results indicated that there were differential changes in inpatient days of care by Year 3 wherein patients in the specialized programs averaged fewer inpatient days than those in the standard care group, although all groups including patients in standard care significantly decreased their days of hospitalization (Blow et al., 2000). In particular, patients in CCM programs decreased their inpatient days by 85% over 3 years,

those in DTC by 64%, and those in the inpatient STAR II programs by 44%. A decrease in days of hospitalization not only leads to decreased inpatient costs to the system but also may affect symptomatology positively or negatively depending on patient characteristics and factors related to the specialized treatment approaches. Clinical results indicated that patients in the STAR II and CCM programs experienced a decrease in psychiatric symptoms, whereas standard care patients remained unchanged and DTC patients became more symptomatic. Across programs, patients with other mood disorders (primarily major depression with psychosis) were the least satisfied and were significantly less satisfied than those with schizophrenia.

Many of the studies of specialized treatment for persons with serious mental illness have not addressed costs specifically. Reductions in inpatient service use, fewer relapses, and improvements in psychosocial functioning all may contribute to lowering the cost of treating these patients. The issue of costs, balanced with the other critical issue of patient outcomes, is particularly pertinent in a time of changing health care. The current study is an exploratory analysis that compares the costs incurred by seriously mentally ill veterans in standard care and the three innovative treatment programs.

## Method

This exploratory study was designed to overcome some of the limitations found in studies extant in the literature. First, the sample size of 866 is sufficiently large to ensure that there is adequate power to conduct the analyses. Statistical analyses were conducted that are consistent with the data. This study was conducted over a 5-year period—a baseline, preenrollment year and 4 years of follow-up—so that variables and outcomes of interest could be measured at multiple time points and with sufficient length of follow-up. The study used multiple sources of data: clinician assessment, VA hospital and clinic databases, and VA cost data. And finally, attrition analyses were performed to determine their impact on the longitudinal cost profile.

## Study Sample

In this study, 866 patients out of a larger study of 1,329 veterans with serious mental illness were examined. This study targeted the most persistently mentally ill patients in the VA health care system. The patients were enrolled in fiscal years 1991–1994 in VA medical centers that received demonstration funds for the overall outcome study. Patients were included in the project if they (a) were eligible for VA hospital care; (b) had a diagnosis of psychosis (i.e.,

schizophrenia, bipolar disorder, major depression with psychosis, or organic psychosis) from the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; American Psychiatric Association, 1987); and (c) had 150 or more documented days of hospitalization in the past year or five or more admissions during the past year. Eligible veterans at each demonstration site were assigned by treatment staff to an enhanced treatment program or the comparison condition on the basis of program availability at that site and clinicians' assessments of patient needs. Enrollment occurred in a 1:4 ratio, with 1 comparison patient assigned for every 4 specialized treatment patients. An intention-to-treat follow-up strategy was used, because patients began treatment in their assigned program but may have left those programs or moved in and out of treatment over the course of the study as their skills improved or condition changed (Blow et al., 2000). Specific data about such movement are not available.

Attrition analyses focused on the 1,329 participants who enrolled in the study in fiscal years 1991–1994 and hence were eligible to provide the fourth year of cost data for this longitudinal study. Of these 1,329, 463 (35%) were lost to attrition at an approximate annual attrition rate of 11%. Of the 436 patients, 62% were known to be deceased, another 33% had no available data other than that the caregiver had lost contact with them, and the remaining patients either refused further follow-up, were in jail, or were too ill to complete follow-up. Comparison of the 866 participants who provided both baseline and fourth-year cost data to those lost to attrition revealed that there were no differences in gender, ethnicity, or baseline instrumental activities of daily living (IADL). Those lost to attrition were somewhat older ( $M = 53.1$  vs.  $50.2$  years),  $t(1327) = 3.95$ ,  $p = .001$ ; scored slightly lower on the Global Assessment of Functioning (GAF; Blow et al., 1998), with higher scores reflecting better functioning ( $M = 45.1$  vs.  $46.7$ ),  $t(1327) = 2.02$ ,  $p = .044$ ; and scored slightly lower on the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962), with lower scores reflecting less symptomatology ( $M = 18.4$  vs.  $20.3$ ),  $t(1022) = 2.77$ ,  $p = .005$ . They were more likely to have organic psychosis,  $\chi^2(3, N = 1,329) = 9.77$ ,  $p = .021$ , and were more likely to have been enrolled in standard care but less likely to be enrolled in CCM,  $\chi^2(3, N = 1,329) = 40.51$ ,  $p = .001$ .

## Treatment Programs

Twelve VA hospitals provided the patients who were included in the current study (Blow et al., 1998, 2000). All treatment sites provided at least one of the three types of enhanced care—inpatient rehabilitation and transition in the STAR II program, DTC, or CCM—as well as standard inpatient care. Six hospitals had established STAR II programs (Dobson, McDougall, Busheikin, & Aldous, 1995). DTC were established at five medical centers. Five hospitals operated CCM programs that provided intensive services to patients while they were residing in the community. The comparison group consisted of seriously mentally ill veterans

meeting study criteria who were assigned to standard long-term psychiatric care offered in the VA health care system.

## Measures

Data on the cost of health services for these patients were provided by the Department of Veterans Affairs' Allocation Resource Center (ARC) located in Boston, Massachusetts. The ARC assists VA policy and operations management by developing, maintaining, and utilizing patient-specific workload and expenditure databases. Data were provided from 1990, the year prior to the start of enrollment into the study, through 1998. Because the ARC does not maintain programmatic data for all of the treatment programs in this study, cost data were computed using information reported to the ARC for each individual patient enrolled in these programs. Program costs were calculated relative to each patient's year of enrollment in the study. Altogether, 100% of study patients were matched with the ARC cost data for at least one fiscal year.

## Cost Data

Cost data included both direct and indirect costs on all inpatient and outpatient services, including VA services and subcontracted non-VA services paid for by the VA. Costs were cumulated for the year prior to enrollment and for each of the next 4 years. Costs were adjusted for inflation for Fiscal Year 1991 through Fiscal Year 1996 using average personal services obligations per full-time-equivalent employee supplied by the VA Office of Finance Resource Formulation. Therefore, all costs are presented in Fiscal Year 1990 dollars.

## Patient Functional Assessment Data

All patients were assessed by their clinicians on physical and psychological functioning dimensions at baseline, every 6 months for 2 years, and yearly for 2 years thereafter. Standardized outcome measures were used across all treatment sites and programs. Three key scales were used to measure symptom severity and functioning. The BPRS is a widely used, standardized measure of the severity of 19 symptoms (Overall, 1988; Overall & Gorham, 1962) with scores of 0 (*not present*) to 6 (*extremely severe*) for each item. Total scores can range from 0 to 114, with higher scores indicating greater symptomatology and poorer functioning. The second instrument assessed impairment in functional capacity, that is, impairment in a patient's ability to perform IADL, such as upkeep of their home, shopping, and social activities (Paveza et al., 1990). The scale is the mean of eight items, with possible scores of 0, 1, 2, and 3 for each item and a range of 0-3 for the scale; higher scores indicate poorer functioning. The GAF, equivalent to Axis V in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994), is an overall clinical assessment taking into consideration both psychiatric and functional abilities. Scores on this single-item construct

can range from 1 to 90, with higher scores indicating better functioning. The measures from these items were included to control for cost differences attributable to functional status.

## Patient Descriptive Data

Patient's date of birth, age, program, and physical location were obtained from VA databases or, when data were missing from the national records, from VA personnel at the patient's site of treatment. The patient's age was calculated from his date of birth and the date of enrollment in the Long-Term Mental Health Project.

An attempt was made to assess urban-rural differences, which can be significant, but two communities in the study could not be categorized. Therefore, we decided to compare VAs in terms of geographic region rather than distinguish between rural and urban communities. The U.S. Census region was determined from the hospital location and Census data (United States Bureau of the Census, 1994). When the categorical measure of region was dummied for regression analysis, the Northeast region was omitted and served as the comparison region. The Northeast, for historical reasons, is the region with the greatest concentration of veterans and large psychiatric facilities.

## Statistical Analyses

Data analysis was conducted in several stages. Demographic and other characteristics of the patients in the four treatment programs were compared using chi-square tests for categorical variables and analysis of variance for continuous variables. Cost differences were examined with multiple (repeated measures) analysis of covariance (MANCOVA), and predictors of annual costs were assessed with multiple regression analysis and logistic regression. The primary dependent variables were the annual cost of health care of individuals in each program and dichotomous variables indicating being in the top 10% of annual costs. The independent variable was program. Covariates controlled for baseline differences in age, being Black, being male, region, baseline cost, baseline BPRS, and baseline IADL score. Baseline GAF score was not included because of high multicollinearity with BPRS, as well as the poorer reliability of a single-item measure. Differences between patients in longitudinal analyses and those lost to attrition were assessed with *t* tests, chi-square analysis, and logistic regression.

## Results

### Demographic Characteristics

The 866 study participants were primarily male (95.8%) and Caucasian (85.1%), and over half had never married (52.5%). The primary diagnosis was schizophrenia (81.2%), followed by bipolar disorder (10.4%), other mood disorders (primarily major

depressive disorder with psychosis; 6.8%), and organic psychosis (1.6%). Approximately 37.3% of the patients were enrolled in the STAR II programs, 21.8% were admitted to standard inpatient care, 21.5% were in DTC, and 19.4% were assigned to participate in CCM (see Table 1).

Baseline differences among the program groups were found. Differences in race/ethnicity,  $\chi^2(6, N = 866) = 52.83, p < .001$ , resulted from fewer Black veterans in STAR II and more Black veterans in DTC. There were more women in DTC,  $\chi^2(3, N = 866) = 9.74, p = .021$ . Additionally, patients in the different programs varied in age,  $F(3, 862) = 13.68, p < .001$ . Those in standard care were older than those in any enhanced care program, and those in STAR II were older than those in DTC. There were no differences in diagnosis or marital status.

In the Northeast region, there were more STAR II patients and fewer CCM patients, whereas the South had more DTC but fewer STAR II and CCM patients,  $\chi^2(9, N = 866) = 415.41, p < .001$ . In the West, there were more CCM patients but fewer DTC patients. In the Midwest, there were fewer STAR II and DTC patients but more patients in CCM.

Baseline cost differences were found,  $F(3, 862) = 19.47, p < .001$ , among the programs. DTC patients cost less than patients in other programs (STAR II, CCM, and standard care).

Functional differences also were found. Generally speaking, those in DTC scored better on baseline psychiatric functioning measures. For BPRS,  $F(3, 862) = 6.23, p < .001$ , patients in both standard care and STAR II programs scored worse than DTC patients. On the GAF,  $F(3, 862) = 15.22, p < .001$ , those in standard care, STAR II, and CCM scored worse than those in DTC. Patients in standard care were also more impaired in their ability to carry out IADL in comparison with CCM and DTC patients, and STAR II patients were more impaired than DTC patients,  $F(3, 862) = 11.59, p < .001$ .

### Longitudinal Cost Profile

Figure 1 depicts 4 years of cost data. There was an interaction effect of time by program (Wilks's lambda),  $F(9, 2042.1) = 2.49, p < .008$ , indicating that the effect of program on costs varied over the 4 years of the study. The linear contrast of standard

Table 1  
*Demographic Characteristics of Seriously Mentally Ill Veterans Enrolled in Specialized Treatment Programs, by Program: Standard Care (Inpatient), Sustained Treatment and Rehabilitation Program (STAR II), Community Case Management (CCM), and Day Treatment Center (DTC)*

| Measure                     | Standard care |          | STAR II  |          | CCM      |          | DTC      |          |
|-----------------------------|---------------|----------|----------|----------|----------|----------|----------|----------|
|                             | <i>n</i>      | <i>M</i> | <i>n</i> | <i>M</i> | <i>n</i> | <i>M</i> | <i>n</i> | <i>M</i> |
| Age (years)                 | 189           | 54.5     | 323      | 50.6     | 168      | 47.9     | 186      | 47.1     |
|                             | <i>n</i>      | %        | <i>n</i> | %        | <i>n</i> | %        | <i>n</i> | %        |
| Gender                      |               |          |          |          |          |          |          |          |
| Female                      | 5             | 2.7      | 9        | 2.8      | 7        | 4.2      | 15       | 8.1      |
| Male                        | 184           | 97.4     | 314      | 97.2     | 161      | 95.8     | 171      | 91.9     |
| Total                       | 189           | 100.0    | 323      | 100.0    | 168      | 100.0    | 186      | 100.0    |
| Marital status <sup>a</sup> |               |          |          |          |          |          |          |          |
| Divorced/separated          | 46            | 26.7     | 100      | 32.6     | 53       | 32.3     | 59       | 31.9     |
| Married/widowed             | 29            | 16.9     | 56       | 18.2     | 21       | 12.8     | 29       | 15.7     |
| Never married               | 97            | 56.4     | 151      | 49.2     | 90       | 54.9     | 97       | 52.4     |
| Total                       | 172           | 100.0    | 307      | 100.0    | 164      | 100.0    | 185      | 100.0    |
| Primary diagnosis           |               |          |          |          |          |          |          |          |
| Schizophrenia               | 159           | 84.1     | 254      | 78.6     | 145      | 86.3     | 145      | 78.0     |
| Bipolar                     | 18            | 9.5      | 35       | 10.8     | 12       | 7.1      | 25       | 13.4     |
| Other mood disorder         | 8             | 4.2      | 30       | 9.3      | 7        | 4.2      | 14       | 7.5      |
| Organic psychotic           | 4             | 2.1      | 4        | 1.2      | 4        | 2.4      | 2        | 1.1      |
| Total                       | 189           | 100.0    | 323      | 100.0    | 168      | 100.0    | 186      | 100.0    |
| Race/ethnicity              |               |          |          |          |          |          |          |          |
| Black                       | 24            | 12.7     | 20       | 6.2      | 19       | 11.3     | 40       | 21.5     |
| White                       | 160           | 84.7     | 298      | 92.3     | 134      | 79.8     | 145      | 78.0     |
| Other                       | 5             | 2.7      | 5        | 1.6      | 15       | 11.3     | 1        | 0.5      |
| Total                       | 189           | 100.0    | 323      | 100.0    | 168      | 100.0    | 186      | 100.0    |

<sup>a</sup>Frequency missing = 38.

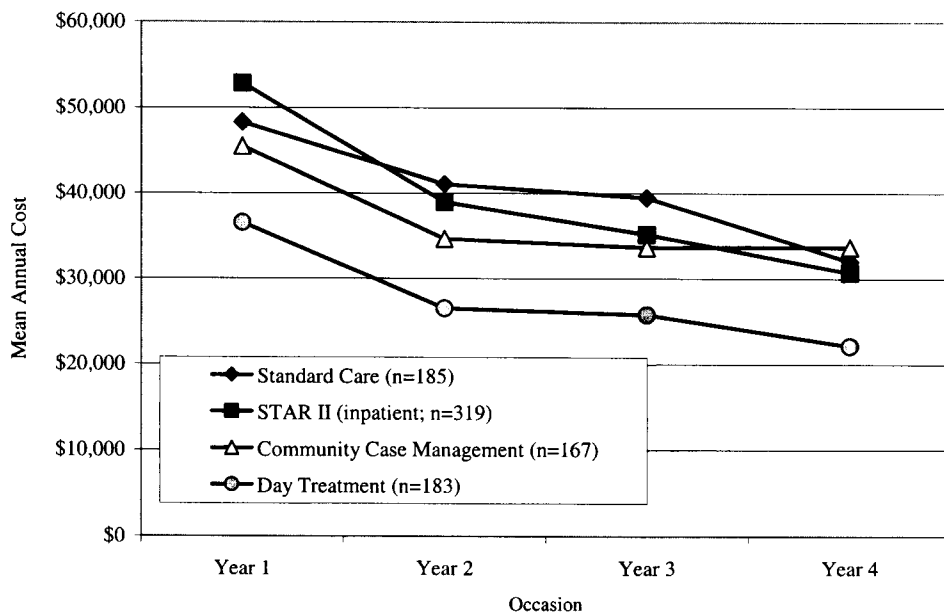


Figure 1. Costs adjusted to average personal services (in Fiscal Year 1990 dollars) for seriously mentally ill veterans over 4 years. STAR II = Sustained Treatment and Rehabilitation Program.

care patients with patients in any enhanced program revealed a significant effect,  $F(1, 841) = 12.55, p < .001$ , consistent with the general finding that standard care was more expensive than enhanced treatment. Specific program differences were found in Year 1, in which DTC cost significantly less than standard care, STAR II, or CCM and CCM cost less than STAR II ( $p < .003$  for all tests). In Year 2, DTC remained the least costly. In Year 3, DTC cost less than standard care and STAR II but was indistinguishable in cost from CCM ( $p < .01$  for both). In Year 4, DTC again cost less than any other program ( $p < .05$  for all). Changes in cost by program over the 4-year period were as follows: for DTC, \$36,557 to \$22,137 (-39%); for STAR II, \$52,867 to \$30,708 (-42%); for CCM, \$45,508 to \$33,704 (-26%); for standard care, \$48,292 to \$32,031 (-34%).

Regional differences were not manifested in the first year. In the second and third years, costs in the West were lower than those in the Midwest and Northeast. In the fourth year, only the West and Northeast differed significantly, with the West remaining less costly.

Patient costs for all programs showed the same basic pattern of change: the highest health care costs occurred in the year of enrollment into a program; costs declined over time; and costs for the fourth year were lowest, except for CCM patients, who showed virtually no change from Year 2 onward. Patients

enrolled in CCM and DTC, two enhanced programs, tended to have lower costs over time, with significantly lower costs than patients in standard care. Patients enrolled in STAR II showed significant decreases in costs by the end of the 4-year follow-up, but their costs were not significantly different from those of patients in standard care.

### Predictors of Costs

**Total costs.** A regression analysis was conducted to determine which variables were the best predictors of costs. The predictors age, baseline functioning scores (BPRS, GAF, and IADL), psychiatric diagnoses, and regions were entered into the analysis initially, followed by program type (STAR II, CCM, and DTC). Diagnosis of schizophrenia, living in the Northeast region, and standard care treatment program were the omitted comparison categories for the regression analyses.

First-year costs were associated with a diagnosis of other (i.e., not bipolar) mood disorders, in comparison with schizophrenia. Patients with other mood disorders were estimated to have a lower total first-year cost by about \$5,671. Prior-year costs were a significant predictor of first-year costs; for every dollar spent in prior year costs, first year costs increased approximately 26 cents. Being in the STAR II program rather than in standard care increased first-year

costs by \$4,761 on average, while being in DTC rather than standard care was associated with an average decreased cost of \$11,670. Patients treated in the Midwest cost on average \$4,024 less the first year. The percentage of variance among subjects accounted for by this model was 26%.

Fourth-year costs were predicted by prior-year costs, region, baseline IADL, and being in DTC. For every prior-year dollar spent, fourth-year costs increased by 21 cents, and for every point increase in impairment in IADLs, costs increased \$3,957. Those in the West averaged a relative savings of \$8,777, and those in DTC rather than standard care cost roughly \$9,640 less. Variance in patient costs accounted for by the regression model was 10%.

To summarize, after prior-year costs were controlled for, the STAR II treatment program was associated with higher costs initially, whereas more severe functional impairment measured by the IADL score was associated with higher costs in the long term. Lower costs were associated with a diagnosis of other mood disorder, with being in the Midwest or West, and with being in DTC.

*Highest costs.* The highest cost group consisted of patients whose costs were in the top 10% of total patient costs. For this analysis, a dichotomous variable was created that differentiated between highest cost (1) and all others (0). The same independent variables described in the previous regression analysis were used in the logistic regression. Odds ratios were calculated to express contributors to the risk of being in the highest cost group.

The likelihood of being in the top decile of costs in the first year decreased by roughly 75% for patients with a diagnosis of other mood disorder rather than schizophrenia; patients in DTC had a 91% decreased chance of being among the most costly compared with those in standard care. The risk of being most costly increased by a factor of 5.6 among those who were most costly before enrollment, by a factor of 2.2 for those in STAR II rather than in standard care, and by about 2.2% for each point increase in baseline BPRS. Region was significantly associated with the likelihood of being high cost: those in the Midwest were 73% less likely to be highest in cost, and those in the South were 93% less likely. The model showed a high association between predicted probabilities and observed responses (area under the Receiver Operator Characteristics curve, 84.8%).

The risk of being among the costliest patients in the final year of the study was 2.5 times greater for those patients who were most costly to begin with. Each point increase on the scale measuring impairment in

IADLs increased the risk by a factor of 1.5. Patients in DTC rather than standard care, however, had a 66% decreased chance of having the highest costs in the fourth year. Region, diagnosis, age, race, and sex were not significant factors in peak fourth-year costs. The proportion of area under the ROC curve was 69.4%.

In summary, high-cost patients were likely to remain high cost over the study period. Impairments in daily life functioning and increased psychiatric symptoms were associated with incurring costs in the top 10%. The diagnosis of other mood disorder was associated with a lowered risk of peak costs. Participation in DTC decreased the odds whereas enrollment in STAR II increased the odds of being in the high-cost group. Regional differences were noticeable in the first but not the final year.

## Discussion

This study found that, overall, alternative treatment modalities for seriously mentally ill patients, such as STAR II, CCM, and DTC, were lower cost options when compared with standard inpatient treatment. In general, there were long-term reductions in costs for all programs studied. Although the overall downward trend may reflect mental health care policy changes that encourage a move away from costly inpatient programming, there were significant differences among the programs within this downward trend.

At baseline, day treatment patients were functioning better both psychiatrically and socially. This finding reflects the clinician's choice of treatment assignment based on patient suitability to the particular treatment program. Better functioning patients with psychosis are more immediately able to live in the community with scheduled support sessions than are more impaired persons. This baseline difference carries the implication that costs may be lower at baseline and thereafter because the mode of treatment delivery is expected to be less expensive. Therefore, the finding that DTC was persistently lower in cost than other treatment programs was not surprising. Of more interest is the finding of no cost differences among standard care, STAR II, and CCM beyond the first year, making the two enhanced treatment programs an attractive alternative to VA standard care, particularly in view of their more beneficial outcomes (Blow et al., 2000). In addition, while DTC may be the lowest cost approach to treating patients with psychosis, it is not necessarily the best choice for the individual. Treatment must match the needs of the patient in order to produce the most beneficial

outcomes for the patient and ultimately the best results for the health care system in the long run.

Examination of the predictors of cost for the various programs found that much of the variation in costs could be attributed to differences that may prove difficult to change: geographic region and illness type. Investigation into administrative structure and patient populations might provide insight into why the geographic differences exist, although regional cost differences in supplies, labor, real estate, and transportation may explain this phenomenon in large part. On the other hand, Ashton et al. (1999) found that geographic differences in VA hospital use mirrored that found in the private sector and attributed it to physician practice styles. Given the intriguing literature developing on the instability of psychosis diagnosis (Chen, Swann, & Johnson, 1998), cost differences by diagnosis may be amenable to change, particularly if difficulties in making a diagnosis are resulting in inappropriate treatment, which cannot be cost effective.

Impairments in daily life functioning and increased psychiatric symptoms contribute to the high cost of long-term care for patients severely afflicted with psychosis. Programs that address skills acquisition and maintenance must be continued to encourage community living and to partially offset potentially greater costs of complex care. The evaluation of this project found that although no program improved IADLs, patients in the enhanced programs generally maintained their IADL levels whereas those in standard care lost ground (Blow et al., 2000). The initial cost of the STAR II program is well worth the long-range benefit accrued to these seriously mentally ill patients who were not able to begin treatment in an outpatient setting.

Only 65% of patients were in the study or programs through the fourth year of follow-up. Patients lost to attrition were significantly older, had slightly lower global functioning assessments, had slightly fewer psychiatric symptoms, and were more likely to be enrolled in standard care. This finding has implications for programs regarding the patients who need to be targeted for more intensive follow-up procedures to ensure that lower functioning, seriously mentally ill patients do not drop out of care and suffer potentially worse outcomes than those who remain in contact with treatment programs.

Those patients who maintained system contact throughout the study were more likely to be in the enhanced programs rather than standard care. One of the benefits to enrollment in these alternative programs, in addition to lower costs, may be that these

approaches promote continuity of care for veterans with serious mental illnesses. Of note, however, is the finding from the larger study of treatment effectiveness that indicated patients in DTC became more symptomatic over the course of the first 3 years of the study. This form of treatment, because it can be less intensive than the other models of care, may promote retention of patients even though they become more symptomatic. Further research is needed to determine how to optimize care for the most difficult-to-treat patients.

There are three limitations to address in this study. First, this investigation used a quasi-experimental design (McKay, Alterman, McLellan, Snider, & O'Brien, 1995; Speer & Newman, 1996). The design was used to evaluate the costs of alternative treatment programs as they are practiced in the Veterans Health Administration. Although the study did not encompass random assignment of patients to the interventions or standardized interventions across treatment sites, quasi-experimental designs are valid, practical approaches to studies such as this one of psychiatric treatment options in a large health care system in which treatment programs are implemented and ongoing (Cook & Campbell, 1979; Singleton, Straits, & Straits, 1993).

Second, in studying treatment programs across the United States, one may find variation in how the programs are deployed. As part of the larger study, each site provided detailed descriptions of their services. Sites implementing each model of enhanced care—CCM, DTC, and STAR II—followed the basic tenets of each model and provided the same basic services. There was, however, some variation in the amounts of care in the community and where in the community or VA the programs were housed. These are issues for future studies to address.

Third, cost data are not accrued by program. As a consequence, these data were derived by summing the costs of each patient enrolled in a particular program. The specific proportions of costs attributable to each program are unknown. However, cost data included both direct and indirect costs available on all inpatient and outpatient as well as VA and subcontracted non-VA services.

Although these factors limit the generalizability of this study, they are a direct result of the type of care provided to seriously mentally ill patients treated by public health care systems. In spite of these limitations, this investigation had a large sample size that was sufficient to conduct these analyses, featured a systematic multiple-stage approach to longitudinal data collection with clearly delineated outcome



variables, and included a comparison group to compare specialized programs to traditional programs for patients with serious and persistent mental illnesses. The quasi-experimental design had sufficient external validity to draw conclusions regarding the cost of delivery of alternative types of treatment to seriously mentally ill patients in a large medical health care system.

The implications of this study are pertinent to the large health care systems that are developing alternative methods of treatment for high-risk, high-cost patients, particularly those with serious mental illnesses. Short-term cost benefits can be gained through the clinically justified assignment of seriously mentally ill patients to enhanced programs, such as CCM and DTC, whereas long-term cost benefits also accrue from the use of the STAR II program, which prepares inpatients for movement into the community. The decreased costs attributable to STAR II patients suggest that they successfully made the transition away from inpatient care.

This study, and ones similar to it, shows that innovative programs for patients with serious and persistent mental illnesses result in reduced care costs without compromising patients' functional levels or quality of life. The commitment to the improved care of these challenging patients remains a priority for publicly funded health care systems to address and is well justified, in terms of both clinical outcomes and resource allocation. In addition, this study provides important information to taxpayers and policymakers to investigate the costs of a Congressionally mandated program, using the best data that are available. It illustrates that the urgent needs of the vulnerable mentally ill can be met through fiscally circumspect treatment strategies. From a policy standpoint, targeting innovative community-based psychiatric programs to the most difficult-to-treat patients can have positive overall effects on large health care systems in a time of change to a more managed mental health environment.

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