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Dual diagnosis patients in community or hospital care: One-year outcomes and health care utilization and costs

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Abstract
Background: Services for dual diagnosis patients are strained by reductions in hospital-based inpatient treatment facilities and the lengths of inpatient stays in order to reduce health care costs.
Aims: This study evaluated the effectiveness and cost-effectiveness of community- and hospital-based acute residential treatment for dually disordered patients, and whether moderately-ill patients benefitted more from community care, and severely-ill patients from hospital care.
Method: Patients ($N = 230$) with dual substance use and psychiatric disorders were randomly assigned to community or hospital acute care programs that had the same level of service-intensity. They were followed for 1 year (80%) using the Addiction Severity Index. Patients' health care utilization was assessed from charts, VA databases, and health care diaries; costs were assigned using methods established by the VA Health Economics Resource Center.
Results: Patients had better substance use outcomes when they were initially assigned to community rather than to hospital acute care. Patients assigned to hospital care had shorter index stays, but these index stays were more costly than were the longer index stays of patients assigned to community care. Patients assigned to hospital care also had more mental health follow-up outpatient visits, and more costly mental health follow-up stays, over the study year.
Conclusions: Cost savings may be achieved without loss of benefit to all but the most decompensated dually disordered patients by shifting the locus of acute treatment from hospital to community care.
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Keywords: *Dual diagnosis, community-based care, hospital-based care, cost-effectiveness*

Introduction

Increasing numbers of dual diagnosis patients are challenging health services, particularly the addiction and psychiatric treatment systems (Grella & Gilmore, 2002; Watkins et al., 2001). Compared with either substance use or psychiatric patients, patients with both problems have higher use of health services, as well as housing instability and homelessness, and violent and criminal behavior (Drake et al., 1996; Phillips, 2000; Virgo et al., 2001). Services for dual diagnosis patients have been strained by efforts to reduce the number of hospital-based inpatient treatment facilities and the lengths of inpatient stays in order to reduce health care costs, as well as by the press to provide treatment in less restrictive

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settings. There has been a shift in the locus of acute treatment for dual diagnosis patients from hospital-based inpatient to community residential care (Humphreys & Horst, 2002; Nuttbrock et al., 1998; Piette & Fong, 2000).

This study evaluated the effectiveness and cost-effectiveness of community-based and hospital-based acute residential treatment for dually disordered patients. It also examined the possibility that patients with moderate substance use and psychiatric disorders may be treated as or more effectively in community as in hospital residential settings, whereas patients with severe disorders may benefit more from hospital-based treatment.

Community- versus hospital-based acute care

Previous studies comparing outcomes and costs of community- and hospital-based care described the treatment settings in general terms. The studies did not systematically assess the community and hospital settings to determine whether they were comparable in terms of the intensity of services provided to patients. In addition, most previous comparisons of community- and hospital-based care have focused on patients with psychiatric disorders only.

Some of these studies found that patients treated in community or hospital residential programs were comparable on outcomes, but that community care was less costly. For example, psychiatric patients randomly assigned to a community or hospital program had comparable symptom improvement and acute care utilization rates over a 6-month follow-up. In addition, the community program's cost per episode of care was 44% of the hospital program's, and community patients had lower treatment costs during follow-up (Fenton et al., 1998; Fenton et al., 2002). In observational studies, community and hospital residential programs had psychiatric patients with similar levels of improvement and stability in treatment gains, and the cost of treatment was lower for community programs (Beecham, 1996; Hawthorne et al., 1999).

In contrast to these studies, others have found that patients in community programs have better outcomes than those in hospital programs, but that the community programs are more costly. An observational study of psychiatric patients reported that, compared to patients in hospital programs, those in community programs had more psychiatric symptom improvement at a 1-year follow-up and remained in better contact with continuing care services while having fewer acute readmissions and spending less time in acute inpatient units. However, community-based programs also had higher costs per patient, which were attributed to longer lengths of stay (Boardman et al., 1999; Haycox et al., 1999).

Two studies of dual diagnosis patients found that hospital care was more effective than community care. Moos, Finney, and Moos (2000) reported that dual diagnosis patients who entered hospital-based care had better psychiatric and employment outcomes, but comparable substance use outcomes, to those who entered community-based care. Similarly, Rosenheck and Fontana (2001) reported that the effectiveness of treatment for dual diagnosis patients, assessed in terms of alcohol and drug use and violent behavior at a 4-month follow-up, declined in programs that converted from a hospital to a community residential treatment model. These studies did not examine patients' health care utilization or the cost-effectiveness of care.

Matching patients' symptom severity to program location

Previous observational studies comparing community- to hospital-based care have not reported the extent to which providers may have considered patients' symptom severity

when deciding on the program location for treatment. Neither have randomized studies used patients' symptom severity to determine the optimal matching to program location for achieving beneficial outcomes. In this regard, the extent and direction of relationships between the treatment program's location or setting and treatment effectiveness and cost-effectiveness may depend on the nature of patients' impairments. Hospital-based care may provide more benefit to more severely-ill dual diagnosis patients because inpatient programs often have a stronger adherence to a directive treatment orientation and provide more integrated treatment plans (Moos et al., 2000a). Moderately disordered dual diagnosis patients tend to do well in a broader range of programs (Simpson et al., 1999). Nonetheless, hospital-based programs may create a treatment environment lacking in opportunities for personal control, demand, and challenge such that better-functioning patients respond maladaptively, that is, with continued poor functioning and high levels of health care utilization (Timko & Moos, 1989; Timko et al., 1993).

In an observational study, Garrod and Vick (1999) found that more severely and chronically mentally ill patients cost more to care for in the community than they did to care for in the hospital. In contrast, moderately-ill patients cost more to care for in the hospital than in the community. This occurred largely because severely-ill patients living in the community required the most expensive settings with high staff-patient ratios, whereas moderately-ill patients resided in less costly community care options with lower ratios of staff to patients.

We compared dual diagnosis patients who were randomly assigned to an index stay in a community or hospital program. Patients were followed for 1 year and compared on the outcomes of alcohol and drug use, psychiatric functioning, and health care utilization and costs. Because the community and hospital acute care programs were selected to be equivalent on the intensity of services they provided, any differences found between programs on patients' outcomes and health care over the year can be linked to setting rather than service-intensity. In addition to comparing community to hospital care overall, we hypothesized that patients with severe clinical problems would have better outcomes in hospital programs but that, in contrast, patients with moderate clinical problems should have similar or even better outcomes in community-based programs.

Methods

Site selection

To select data collection sites, a survey was conducted of all 406 hospital-based substance abuse and psychiatric treatment programs in the USA's Department of Veterans Affairs (VA) nationwide. Publicly funded by the federal government, the VA operates the largest psychiatric and substance abuse treatment systems in the United States. Completed surveys were received from 383 (95%) program managers. In addition, a survey was conducted of 321 community residential facilities (CRFs) that contracted with the VA to provide treatment services for veterans and also provided services to non-veterans; 299 (93%) program managers completed this survey.

As part of the surveys, programs were rated on Service Intensity, which is a measure taken from the Residential Substance Abuse and Psychiatric Programs Inventory, assessing the availability of 31 health and treatment services, and 10 social-recreational services, within the program (Timko, 1995; Timko & Sempel, 2004). The measure's item scores were summed and raw scores were converted to percentage scores (range = 5 – 100%, Cronbach's alpha = .81).

Each hospital program and CRF was classified as high-intensity or low-intensity. Specifically, high-intensity hospital and CRF programs scored above the median (72.8%) of hospital programs on Service Intensity; low-intensity programs scored below the hospital program median on this measure. (For a more complete description of the treatment provided in high and low service-intensity programs, see Timko & Sempel, 2004.) Assessments of the quantity of services confirmed the classification of programs, in that high-intensity programs provided the services they had available to higher proportions of patients and for more hours per week per patient than did low-intensity programs. For example, regarding each rehabilitation service (daily living skills training, social skills training, vocational counseling, work therapy, occupational therapy), high-intensity programs gave 25% more of their patients the service in a typical week, for two to three times as many hours. In addition, in high-intensity programs, social-recreational activities were offered one to two times a week, compared to once a month in low-intensity programs.

We recruited 3 high- and 4 low-intensity hospital programs that admitted at least 3 dual diagnosis (substance use and psychiatric) patients per month and were in a facility that contracted with a CRF that was of the same service intensity (high or low) as the hospital program. All CRF programs that were paired with a hospital program also participated. The hospital program-CRF pairs were located throughout the USA.

Procedures

Project participants were veterans who were referred to and/or sought substance misuse treatment at the facilities in which the seven participating hospital programs were located, and were triaged to inpatient rather than outpatient care. All participants signed an informed consent form after receiving a complete description of the study. They were evaluated with the Addiction Severity Index (ASI; McLellan et al., 1992) during an initial period of stabilization.

The ASI is a structured, 40-minute clinical research interview that assesses seven problem areas, three of which are reported here: alcohol use, drug use, and psychiatric. Two kinds of scores are produced for each area: *Severity* ratings represent global clinical judgments of the patient's problems, and *Composites* represent a summary of specific indices that reflect the patient's status at baseline and outcome.

The 10-point severity ratings are used for initial treatment planning and referral, and provide valid, reliable (i.e., internally consistent, consistent across testing occasions and raters), and clinically useful estimates of problem severity (McLellan et al., 1985; Timko & Moos, 2002). In each domain, severity ratings can be broken down as: $0-1=$ no real problem, treatment not indicated; $2-6=$ moderate problem, treatment indicated; $7-9=$ considerable to extreme problem, treatment necessary. Based on procedures by Timko and Moos (2002), patients were classified as high-severity when they scored at least 7 on the alcohol and/or drug and at least 7 on the psychiatric baseline severity ratings. They were classified as moderate-severity when they scored less than 7 on the alcohol and drug, and/or on the psychiatric, baseline severity ratings.

Consenting patients who were eligible for the study were randomly assigned to hospital or CRF placement. However, not all patients randomly assigned to the CRF were placed there. This occurred when VA facility funds for CRF contracts in a particular fiscal year were completely expended, and therefore project participants could not be sent to the CRF. As in previous comparisons of hospital and community care (e.g., Boardman et al., 1999), when patients were randomly assigned to the CRF, but a CRF bed was not available (due to a

temporary lack of funds), patients were retained in the study and remained in the hospital program. These patients ($N = 58$) were retained because they had been compliant with random assignment procedures (Staines et al., 1999; Ward et al., 1999).

Participants

Of 263 potential participants, 230 (87.5%) provided informed consent and met eligibility criteria, i.e., were diagnosed with co-occurring substance use and psychiatric disorders and clinically evaluated by program staff as not an immediate danger to themselves or others. Most of the 230 participants were men (96.5%). At intake to treatment, on average, participants were 45.4 years old (SD = 7.0) and had completed 12.8 years of education (SD = 1.9). Most participants were white (48.7%) or African American (47.0%), and most were employed (68.7%); only 22.6% were married at intake.

In their medical record, patients had from 1 to 4 substance use-related diagnoses (mean number = 1.70, SD = .77). Most commonly, patients had abuse/dependence of alcohol alone (33%), alcohol and cocaine (20%), cocaine alone (10%), or alcohol, cocaine, and cannabis (8%). Patients had from 1 to 3 psychiatric diagnoses (M = 1.08, SD = .28). The most common were major depression (19%), bipolar (16%), PTSD (11%) or another anxiety disorder (11%), schizophrenia (8%), and dysthymia (8%). On average, patients had been treated (inpatient, residential, and/or outpatient) 2.8 (SD = 3.8) previous times for their substance use problems, and 4.6 (SD = 8.1) times for their psychiatric problems.

According to patients' self-reports at baseline, during the previous month, 78% had experienced serious signs of depression, and 80% of anxiety; 27% had visual and/or auditory hallucinations, and 28% episodes of violence; and 43% had seriously considered committing suicide, and 8% had attempted suicide during the month. In addition, 66% were in possession of prescription medications for their psychiatric problems.

Results of *t*-tests showed that patients placed in hospital care ($N = 173$) were comparable to patients placed in CRF care ($N = 57$) on baseline ASI severity ratings in the domains of alcohol use and drug use, but hospital patients had somewhat higher baseline ratings on psychiatric severity ($p < .05$). Therefore, we controlled for patients' baseline status in analyses.

Follow-up assessments

Patients were followed at program termination, that is, at discharge or upon leaving against medical advice (98%), and at 1 year (80%). They were assessed with the ASI at each follow-up, yielding composite scores in each of the three problem areas (that is, alcohol, drug, and psychiatric). The composite scores are produced from sets of objective items that are standardized and summed (McLellan et al., 1992) and range from 0 – 1. The questions measure the number, extent, and duration of problem symptoms in the patient's lifetime and in the past 30 days. The patient also supplies a subjective report of the recent (past 30 days) troublesomeness and importance of treatment for the problem area. Analyses showed that patients who participated in follow-ups did not differ from those who did not on demographic characteristics or on ASI composite scores at baseline.

We used the ASI data to construct a dual disorder problem score at intake and each follow-up (Chen et al., 2004). To obtain this score, we averaged the alcohol and drug composites and added the psychiatric composite to the average.

Utilization of health services

Length of index stay. We refer to the patient's stay in the community or hospital program as the index stay. At discharge, the number of days each patient stayed in the program was assessed from the patient's chart and used to create the utilization variable *length of index stay*.

Length of follow-up stays. At the 1-year follow-up, the number of days patients stayed in community or hospital programs since discharge from the index stay was assessed. The VA Patient Treatment File (PTF) was used to assess the number of days patients stayed in VA specialized mental health (i.e., substance use or psychiatric) and medical care programs.

Interviews at 4-, 8-, and 12-month follow-ups were conducted to obtain information about use of non-VA health care services. At discharge from the index stay, patients were given a health utilization diary in which to record any such care received. In each follow-up interview, patients were asked whether they were treated in a non-VA hospital or community residential setting for alcohol or drug problems, emotional or mental health problems, or a medical condition during the specified period; if so, they were asked the number of days for each time they were so treated, and for the name and location of the facility. We verified hospital and community residential admissions by contacting the facility that provided care.

We tabulated the number of days the patient stayed in VA and non-VA inpatient/residential mental health care to indicate the *length of mental health follow-up stays* and the number of days in medical care to indicate the *length of medical follow-up stays*. *Total index and follow-up stays* is the number of days the patient used community or hospital services for specialty mental health and medical care over the index and follow-up periods.

Outpatient care. The VA National Patient Care Database (NPCD) was used to assess VA outpatient utilization between discharge from the index stay and the 1-year follow-up. Specialized mental health care was distinguished from medical care. Regarding non-VA outpatient services, at each follow-up interview, patients were asked if they had received outpatient treatment during the specified period for substance use, psychological, or medical problems, and if so, how many visits they had. Patients were asked to refer to their diaries when providing this information. We combined VA and non-VA outpatient utilization to measure the number of *mental health follow-up visits* and the number of *medical follow-up visits*. *Total visits* is the number of outpatient visits the patient had for mental health and medical care over the follow-up period.

Cost of health services

Cost of index stay. For VA programs, the cost of the index stay was estimated using microcosting methods. The director of each program provided the number of occupied beds as well as the number of full-time equivalent employees for each type of staff (e.g., Certified Addiction Therapist, Psychiatrist, Vocational or Practical Nurse). Average salaries from the VA Financial Management System were used to estimate staff costs in each program. The annual staffing cost was divided by 365 to determine the staffing cost per day which was divided by the average number of occupied beds during the year to obtain staff cost per patient per day. Based on VA data, we added $14/day for patient meals. Then, to account for overhead costs (e.g., space, administrative support, utilities), we added 70% of the daily staffing plus meal costs (70% is the national average ratio of overhead to direct cost for VA

inpatient mental health treatment [Barnett, 2003]). The total daily cost was multiplied by the patient's length of stay to obtain the cost of an index VA hospital stay.

The director of each community residential program provided the average per diem charge for veteran patients. To this, we added 25% to represent the VA cost of administering contracted community care programs. The overall daily cost was multiplied by the patient's length of stay to obtain the cost of the index stay for each community program.

Cost of mental health follow-up stays. To estimate the daily cost of VA mental health (i.e., substance use, psychiatric) inpatient/residential stays during the follow-up period, we used average cost methods established by the VA Health Economics Resource Center (HERC) (Wagner et al., 2003), which estimated substance use disorder care to cost $418 per day and psychiatric care to cost $744 per day. We estimated the daily cost of non-VA inpatient and residential care using the VA rate for comparable care. For each type of stay, the daily cost was multiplied by the patient's length of stay to obtain the total cost.

Cost of medical follow-up stays. We found the daily cost of acute VA medical hospital stays using the HERC average cost method (Wagner et al., 2003). This method assigns costs based on the acuity of the condition as represented by the Diagnosis Related Group (DRG). For non-VA medical care, because we did not know the DRG, we used the mean daily cost of VA acute medical care. Daily cost was multiplied by length of stay to obtain total cost.

Cost of mental health and medical follow-up visits. To assign the cost of patients' VA mental health and medical visits during the follow-up period, we used a microcosting method. This method matched Common Procedure Terminology codes (i.e., codes used in the USA for public and private health-related transactions for common services) with Medicare payment rates (i.e., the amount for a health-related item or service that is paid by Medicare, which is a federal health insurance program in the USA) and aggregated VA budget data to estimate the cost of every VA outpatient visit (Phibbs et al., 2003). The costs of non-VA mental health and medical visits were estimated as the mean costs of comparable VA visits. Cost per visit was multiplied by the number of visits to calculate the total cost.

Total cost of outpatient visits. The total cost of outpatient visits was the total cost of VA and non-VA mental health and medical follow-up visits.

Total health services cost. Total health services costs included the total cost of index and follow-up inpatient/residential stays for mental health and medical care, plus the cost of all outpatient visits.

Analyses

We conducted Analyses of Covariance (ANCOVAs) to compare patients in community or hospital programs on ASI composite scores; covariates were the intake value of the corresponding composite score and treatment facility site (dummy coded). We also conducted ANCOVAs to compare patients in community or hospital programs on health care utilization and costs; for these analyses, the covariates were the intake value of the dual problem score and facility site. In addition, for the cost analyses, data were log-transformed beforehand to normalize distributions (Dickinson et al., 2005; Manning, 1998). Next, to examine possible benefits of matching patient severity to program location, ANCOVAs were conducted for high-severity and moderate-severity patient groups separately.

Results

Comparisons of patients in hospital or community programs

ASI scores. Table I presents the results of ANCOVAs comparing patients in hospital or community programs on ASI composite and dual problem scores at the 1-year follow-up. Lower ASI composite scores indicate less severe problems. CRF patients had less severe alcohol and drug problems at 1 year than did hospital patients when patients' intake status and facility site were controlled.

Health care utilization. We also conducted ANCOVAs to compare patients in hospital or community programs on average health care utilization, controlling for patients' dual problem scores at baseline and facility site (Table II). Patients in CRFs had a longer index stay than did patients in hospitals. Over the study year, patients assigned to CRFs had more days of inpatient/residential care. In addition, patients in CRFs had fewer mental health follow-up visits and fewer outpatient visits in total.

Health care costs. As seen in Table III, we also conducted ANCOVAs to compare patients in hospital or community programs on the average costs of health care (after data were log-transformed), controlling for patients' dual problem scores at intake and facility site. Patients assigned to hospital care had a more costly index stay, and they also had more costly

Table I. ASI scores at 1 year of patients assigned to hospital or community care, controlling for baseline value of score and facility site.

ASI composites	Hospital ($n = 173$) Mean (SD)	Community ($n = 57$) Mean (SD)	F
Alcohol	.184 (.247)	.169 (.261)	5.83**
Drug	.070 (.110)	.045 (.059)	3.18*
Psychiatric	.393 (.275)	.361 (.284)	.54
Dual problem score	.523 (.371)	.468 (.372)	2.32

*$p < .05$; **$p < .01$.

Table II. Health services utilization by patients assigned to hospital or community care, controlling for baseline dual problem score and facility site.

	Hospital ($n = 173$) Mean (SD)	Community ($n = 57$) Mean (SD)	F
Inpatient/residential care (days)			
Index stay	26.01 (21.35)	55.39 (51.39)	94.61***
Mental health follow-ups (Used by 136 patients)	41.20 (69.04)	20.58 (44.47)	1.50
Medical follow-ups (Used by 91 patients)	9.28 (17.83)	9.89 (28.42)	1.05
Total index and follow-up stays	78.49 (82.77)	85.86 (78.56)	7.97**
Outpatient care (visits)			
Mental health follow-up visits (Used by 228 patients)	96.42 (88.59)	71.26 (78.70)	3.75*
Medical follow-up visits (Used by 226 patients)	33.10 (29.95)	32.84 (35.44)	.33
Total visits	129.53 (102.63)	104.10 (100.98)	3.10*

*$p < .05$; **$p < .01$; ***$p < .001$.

mental health follow-up stays. Patients in hospital or community programs did not differ on the costs of mental health or medical outpatient care.

Matching patient severity to program location

ASI composites. Table IV compares the ASI composite and dual problem scores at 1 year of high-severity patients in hospital or community programs. High-severity patients treated in hospital or community programs did not differ on alcohol, drug, psychiatric, or dual problems. The table also shows that moderate-severity patients treated in community programs had better outcomes on the ASI alcohol composite, but otherwise did not differ from hospital patients on ASI scores at 1 year.

Health services utilization. As seen in Table V, high-severity patients in hospitals had a shorter index stay than did high-severity patients in community programs. High-severity patients in hospitals had more outpatient visits for mental health problems, and more outpatient visits overall (i.e., mental health and medical combined).

Similarly, moderate-severity patients in hospitals had a shorter index stay, and fewer days of inpatient/residential care over the study year, than did moderate-severity patients in community programs. Moderate-severity patients in hospital and community programs

Table III. Health services costs of patients assigned to hospital or community care, controlling for baseline dual problem score and facility site.

	Hospital ($n = 173$) Mean (SD)	Community ($n = 57$) Mean (SD)	F
Inpatient/residential care			
Index stay	$5,217 ($4,256)	$4,986 ($4,497)	4.93*
Mental health follow-up stays	$16,257 ($17,514)	$7,848 ($11,232)	4.74*
Medical follow-up stays	$3,088 ($7,291)	$2,242 ($6,657)	.36
Total index and follow-up stays	$24,562 ($21,505)	$15,076 ($15,203)	.42
Outpatient care (visits)			
Mental health follow-up visits	$6,298 ($6,642)	$4,853 ($5,581)	2.19
Medical follow-up visits	$2,328 ($2,647)	$2,038 ($1,998)	.06
Total visits	$8,625 ($7,760)	$6,891 ($6,547)	1.99
Total care	$33,188 ($25,473)	$21,966 ($17,599)	.002

*$p < .05$.

Table IV. ASI scores at 1 year of high-severity and moderate-severity patients assigned to hospital or community care, controlling for baseline value of score and facility site.

	High-severity patients			Moderate-severity patients		
	Hospital ($n = 82$) Mean	CRF ($n = 16$) Mean	F	Hospital ($n = 91$) Mean	CRF ($n = 41$) Mean	F
ASI composites						
Alcohol use	.152	.171	.65	.210	.168	4.42*
Drug use	.093	.040	2.70	.052	.046	1.42
Psychiatric	.410	.413	.30	.379	.340	1.89
Dual problem score	.538	.519	.18	.510	.447	2.12

*$p < .05$.

were comparable on average numbers of outpatient visits for mental health and medical problems.

Health care costs. Table VI shows that the index stay and mental health and medical follow-up stays were not significantly more or less costly for high-severity patients in hospital programs than for high-severity patients in CRFs. High-severity patients in hospitals had

Table V. Health services utilization over 1 year of high-severity and moderate-severity patients assigned to hospital or community care, controlling for baseline dual problem score and facility site.

	High-severity patients			Moderate-severity patients		
	Hospital ($n = 82$) Mean	CRF ($n = 16$) Mean	F	Hospital ($n = 91$) Mean	CRF ($n = 41$) Mean	F
Inpatient/residential care (days)						
Index stay	29.96	64.18	19.47**	22.44	51.95	111.81***
Mental health follow-up stays	49.77	43.31	1.61	33.48	11.71	.27
Medical follow-up stays	13.43	13.00	.12	5.55	8.68	.79
Total index and follow-up stays	93.16	120.50	.46	61.47	72.34	10.55***
Outpatient care (visits)						
Mental health follow-up visits	108.65	59.00	5.75*	85.41	76.05	.29
Medical follow-up visits	27.44	27.25	.56	38.20	35.02	.01
Total visits	136.08	86.25	5.35*	123.61	111.07	.20

*$p < .05$; **$p < .01$; ***$p < .001$.

Table VI. Health care costs over 1 year of high-severity and moderate-severity patients assigned to hospital or community care, controlling for baseline dual problem score and facility site.

	High-severity patients			Moderate-severity patients		
	Hospital ($n = 82$) Mean	CRF ($n = 16$) Mean	F	Hospital ($n = 91$) Mean	CRF ($n = 41$) Mean	F
Inpatient/residential care						
Index stay	$5,804	$6,364	3.01	$4,688	$4,447	1.95
Mental health follow-up stays	$21,470	$16,749	.10	$11,560	$4,374	5.73*
Medical follow-up stays	$3,946	$1,779	.04	$2,315	$2,423	.34
Total index and follow-up stays	$31,209	$24,893	.84	$18,564	$11,244	.27
Outpatient care						
Mental health follow-up visits	$7,403	$4,089	4.36*	$5,301	$5,151	.09
Medical follow-up visits	$2,506	$2,154	.02	$2,167	$1,992	.02
Total visits	$9,909	$6,242	3.68*	$7,469	$7,144	.03
Total health care	$41,128	$31,135	.43	$26,033	$18,388	.25

*$p < .05$.

more costly outpatient follow-up visits for mental health problems, and more costly outpatient mental health and medical visits combined, than did high-severity patients in CRFs.

The mental health follow-up stays over the study year were more costly for moderate-severity patients in hospital programs than for those in CRFs. Moderate-severity patients treated in hospitals or CRFs had comparable outpatient health care costs.

Discussion

Dually diagnosed patients who were followed for one year had better substance use outcomes when they were initially assigned to community rather than to hospital acute care. Patients assigned to hospital care had shorter index stays, but these index stays were more costly than were the longer index stays of patients assigned to community care. Patients assigned to hospital care also had more mental health visits, and more costly mental health follow-up stays, over the study year.

Our finding that hospital care was more expensive without yielding better outcomes agrees with reports on psychiatric patients by Fenton et al. (1998, 2002) and Hawthorne et al. (1999). It extends previous work with dual diagnosis patients (Moos et al., 2000a; Rosenheck & Fontana, 2001) by demonstrating that community care may be more effective in the substance use domain, and as effective in the psychiatric domain, as hospital care for this population, when service-intensity is the same in both locations. Patients in hospital programs may have received inadequate ''doses'' of treatment in that they had a shorter duration of care, despite research evidence that longer episodes of care are beneficial to dual diagnosis patients (Moos et al., 2000b). Other studies have also found relatively greater improvement on substance use measures than on psychiatric symptoms among treated dual diagnosis patients, possibly because substance use coping skills (requiring patients to resist temptations to use alcohol and drugs) are taught more frequently and effectively than are general coping skills (requiring patients to take actions to resolve life stressors such as psychological dysfunction) (Moggi et al., 1999).

Studies have not examined how community substance use and psychiatric programs achieve cost savings when they provide a comparable intensity of services for patients with comparable characteristics and outcomes to those of hospital programs. Some have suggested that community programs are more cost-effective than hospitals in part because they provide comparable services with fewer staff who are more likely to be paraprofessionals, and have less stringent building requirements (Humphreys & Horst, 2002; Hyde et al., 1987; Lapsley et al., 2000; Moltzen et al., 1986; Reinharz et al., 2000). Regarding staffing, we found that, on average, community programs had a lower ratio of direct care staff per patient (Ms = .18 in CRFs, .59 in hospital programs; $t = 7.91$, $p < .001$) and a higher percentage of direct care staff who were paraprofessionals (Ms = 84% in community programs vs. 56% in hospital programs; $t = 15.59$, $p < .001$). Evidence regarding the important issue of how community programs may achieve cost savings without reducing services is quite limited, but more information in this area could help hospital programs reduce costs while providing care of high quality.

Moderate-severity dual diagnosis patients were treated more effectively in community-based programs. Compared to hospital-based programs, community programs may have had treatment environments emphasizing personal responsibility such that moderately-ill patients responded by decreasing their substance misuse (Timko & Moos, 1989; Timko et al., 1993). Moderately-ill patients in hospital programs also had more costly mental health follow-up stays over the study year (Garrod & Vick, 1999). In contrast, high-severity patients

were treated as effectively in community as in hospital-based acute care programs. High-severity patients in the hospital also had more, and more costly, mental health follow-up visits than did high-severity patients in community settings, underscoring the possibility that such patients in hospital programs received inadequate doses of treatment due to their shorter duration of care. Findings for high-severity patients may not hold for those who are even more severely ill than those considered for this study (i.e., at immediate risk of harming themselves or others) and therefore are not clinically eligible for treatment in community programs. Nevertheless, studies have found that the majority of patients with psychiatric problems who need residential rather than outpatient care are eligible for community-based care (Fenton et al., 2002; Sledge et al., 1996).

Cost-effectiveness

To examine cost-effectiveness, we calculated a dichotomous 1-year outcome representing remission: for the 30 days prior to the follow-up interview, the patient reported no alcohol or drug use (76% of CRF patients, and 64% of hospital patients; $p > .05$) and no psychiatric or emotional problems (29% of CRF patients, and 20% of hospital patients; $p > .05$). By this definition, 16% of hospital patients, and 26% of CRF patients, were remitted at 1 year ($p > .05$). Among the remitted hospital patients, the average health care costs over the study year were $25,462. Among the remitted CRF patients, the average health care costs over the study year were $12,174, or just under half of the health services costs of the patients assigned to hospital care. Although these findings must be viewed with caution because of the small numbers of patients involved, they indicate the possibility that CRF care achieved a higher percentage of patients in remission at a lower cost per remitted patient. They suggest that cost savings may be achieved without loss of benefit to patients by the shift from hospital to community care.

Benefits of community residential care for dual diagnosis patients

We found that patients in CRFs achieved better substance use and comparable psychiatric outcomes to those of hospital patients for lower index stay costs. It is possible that patients in CRFs also had better outcomes in other domains, such as community integration and satisfaction. Community integration entails helping clients to move toward normal adult roles (independence, illness self-management), rather than pulling them into greater isolation and stigma associated with hospital care. It is the goal of care for people with serious mental illness, and is the cornerstone of community programs (Bond et al., 2004). Compared to hospitals, community residences are more often homelike, less restrictive, and preserve a familiar lifestyle that includes social interactions with friends, family, and community contacts in the ''outside world'' (Biancosino et al., 2004; Davidson et al., 1996). Brunt and Hansson (2004) found that persons with serious mental illness in community residences, compared to those in inpatient care, had greater satisfaction with their living situation, social relations, leisure activities, and work.

Even knowing the advantages of community residential care over hospital inpatient care, policy makers may shun community residential treatment because its costs are typically higher than those for outpatient services, without clarity that outcomes are better for most clients receiving residential care. Evidence is needed to justify residential treatment if it is to be chosen over other less intensive and less costly options. To begin to tackle this issue, French and colleagues (French et al., 2000), studying substance use disorder clients in publicly funded treatment, conducted a benefit-cost analysis of a combination of inpatient

care prior to outpatient services, and of outpatient treatment alone. Both treatment options generated positive and significant net benefits to society, but net benefit (i.e., cost subtracted from benefit) estimates favored investment in the inpatient plus outpatient option relative to the outpatient only option. In related work, French, Salome, and Carney (2002), estimating the costs and benefits of publicly-funded community residential treatment for addiction, concluded that the economic benefits (that is, treatment outcomes, such as employment status, that had been converted into economic [dollar] benefits using monetary conversion factors) significantly exceeded the economic costs (i.e., costs of treatment). Specifically, every $1 invested in residential treatment returned $4.34 in economic benefit to society. French's findings provide an economic justification for community residential substance abuse programs caring for patients such as those in our study (i.e., were evaluated by clinical staff as in need of residential rather than outpatient services).

Limitations

One limitation of this study was that the group of high-severity patients in community programs was small. In addition, the findings must be considered in light of the fact that, although study participants were spread throughout the United States, all of the patients were treated either within VA hospitals or within community programs that accepted veteran as well as non-veteran patients (specifically, in five of the CRFs, veterans accounted for less than one-quarter of residents). Studies comparing mental health care within and outside the VA suggest that VA-based findings may generalize somewhat better to non-profit than to for-profit settings (Calsyn et al., 1990; Rodgers & Barnett, 2000), although generally, mental health services in the VA are of similar quality and effectiveness to those in the private sector (Rosenheck et al., 2000). The VA patient population has poorer health status compared with the general patient population (Agha et al., 2000), and so the extent to which our findings will be replicated in studies of patients with more health and social resources and in other health care systems remains to be determined.

In this regard, Gastfriend, Lu, and Sharon (2000) noted that patient-treatment matching poses great challenges due in part to variability in settings and patients. Nevertheless, in the treatment of substance use disorders, progress on matching is being made through efforts to implement and refine the American Society of Addiction Medicine's Patient Placement Criteria. Future research should continue to examine the feasibility and outcomes (e.g., patients' access to appropriate care and treatment engagement) of developing and using placement criteria for treatment matching among dually diagnosed patients.

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