Effectiveness and Cost of the Inpatient Treatment of Posttraumatic Stress Disorder: Comparison of Three Models of Treatment

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Objective: *This study compared the outcomes and costs of three models of Department of Veterans Affairs (VA) inpatient treatment for posttraumatic stress disorder (PTSD): 1) long-stay specialized inpatient PTSD units, 2) short-stay specialized evaluation and brief-treatment PTSD units, and 3) nonspecialized general psychiatric units.* *Method:* *Data were drawn from 785 Vietnam veterans undergoing treatment at 10 programs across the country. The veterans were followed up at 4-month intervals for 1 year after discharge. Successful data collection averaged 66.1% across the three follow-up intervals.* *Results:* *All models demonstrated improvement at the time of discharge, but during follow-up symptoms and social functioning rebounded toward admission levels, especially among participants who had been treated in long-stay PTSD units. Veterans in the short-stay PTSD units and in the general psychiatric units showed significantly more improvement during follow-up than veterans in the long-stay PTSD units. Greatest satisfaction with their programs was reported by veterans in the short-stay PTSD units. Finally, the long-stay PTSD units proved to be 82.4% and 53.5% more expensive over 1 year than the short-stay PTSD units and general psychiatric units, respectively.* *Conclusions:* *The paucity of evidence of sustained improvement from costly long-stay specialized inpatient PTSD programs and the indication of high satisfaction and sustained improvement in the far less costly short-stay specialized evaluation and brief-treatment PTSD programs suggest that systematic restructuring of VA inpatient PTSD treatment could result in delivery of effective services to larger numbers of veterans.*

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Since the late 1960s, health care providers in every system of care have been increasingly accountable for providing the most effective services to as many patients as possible, while keeping costs to a minimum (1). Because of the high cost of hospitalization, every attempt is being made to limit inpatient care and to substitute outpatient care without compromising the quality or effectiveness of services.

The first specialized programs for posttraumatic stress disorder (PTSD) in the Department of Veterans Affairs (VA) were started in the late 1970s in the form of specialized inpatient PTSD units. Over the years, VA continued to establish more of these units, so that in 1995 there were 25 programs officially recognized as specialized inpatient PTSD units. These programs use a mix of individual and group therapies that 1) provide a safe, supportive setting for a structured treatment experience that typically lasts *several months,* 2) foster intensive exploration of traumatic war-zone experiences and their postwar consequences, and 3) encourage peer support, confrontation, and sharing among veterans with similar war-zone experiences (in part by admitting cohorts of veterans simultaneously). Patients in the specialized inpatient PTSD units are typically screened before entry so that the exploration of PTSD problems will not be compounded by acute psychiatric or substance abuse problems. Because of their popularity and limited availability, these programs typically have long waiting lists and require waits of many months before admission.

Despite the existence of specialized inpatient PTSD units for 20 years, there have been only a few empirical

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studies of their effectiveness (2–10). While most of these studies have shown improvement at discharge and a few have shown some improvement after discharge, serious limitations in their methods have compromised the generalizability of the results. The major goal of the present study was to determine the cost-effectiveness of the specialized inpatient PTSD units with quantitative data that were obtained from a large group of veterans who had been treated in some of the most respected programs in the VA system. For comparison purposes, similar data were collected on the nonspecialized treatment of veterans with PTSD in general psychiatric units.

Serendipitously, at the time this study began, VA began to establish other types of specialized inpatient programs in an effort to broaden the spectrum of services. The first of these new types of programs was the evaluation and brief-treatment PTSD unit. Like the long-stay specialized inpatient PTSD units, the specialized evaluation and brief-treatment PTSD units use an intensive mix of specialized individual and group therapies, but they 1) have short stays, 2) have short waiting lists, 3) are less selective, and 4) focus less intensively on war experiences than do the long-stay specialized inpatient PTSD units. Specialized evaluation and brief-treatment PTSD units are intended to provide more immediate intervention for acute exacerbations of PTSD, albeit in a specialized treatment setting. In 1995 there were 15 evaluation and brief-treatment PTSD units. The establishment of these specialized short-stay PTSD units provided an opportunity for comparing them, as a second model of specialized inpatient PTSD treatment, to general psychiatric units and to the long-stay specialized inpatient PTSD units.

Treatment in general psychiatric units typically involves no screening or waiting period. Admission and discharge in these programs are based on clinical assessment of the immediate need for hospitalization. In this study, the duration of treatment in these programs was approximately 4 weeks.

This study was organized to answer the following two basic questions: 1) Are the three models of inpatient treatment the same or different in clinical outcomes? 2) Are there significant differences among the three models in health care costs?

METHOD

Design

For this study, a quasi-experimental observational design was chosen. The course of treatment and outcome among veterans treated in long-term specialized inpatient PTSD units was compared with the course of treatment in short-stay specialized evaluation and brief-treatment PTSD units and in programs that offered nonspecialized, general psychiatric treatment for PTSD. Veterans were enrolled in the study over a 27-month period, from November of 1991 through January of 1994. The last postdischarge follow-up was completed in June of 1995.

Veterans were recruited from 10 VA sites: long-stay PTSD units at American Lake, Wash. (N=65), Augusta, Ga. (N=103), Palo Alto, Calif. (N=81), and West Haven, Conn. (N=84); short-stay PTSD units at Jackson, Miss. (N=28), New Orleans (N=94), Palo Alto, Calif. (N=21), and San Francisco (N=79); and general psychiatric units at Albany, N.Y. (N=38), Gainesville, Fla. (N=64), and Houston (N=32). In addition, comparison veterans were enrolled from general psychiatric units at two of the sites with specialized PTSD units (N=96). The long-stay PTSD units were selected on the basis of their national reputations as leaders in specialized inpatient PTSD treatment. The particular short-stay PTSD units were selected because they were among the first of their type to be established and, therefore, were available for inclusion at the start-up of the study. The sites for the three general psychiatric programs were selected because they did not have specialized inpatient PTSD units and because analysis of national computerized databases showed that they treated relatively large numbers of veterans with PTSD in their general psychiatric units.

Each consecutively admitted veteran with a primary clinical diagnosis of PTSD that was related to Vietnam war exposure was invited to participate in the study. The percentage of those invited who did participate was 83.9% for the long-stay PTSD units, 91.1% for the short-stay PTSD units, and 78.6% for the general psychiatric units.

Subjects

In order to maximize the comparability of the veterans in the different models, participation in the study was limited to veterans who 1) were currently distressed by symptoms sufficient to warrant a primary clinical diagnosis of PTSD, 2) had served in the Vietnam theater, 3) did not have a secondary diagnosis of psychotic disorder or organic brain syndrome, and 4) if admitted to a general psychiatric unit, had no immediate plans for seeking treatment in a specialized PTSD unit. A total of 785 veterans were enrolled: 333 from long-stay PTSD units, 222 from short-stay PTSD units, and 230 from general psychiatric units.

All veterans were male. They averaged 45.2 years of age (SD= 3.2), with 13.0 years of education (SD=2.0). In terms of marital status, 38.5% (N=302) were currently married and 51.7% (N=406) were currently separated or divorced; 9.8% (N=77) were either widowed or never married. Ethnically, 74.3% were Caucasian (N= 583), 15.6% were African American (N=122), 4.6% were Hispanic (N=36), and 5.5% were of other ethnicity (N=44). Written informed consent was obtained from each veteran after explanation of the procedures.

Schedule of Data Collection

At the time of program admission, an evaluation assistant who was independent of the program surveyed each veteran's demographic background, symptoms, and social functioning with a structured interview. In addition, the evaluation assistant surveyed symptoms and social functioning at discharge and 4, 8, and 12 months later. Successfully completed data collection averaged 66.1% across the three follow-up time points.

Measures of Veteran Characteristics, Perceptions, and Outcome

We examined 52 individual veterans' characteristics from 10 broad areas: sociodemographic background, childhood background, war exposure, psychiatric history, involvement in the criminal justice system, social support, service use and disability status, current psychiatric disorder, current substance abuse, and current social functioning.

Veterans' perceptions of the social environments of their programs were assessed 2 weeks after admission by a modification of the Community Oriented Programs Environment Scale (11), to which items specific to discussion of combat experiences were added. Eight subscales were found to be intercorrelated highly, and we combined them into one index, which we called "social climate" (Cronbach alpha= 0.89). We kept the subscales of anger and control separate, as we did with the newly devised items relating to combat. Discussion of combat experiences was represented by two subscales: discussion among the veterans themselves and discussion between veterans and staff. At discharge, the veterans' satisfaction with the program was recorded. Satisfaction was assessed on a 5-

level scale, ranging from very satisfied (score=4) to very dissatisfied (score=0). Two of the most important program policies were represented in terms of time periods: the number of days on a waiting list and the length of stay in the program.

Outcome was assessed on nine psychometric measures of symptoms and social functioning. The rating period at follow-up was either the preceding 30 days or the preceding 4 months, whichever corresponded with the period used for the assessment at admission. The measures included the Clinician-Administered PTSD Scale (12, 13); the Mississippi Scale for Combat-Related Posttraumatic Stress Disorder (14); the Brief Symptom Inventory (15); the psychiatric symptom, alcohol, drug, family, legal, and medical indices from the Addiction Severity Index (16); a measure of violent behaviors and thoughts (17, p. 179); the number of days the veteran worked for pay during the past month; and social involvement. This last variable was the sum of three standardized variables: the number of people one felt close to, frequency of contact with them, and amount of participation in social activities (18) (Cronbach alpha=0.59).

Estimates of Health Care Costs

The health care cost for each veteran was determined by multiplying the units of service by the cost of each service. Data on VA service use were obtained from the structured interviews with the veterans and from national computerized workload databases—the patient treatment file and the outpatient care file. The data used in this report are from structured interviews, but they were compared with data derived from the patient treatment file and outpatient care file (to be reported subsequently) and were not substantially different. At admission and each follow-up time point, each veteran reported the number of outpatient sessions and days of inpatient hospitalization that he had received during the preceding 4 months, using a structured list of VA and non-VA treatment sources.

Unit costs for VA services were derived from the VA cost distribution report according to methods described elsewhere (19–21). The cost distribution report uses standardized accounting procedures to distribute both direct and indirect costs to each VA health care program at each facility. Because a single year (fiscal year 1995) was used as the basis for all cost calculations, no adjustment for inflation was necessary. Since a previous study of the staffing of long-stay specialized inpatient PTSD units and general psychiatry programs had shown few differences in staff-patient ratios between these programs (22), a single national unit cost for inpatient VA psychiatric care was used for all estimates, with appropriate adjustment for the cost of capital (19).

Since non-VA service use was expected to be relatively infrequent and data-gathering resources were limited, information on non-VA service use was obtained exclusively from the interviews with the veterans. The costs of non-VA services were estimated to be 1.6 times those of VA services on the basis of a study that systematically compared VA unit costs with those at nearby non-VA hospitals (23).

Health care costs were estimated and were compared across the three program types for three time periods: 1) the index stay (admission to discharge), 2) the year after discharge from the index stay (the follow-up year), and 3) the year following admission for the index stay (i.e., the index stay plus the remainder of the year that occurred during the postdischarge period). The last was selected as the primary cost outcome.

Data Analysis

First, one-way analyses of variance (ANOVAs) were performed to compare the veterans across the three models of treatment on the 52 veterans' characteristics. Those that differentiated significantly among models and were related significantly to treatment processes or outcomes were used as covariates in analyses that compared the models of treatment to each other. Next, one-way ANOVAs were conducted to compare the models on program environment and policies. Finally, outcomes were evaluated. Any attempt to track outcome over multiple time points is subject to the problem of missing data at one or more of the time points. Fortunately, statistical research has led to development of random regression modeling for use with longitudinal data (24). We adopted the approach developed by Jennrich and Schluchter (25) for modeling missing data for repeated measures by using structured covariance matrices. The approach is available for use as program 5V of the BMDP statistical package (26).

Two series of random regression analyses were performed as factorial analyses of variance in which change over time was evaluated across the three models of treatment. The first series evaluated change from admission to discharge, and the second evaluated change from admission to 4, 8, and 12 months after discharge. Veterans' characteristics that differed significantly among models and were related significantly to outcome measures were used as covariates. The statistical significance of each random regression analysis was evaluated by Wald's chi-square. For economy of presentation, only the interaction results are presented.

RESULTS

Veterans' Characteristics

The veterans differed significantly across the models of treatment on 28 of the 52 characteristics. No consistent pattern emerged to suggest that veterans receiving treatment according to one model were generally more troubled or had a poorer prognosis, in terms of either their clinical history or their social functioning, than veterans receiving treatment according to the other models. At the time of admission, the veterans in general psychiatric units had more-acute psychiatric symptoms and had greater abuse of addictive substances than veterans in the short-stay or long-stay specialized PTSD units, whereas the veterans in the short-stay PTSD units were more symptomatic than the veterans in the long-stay PTSD units. Historically, however, the veterans in the long-stay units had more severe alcohol abuse than the veterans in the other programs.

Program Environment and Policies

Comparison of program environment and policies after adjustment for veteran characteristics is presented in table 1. The models differed significantly on 13 of the 16 process variables, indicating that the models offered quite different treatment. The long-stay specialized PTSD units had far longer lengths of stay than the other models and had a longer wait before admission. The short-stay specialized PTSD units were intermediate in length of time participants were on waiting lists, but they were not significantly different from general psychiatric units in the length of stay.

For the most part, the social environment was perceived more positively by veterans in the long-stay and short-stay specialized PTSD units than by those in the general psychiatric units. The notable exception was expression of anger, for which the long-stay PTSD units and the general psychiatric units were perceived equally negatively, and both were perceived significantly more negatively than the short-stay PTSD units. The short-stay PTSD units were also characterized by greater staff-veteran discussion of combat experiences than was perceived in either the long-stay PTSD units or the general psychiatric units. The short-stay specialized

TABLE 1. Program Environment and Policies Experienced by Veterans With PTSD Treated in Long-Stay Specialized PTSD Units, Short-Stay PTSD Units, and General Psychiatric Units

Program Characteristic	Long-Stay PTSD Units (L) (N=333)		Short-Stay PTSD Units (S) (N=222)		General Psychiatric Units (G) (N=230)		ANCOVA			Significant Pairwise Difference[b]
	Mean	SD	Mean	SD	Mean	SD	F	df	p[a]	
Score on Community Oriented Programs Environment Scale										
Social climate index (combination of eight subscales)	53.15	12.21	54.77	11.42	38.97	14.69	62.12	2, 665	0.001	L, S > G
Anger	5.48	2.05	4.15	1.88	5.51	2.02	18.72	2, 665	0.001	L, G > S
Control	6.56	1.44	6.70	1.38	6.89	1.73	0.78	2, 665	n.s.	
Discussion of combat experiences										
Discussion among veterans	2.08	1.11	2.29	1.00	1.73	1.23	8.96	2, 663	0.001	L, S > G
Discussion between veterans and staff	2.92	1.68	3.69	1.29	1.62	1.58	65.97	2, 664	0.001	S > L > G
Time										
Days on waiting list	108.58	101.84	28.21	21.94	9.65	4.89	42.82	2, 392	0.001	L > S, G
Days in program	100.80	44.71	36.89	24.33	30.47	31.57	258.95	2, 711	0.001	L > S, G
Patient satisfaction with program	3.28	0.95	3.57	0.83	1.94	1.49	61.12	2, 510	0.001	S > L > G

[a]Bonferroni-corrected probability level is 0.006.
[b]Two-tailed t test.

PTSD units received the highest satisfaction rating of the three models of treatment, and the general psychiatric units received the lowest.

Treatment Outcomes

Comparison of treatment outcomes across models is presented in table 2. Change from admission to discharge differed significantly across models for seven of the eight outcome measures (work adjustment was not applicable at discharge) and generally was most positive for the short-stay specialized PTSD units. PTSD symptoms as assessed by the Clinician-Administered PTSD Scale, general psychiatric distress as assessed by the Addiction Severity Index and the Brief Symptom Inventory, alcohol abuse and drug abuse as assessed by the Addiction Severity Index, and violent thoughts and behaviors all declined more for the veterans in the short-stay PTSD units and general psychiatric units than for veterans in the long-stay PTSD units. Veterans in the long-stay PTSD units and the general psychiatric units had *less* social involvement at discharge, unlike the veterans treated in the short-stay PTSD units.

Change from admission to the follow-up year was significantly different across the models for four of the nine outcome measures: PTSD as measured by the Clinician-Administered PTSD Scale, general distress as measured by the Addiction Severity Index and the Brief Symptom Inventory, and alcohol abuse. Generally, veterans in the short-stay PTSD units and the general psychiatric units showed sustained improvement in these areas, while veterans in the long-stay PTSD units showed a return to their admission levels.

Health Care Costs

The mean cost of the index hospitalization was far greater for the long-stay specialized PTSD units (mean=$34,211, SD=$14,560) than for the short-stay PTSD units (mean=$12,616, SD=$7,847) or the general psychiatric units (mean=$10,485, SD=$6,854) as a result of the longer stays (F=409.1, df=2, 782, p=0.0001). Categories of cost data are presented in table 3. Despite the most intensive index treatment, the total cost during the year after discharge for the long-stay PTSD units was somewhat higher than that for the short-stay PTSD units, although the aftercare costs for both types of specialized PTSD units were less than that for the general psychiatric units. When we examined the costs over a standard period of time, the first year after the index admission, treatment that originated in long-stay PTSD units emerged as far more costly than treatment that originated in either short-stay PTSD units or general psychiatric units.

DISCUSSION

A limitation of this study is that the veterans were not randomly assigned to the three types of treatment, and the data clearly demonstrate that the veterans receiving treatment according to the three models differed from each other in many ways. Although we used statistical methods to adjust for the influence of these differences, these methods cannot rule out the possible influence of the differences with the same degree of confidence that would be possible with random assignment (27). Nevertheless, although the quasi-experimental design we used is weaker in internal validity than an experimental design, it is stronger in external validity. That is, while the absence of random assignment to different types of treatment weakens the confidence in the differences found among the models, the assessment of models as they are typically implemented strengthens the generalizability of the results to actual conditions in the field.

Veterans' Characteristics and Programs' Policies

In general, all of the veterans who received inpatient treatment for PTSD were highly troubled, regardless of the type of treatment that they received. Although there were differences among the veterans receiving the three types of treatment, there was no consistent evidence that the veterans treated in the long-stay specialized inpatient PTSD units were more troubled overall that those treated in the other programs, in spite of their longer stays. In fact, the veterans admitted to the long-stay PTSD units were less symptomatic at the time of admission than the veterans admitted to either the short-stay specialized evaluation and brief-treatment PTSD units or the general psychiatric units. The differences in initial symptom levels among the models appear to be the direct result of differences in admission criteria and program policies. Long-stay specialized inpatient PTSD units typically require that veterans be stabilized psychologically and not be currently abusing substances before they are accepted for admission (22). Often an immediately preceding course of treatment is required to demonstrate the attainment of psychological stability and/or freedom from substance abuse. General psychiatric units are most oriented toward dealing with crises and acute distress, and they have the least selective admission criteria (22).

TABLE 2. Outcomes for Veterans With PTSD Treated in Long-Stay Specialized PTSD Units (N=333),

	Admission Versus Discharge					
	Admission		Discharge		Model by Time (df=2)	
Outcome Measure	Mean	SD	Mean	SD	χ^2	p[a]
PTSD scores						
Clinician-Administered PTSD Scale					20.94	0.0001
Long-stay PTSD units	87.79	17.27	76.43	22.13		
Short-stay PTSD units	102.66	18.12	82.77	25.27		
General psychiatric units	97.08	17.35	81.76	17.92		
Mississippi Scale for Combat-Related Posttraumatic Stress Disorder					7.35	n.s.
Long-stay PTSD units	135.32	16.31	134.99	18.28		
Short-stay PTSD units	133.69	15.21	130.03	16.48		
General psychiatric units	136.90	14.68	133.13	13.44		
Psychiatric symptom scores						
Addiction Severity Index					11.82	0.003
Long-stay PTSD units	0.59	0.14	0.45	0.14		
Short-stay PTSD units	0.66	0.15	0.49	0.15		
General psychiatric units	0.76	0.14	0.56	0.11		
Brief Symptom Inventory					18.51	0.0001
Long-stay PTSD units	2.38	0.72	2.33	0.77		
Short-stay PTSD units	2.37	0.64	2.12	0.70		
General psychiatric units	2.62	0.61	2.30	0.64		
Addiction Severity Index ratings of substance abuse						
Alcohol					51.78	0.0001
Long-stay PTSD units	0.08	0.14	0.06	0.12		
Short-stay PTSD units	0.11	0.18	0.03	0.08		
General psychiatric units	0.16	0.26	0.03	0.06		
Drugs					11.50	0.003
Long-stay PTSD units	0.04	0.08	0.04	0.08		
Short-stay PTSD units	0.02	0.07	0.01	0.04		
General psychiatric units	0.04	0.11	0.01	0.04		
Rating of violent behaviors and thoughts (17)					49.23	0.0001
Long-stay PTSD units	11.10	6.22	7.93	4.80		
Short-stay PTSD units	10.59	6.18	3.91	3.51		
General psychiatric units	11.66	6.16	5.51	3.17		
Rating of social involvement[b]					21.92	0.0001
Long-stay PTSD units	25.61	13.95	23.50	12.61		
Short-stay PTSD units	27.05	14.81	28.54	14.80		
General psychiatric units	26.57	13.31	20.71	9.44		
Days veteran worked for pay in past month					—	—
Long-stay PTSD units	—	—	—	—		
Short-stay PTSD units	—	—	—	—		
General psychiatric units	—	—	—	—		

[a]Bonferroni-corrected probability level is 0.006.

Further, the long-stay specialized PTSD units required extensive waiting periods and had a substantially longer length of stay, almost three times that of either the short-stay specialized PTSD units or the general psychiatric units. A fundamental rationale guiding the establishment and maintenance of many long-stay PTSD units is that long-stay, specialized inpatient treatment is necessary to achieve improvement in symptoms and social role functioning beyond that which can be achieved in general psychiatric programs. Although an argument can be made that the chronicity of the disorders of these veterans may act as a ceiling over the gains that can be achieved, the rationale for the much longer and more intensive program of the long-stay specialized inpatient PTSD units was that it could break through this ceiling with gains that were not being achieved by other programs. The lack of improvement among veterans in the long-stay PTSD units provides no support for the view that these units are successful in reducing symptoms and enhancing social role performance beyond the chronic level of adjustment of the veterans they treat.

Social Environment

The social climate of both the long-stay and short-stay specialized PTSD units was perceived more positively than was the social climate of the general psychiatric units. Veterans' satisfaction with the long-stay and

Short-Stay PTSD Units (N=222), and General Psychiatric Units (N=230)

Admission Versus Follow-Up									
Admission		4 Months Postdischarge		8 Months Postdischarge		12 Months Postdischarge		Model by Time (df=6)	
Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p[a]
								38.77	0.0001
87.79	17.27	84.32	20.20	84.80	19.08	84.29	18.20		
102.66	18.12	91.53	20.69	91.00	17.61	87.89	18.43		
97.08	17.35	91.18	19.57	91.70	17.13	91.74	15.83		
								8.75	n.s.
135.32	16.31	138.16	15.99	138.09	17.52	139.29	16.08		
133.69	15.21	136.37	13.95	137.19	13.86	136.07	15.71		
136.90	14.68	136.60	14.13	137.64	13.66	137.45	14.98		
								22.78	0.001
0.59	0.14	0.57	0.16	0.58	0.16	0.58	0.14		
0.66	0.15	0.60	0.16	0.61	0.15	0.60	0.18		
0.76	0.14	0.68	0.14	0.69	0.13	0.66	0.12		
								21.57	0.001
2.38	0.72	2.62	0.69	2.62	0.68	2.67	0.64		
2.37	0.64	2.53	0.63	2.52	0.59	2.58	0.61		
2.62	0.61	2.60	0.62	2.69	0.58	2.66	0.60		
								47.89	0.0001
0.08	0.14	0.13	0.17	0.12	0.15	0.12	0.14		
0.11	0.18	0.10	0.14	0.09	0.13	0.10	0.14		
0.16	0.26	0.11	0.18	0.09	0.15	0.10	0.16		
								6.20	n.s.
0.04	0.08	0.05	0.09	0.04	0.07	0.04	0.08		
0.02	0.07	0.02	0.06	0.03	0.05	0.03	0.07		
0.04	0.11	0.03	0.07	0.03	0.07	0.04	0.09		
								13.38	n.s.
11.10	6.22	7.88	4.89	8.06	4.94	7.50	4.97		
10.59	6.18	7.54	4.64	6.57	4.07	7.88	5.46		
11.66	6.16	7.95	4.69	8.10	4.52	7.52	5.14		
								11.94	n.s.
25.61	13.95	25.21	12.90	23.31	11.87	22.34	11.34		
27.05	14.81	29.40	12.65	27.23	12.52	25.50	12.93		
26.57	13.31	24.55	11.28	22.78	9.86	22.77	10.49		
								7.42	n.s.
2.25	5.91	2.54	5.62	1.69	4.62	1.73	5.01		
2.69	6.96	1.75	5.18	2.10	5.65	2.23	5.42		
2.54	6.25	2.50	6.00	2.37	5.59	1.81	4.68		

[b]Sum of three standardized variables: the number of people one felt close to, frequency of contact with them, and amount of participation in social activities (18).

short-stay PTSD units was higher as well. This is probably due in large part to the specialization of these programs, which are more homogeneous diagnostically and more focused programmatically than the general psychiatric units (our unpublished data). It is interesting that the veterans rated the long-stay PTSD units equal to the general psychiatric units and higher than the short-stay PTSD units in the expression of anger.

Outcome

The veterans in the long-stay PTSD units achieved some improvement in symptoms and social functioning from admission to discharge, but they then showed deterioration on several measures over the subsequent year. The veterans in the short-stay PTSD units and the general psychiatric units showed widespread improvement from admission to discharge and sustained these gains over the subsequent year. Improvements in the short-stay PTSD units and the general psychiatric units were greater than those in the long-stay PTSD units, both from admission to discharge and over the subsequent year, even after adjustment was made for differences in the veterans' characteristics at admission.

The outcome results are important in several regards. First, problems were reduced at the time of discharge but then rebounded toward admission levels by the 4-month follow-up. This pattern underscores the importance of including a *follow-up* time point in addition to or instead of discharge assessment in any comprehensive and balanced evaluation of outcome. Second, there were similarities between outcome levels at 4 months and 1 year and among outcome levels at 1 year across models of treatment. This commonality across time and programs suggests a convergence toward a chronic level of symptoms that is characteristic of this population of veterans. Third, even though several of the gains for the short-stay PTSD units and the general psychiatric units were highly significant statistically, they were distinctly more modest clinically. The chronicity of the disorders poses its own hindrances to successful treatment beyond those posed by the disorders themselves. An important ongoing task for clinicians and researchers is to continue to devise and test specific interventions and programs that will result in improvements that go beyond this chronic level.

Cost of Health Service Use

Outcome regarding symptoms and social functioning is clearly of major importance in deciding among treatment models. Outcome, however, is not the only crite-

TABLE 3. Cost of Health Care Services for Veterans With PTSD Treated in Long-Stay Specialized PTSD Units (N=333), Short-Stay PTSD Units (N=222), and General Psychiatric Units (N=230)

	Cost (dollars)							
	Long-Stay PTSD Units		Short-Stay PTSD Units		General Psychiatric Units		Analysis (df=2)	
Period and Service Type	Mean	SD	Mean	SD	Mean	SD	χ^2	p[a]
Year after discharge								
Inpatient care							23.86	0.0001
4 months	4,565	8,805	1,931	4.651	6,035	7.717		
8 months	4,303	7,345	3,355	6,588	6,485	11,072		
12 months	3,761	6,511	2,550	5,266	5,769	7,488		
Total	12,629	20,321	7,836	16,931	18,289	25,636		
Outpatient care							34.52	0.0001
4 months	1,734	1,596	2,571	2,000	1,249	1,134		
8 months	1,646	1,598	2,307	2,074	1,312	1,274		
12 months	1,498	1,289	1,694	1,351	1,332	1,220		
Total	4,878	4,917	6,572	5,756	3,893	3,616		
All care							13.40	0.001
4 months	6,299	8,648	4,502	5,054	7,284	7,697		
8 months	5,949	7,363	5,662	6,762	7,797	10,963		
12 months	5,259	6,511	4,244	5,723	7,101	7,414		
Total	17,507	20,447	14,408	18,376	22,182	25,465		
Year of index admission							138.31	0.0001
Index hospitalization	34,211	14,560	12,616	7,847	10,485	6,854		
Remainder of year	12,880	16,772	13,193	17,131	20,191	24,688		
Total	47,091	20,935	25,809	19,614	30,676	25,881		

[a]Bonferroni-corrected probability is 0.01.

rion. Also of importance is the cost of the programs. As expected from the differences in length of stay, the cost of the index admission itself was significantly greater for the long-stay PTSD units than for the other models. Although the total aftercare cost was higher during the 1 year after discharge for the general psychiatric units than for the long-stay PTSD units, the aftercare cost for the short-stay PTSD units was lower than that for the long-stay PTSD units. When the total costs were considered over a standard period of time, the first year after the index admission, treatment that originated in long-stay PTSD units emerged as far more costly than treatment that originated in either the short-stay PTSD units or the general psychiatric units. The average health care cost per veteran during this standard period was $47,091 for the long-stay PTSD units, $25,809 for the short-stay PTSD units, and $30,676 for the general psychiatric units. The far higher initial cost of long-stay specialized inpatient PTSD treatment does not appear to be associated with substantial savings subsequently, particularly as compared to treatment in specialized evaluation and brief-treatment PTSD units.

Conclusions

The data presented in this study of almost 800 veterans receiving treatment for PTSD according to three models of treatment suggest that treatment in long-stay specialized inpatient PTSD units is 82.4% and 53.5% more expensive than treatment in specialized evaluation and brief-treatment PTSD units and general psychiatric units, respectively, and is not associated with the achievement of additional gains in symptom reduction or social functioning. Treatment in long-stay PTSD units may, in fact, be associated with some losses in these areas. On the other hand, veterans treated in the specialized evaluation and brief-treatment PTSD units showed a reduction in symptoms and an improvement in social functioning over the course of the year following discharge. Furthermore, the short-stay PTSD units were somewhat less expensive than the general psychiatric units and far less expensive than the long-stay PTSD units. The paucity of evidence of sustained improvement in the costly long-stay specialized inpatient PTSD programs and the indication of high satisfaction and sustained improvement in the specialized evaluation and brief-treatment PTSD programs suggest that systematic restructuring of the inpatient treatment of PTSD in VA facilities could make effective services available to a greater number of veterans.

REFERENCES

1. Gray BH: The Profit Motive and Patient Care: The Changing Accountability of Doctors and Hospitals. Cambridge, Mass, Harvard University Press, 1991
2. Boudewyns PA, Hyer L, Woods MG, Harrison WR, McCranie E: PTSD among Vietnam veterans: an early look at treatment outcome using direct therapeutic exposure. J Trauma Stress 1990; 3:359–368
3. Hammarberg M, Silver S: Outcome of treatment for post-traumatic stress disorder in a primary care unit serving Vietnam veterans. J Trauma Stress 1994; 7:195–216
4. Harmand J, Starkey T, Ashlock L: A follow-up of Miami model graduates 6–12 months afterward. Vet Center Voice 1987; 8:8–9
5. Johnson DR, Rosenheck R, Fontana A, Lubin H, Southwick S, Charney D: Outcome of intensive inpatient treatment for combat-related posttraumatic stress disorder. Am J Psychiatry 1996; 153:771–777

6. Munley PH, Bains DS, Frazee J, Schwartz LT: Inpatient PTSD treatment: a study of pretreatment measures, treatment dropout, and therapist ratings of response to treatment. J Trauma Stress 1994; 7:319–325
7. Obenchain J, Silver S: Evaluation of an inpatient PTSD unit utilizing scaled self report data, in Proceedings of the Ninth Annual Meeting of the International Society for Traumatic Stress Studies. Northbrook, Ill, ISTSS, 1993, p 6
8. Perconte ST: Stability of positive treatment outcome and symptom relapse in post-traumatic stress disorder. J Trauma Stress 1989; 2:127–135
9. Scurfield RM, Kenderine SK, Pollard RJ: Inpatient treatment for war-related post-traumatic stress disorder: initial findings on a longer-term outcome study. J Trauma Stress 1990; 3:185–201
10. Starkey TW, Ashlock L: Inpatient treatment of PTSD: an interim report of the Miami model. VA Practitioner 1984; 1:37–40
11. Moos R: Community Oriented Programs Environment Scale Manual, 2nd ed. Palo Alto, Calif, Consulting Psychologists Press, 1988
12. Blake DD: Rationale and development of the Clinician-Administered PTSD Scale. PTSD Res Quarterly 1994; 5(2):1–2
13. Weathers FW, Litz BT: Psychometric properties of the Clinician-Administered PTSD Scale, CAPS-1. PTSD Res Quarterly 1994; 5(2):2–6
14. Keane TM, Caddell JM, Taylor KL: Mississippi Scale for Combat-Related Posttraumatic Stress Disorder: three studies in reliability and validity. J Consult Clin Psychol 1988; 56:85–90
15. Derogatis LR, Melisaratos N: The Brief Symptom Inventory: an introductory report. Psychol Med 1983; 13:595–605
16. McLellan AT, Luborsky L, Cacciola J, Griffith J, Evans F, Barr HL, O'Brien CP: New data from the Addiction Severity Index: reliability and validity in three centers. J Nerv Ment Dis 1985; 173:412–423
17. Kulka RA, Schlenger WE, Fairbank JA, Hough RL, Jordan BK, Marmar CR, Weiss DS: Trauma and the Vietnam War Generation: Report of Findings From the National Vietnam Veterans Readjustment Study. New York, Brunner/Mazel, 1990
18. Katz MM, Lyerly SB: Methods for measuring adjustment and social behavior in the community, I: rationale, description, discriminative validity and scale development. Psychol Rep 1963; 13:505–535
19. Rosenheck RA, Frisman LK, Neale MS: Estimating the capital component of mental health care costs in the public sector. Administration and Policy in Ment Health 1995; 21:493–509
20. Rosenheck RA, Neale MS, Frisman LK: Issues in estimating the cost of innovative mental health programs. Psychiatr Q 1995; 66:9–31
21. Rosenheck RA, Neale M, Leaf P, Milstein R, Frisman L: Multisite experimental cost study of intensive psychiatric community care. Schizophr Bull 1995; 21:129–140
22. Fontana A, Rosenheck R, Spencer H: The Long Journey Home, III: The Third Progress Report on the Specialized PTSD Programs. West Haven, Conn, Department of Veterans Affairs, Northeast Program Evaluation Center, 1993
23. Office of the Inspector General: Comparison of Costs and Outcomes of Matched Pairs of VAMCs and Their University Affiliates. Washington, DC, Office of the Inspector General, 1992
24. Gibbons RD, Hedeker D, Elkin I, Waternaux C, Kraemer HC, Greenhouse JB, Shea MT, Imber SD, Sotsky SM, Watkins JT: Some conceptual and statistical issues in analysis of longitudinal psychiatric data. Arch Gen Psychiatry 1993; 50:739–750
25. Jennrich RI, Schluchter MD: Unbalanced repeated-measures models with structured covariance matrices. Biometrics 1986; 42:805–820
26. Schluchter MD: 5V: unbalanced repeated measures models with structured covariance matrices, in BMDP Statistical Software Manual, Vol 2. Edited by Dixon WJ. Berkeley, University of California Press, 1988, pp 1081–1114
27. Cook TD, Campbell DT: Quasi-Experimentation: Design and Analysis Issues for Field Settings. Chicago, Rand McNally, 1979