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ORIGINAL PAPER

Predictors of Rehospitalization in High-Utilizing Patients in the VA Psychiatric Medical System

Nicholas W. Bowersox · Stephen M. Saunders · Bertrand D. Berger

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Abstract 233 high-service-utilizing (HSU) psychiatric patients were recruited during an inpatient psychiatric treatment. They completed a questionnaire related to their treatment beliefs and were tracked via computerized medical records over 2 years. During the follow-up period, 79.8% were readmitted for additional inpatient psychiatric treatment. Survival analysis techniques were used to examine patients' rates of readmittance during the follow-up period. Number of previous year inpatient psychiatric days served as a significant predictor of readmittance status and time to readmission. The survival plot was split by previous-year inpatient days to examine the effect of this variable on readmission. Implications of findings are discussed.

Keywords High-utilizing psychiatric patients · Rehospitalization · Survival analysis · Theory of planned behavior

Introduction

A subset of psychiatric patients accounts for a sizable proportion of emergency psychiatric service use. These patients are characterized by multiple inpatient psychiatric admissions, limited engagement in outpatient psychiatric care, and increased level of disability [1, 2].

N. W. Bowersox (✉)
Department of Veterans Affairs, Health Services Research and Development, Serious Mental Illness Treatment Research and Evaluation Center (SMITREC), PO Box 130170, Ann Arbor, MI 48113-0170, USA
e-mail: nbowersox@yahoo.com

S. M. Saunders
Marquette University, Milwaukee, WI, USA

B. D. Berger
Milwuakee VA Hospital, Milwaukee, WI, USA

B. D. Berger
Department of Psychiatry and Behavioral Medicine, Medical College of Wisconsin, Milwaukee, WI, USA

While various definitions have been suggested for establishing a high utilizer status (e.g., two or more hospitalizations during a 1-year period [3]; more than three lifetime psychiatric hospitalizations [4], these high service utilizing (HSU) patients constitute approximately 20% of psychiatric patients [5] while accounting for a disproportionately large percentage of mental health costs.

Research on this population generally focuses on the identification of factors associated with readmission to inpatient care, with the goal of identifying patients most likely to need future emergency psychiatric care. Unfortunately, this line of inquiry has yielded few results that can be used to shape clinical practice. One consistent finding is the relationship between past inpatient psychiatric admission and future readmission, with patients who have received inpatient care in the past being more likely to be readmitted for future inpatient care [6, 7]. Investigation into other factors such as self-reported patient symptoms [8] and diagnosis [3, 9] have yielded inconsistent results, causing some researchers to suggest that future approaches to this question should focus on treatment-related factors such as treatment adherence and continuity of care rather than demographic or clinical characteristics alone [10].

One such treatment-related factor which has received limited attention is the role of patient treatment perception on later treatment utilization. Research on treatment-related cognitions of psychiatric patients has shown that these perceptions can be powerful predictors of treatment engagement, with one study finding that variability in these cognitions explained nearly half the variance in treatment participation at 2-year follow-up [11]. However, the role of such cognitions on emergency service utilization has not been investigated.

The Theory of Planned Behavior (TPB, [12]) is an empirically-supported theoretical model designed to address the relationship between behavior and cognition. The TPB asserts that behavior is best predicted by behavioral intent, which in turn is predicted by the anticipated behavioral consequences (e.g., the extent to which the person believes that the behavior is likely to lead to positive results), by social norms (e.g., whether important others desire that the person engage in the behavior), and by perceived behavioral control (i.e., the person's sense of capacity to engage in the behavior). The TPB has been shown to be effective in predicting medication adherence in persons with bipolar disorder [13] and intention to seek treatment for a diagnosis of depression [14].

Help-Seeking Orientation

The ability to ask for assistance also factors into the process of treatment engagement and symptom management. Openness to help-seeking is essential for effective treatment participation [15]. Such openness is especially important in psychiatric patients, as chronic symptoms can impair insight [16, 17] and are difficult to manage without assistance.

Short-Term Post-Acute Treatment Engagement

For some psychiatric patients, treatment engagement stops at the point of discharge from inpatient psychiatric care, with little or no participation in aftercare [16, 18]. Such treatment non-engagement has been linked to readmission to inpatient care [19, 20], suggesting that an effective evaluation of readmission requires the consideration of short-term treatment participation.

The Present Study

The present study was designed to identify factors related to readmission to inpatient psychiatric care in high-utilizing psychiatric patients receiving treatment "as usual" by tracking patients over a period of 2 years following discharge from inpatient psychiatric care. A broad range of variables were measured and investigated to better understand patient readmission to emergency psychiatric care. Because of its usefulness in evaluating treatment-related cognitions and behaviors, the TPB provided a model for assessing patients' treatment-related cognitions within the study.

The present study had the following goals:

1. Identify characteristics associated with readmission in high utilizing patients receiving post-acute care.
2. Identify the rate of readmission for high utilizing patients
3. Identify key variables that distinguish patients likely to be readmitted from those likely to not require readmission.

Method

Treatment-Related Cognitions

Treatment Plan Questionnaire

Due to a lack of existing metrics to study treatment-related cognitions of psychiatric patients, the Treatment Plan Questionnaire (TPQ), based on the constructs of the TPB, was developed for this project. To develop the TPQ, focus groups were conducted with patients and providers within the inpatient psychiatric ward of a large VA hospital in the Midwest. Using the guidelines suggested by Ajzen [21], information resulting from these meetings was used to create items related to treatment-based behavioral intentions and the TPB determinants of Perceived Consequences, Social Norms, and Perceived Behavioral Control.

The Theory of Planned Behavior Subscales were created from patient responses to questionnaire items. With regard to behavioral intentions, "taking medications," "attending group meetings," and "keeping medical/psychiatric appointments" were selected as behaviors representative of short-term post-inpatient treatment of veterans within the VA psychiatric system, based on information gathered from focus group sessions.

The Potential Consequences Subscale comprised 31 items related to interpersonal stigma, interpersonal stigma, material cost of treatment, changes in relationships, and changes in symptom levels as a result of treatment participation. The Social Norms contained 12 items evaluating the amount of pressure to engage in treatment that patients expected from their significant others, family, friends, treatment providers, and community supports. Level of Perceived Behavioral Control was assessed using a 12-item subscale evaluating the extent of control patients expected over each of the treatment behaviors of interest (taking medications, attending group meetings, keeping medical/psychiatric appointments). Across these scales, reliability analyses suggested fair to good internal reliability, with scale alphas between 0.60 and 0.87. Each patient also rated their level of intent to engage in each of the treatment behaviors following discharge from inpatient care.

Help-Seeking Orientation

Network Orientation Scale

Each participant also completed the Network Orientation Scale (NOS, [22]) as a measure of their help-seeking orientation. The NOS has been shown to be an effective predictor of later treatment-seeking [23] and has adequate internal validity for psychiatric patients [24].

Demographic and Clinical Variables

Participants' age, race, gender, marital status, educational level, and monthly income were collected from electronic medical records (EMRs). Patients' inpatient EMRs at the time of admission into the study were used to determine diagnosis and serious medical condition status. Based on this, each patient was rated as to whether they had been assigned a mood, psychotic, substance dependence, anxiety, axis II, or serious medical condition diagnosis (e.g., diabetes, congestive heart failure). Additional information was collected related to patients' treatment history and illness severity, using Global Assessment of Functioning [25] scores assigned during the previous year of treatment.

Ratings of Treatment Participation

Short-Term Treatment Engagement

Four variables were created to assess patients' treatment participation during the 2 months after discharge from inpatient care. Medication utilization was assessed by comparing the number of total prescriptions to the number of prescriptions renewed in time to avoid a lapse in administration. Three additional variables were created to evaluate attendance at group therapy sessions, individual appointments with non-psychiatrist staff, and psychiatrist appointments. These variables were calculated as the ratio of attended appointments to overall scheduled appointments.

Long-Term Treatment Participation

Each veteran was also tracked over 2 years post-discharge and whether they were readmitted for additional inpatient psychiatric care was recorded. For veterans who were readmitted, the amount of time between inpatient discharge and readmittance was calculated.

Participant Recruitment

Veterans ($n = 33$) receiving care within an inpatient psychiatric ward at a VA hospital in the Midwest were recruited between March and June of 2006. Patients were recruited from within a combined inpatient treatment milieu setting wherein diagnostically diverse patients were treated in combined treatment groups. Each patient met high-utilizer status based on the combined definitions suggested by Havassy and Hopkins [3] and Lewis and Joyce [4], resulting in the following inclusion criteria: (1) three or more lifetime psychiatric hospitalizations, (2) at least one psychiatric hospitalization in year prior to study, and (3) receiving inpatient psychiatric care at admission into the study. Each patient further was required to have prescribed psychiatric medications and planned post-discharge

attendance at support group meetings, medical appointments, and psychiatric appointments as part of their post-inpatient psychiatric treatment. Patients participated in an informed consent process and completed questionnaires. Treatment participation was assessed at 2 months and again at 2 years following discharge from inpatient care via a review of patient EMRs.

The resulting patient pool was generally middle-aged ($M = 49.89$, SD = 8.28), male (93.6%), and not in a committed relationship (79%). The patients were divided in terms of race (52.4% Caucasian, 47.6% African-American) and education (14.1% less than high school diploma, 44.5% completed high school or equivalence, 23.0% post-high school without a degree, 18.3% post-high school degree). Patients were also distributed in terms of income, based on the poverty level as of the beginning of the study ($9800/year, [26] 55.7% at or below poverty level, 24.6% at 1–2 times poverty level; 19.8% at 2 or more times poverty level). Patient illness and treatment history are presented in Table 1.

Results

Prediction of Psychiatric Rehospitalization

Analyses were conducted in two steps, first focusing on the identification of significant relationships between the predictor variables and rehospitalization status. Once significantly

Table 1 Participant illness and treatment history measures ($N = 233$)

	M	SD
GAF score at intake into study	41.17	9.61
Highest GAF in year prior to entry into study	57.83	7.68
Lowest GAF in year prior to entry into study	39.08	9.87
Inpatient days—last year	8.76	9.67
Total hospitalizations—lifetime	10.51	12.03
Illness length (in years)	14.43	10.34
Diagnosis (per VA Mental Health Professionals)[a]	*N*	%
Substance dependence (non-comorbid)	46	19.8
Psychosis	34	14.6
Mood (without psychosis)	148	63.5
Anxiety	56	24.0
Comorbid sub. dep. and other MH disorder	135	57.9
Comorbid axis II and other MH disorder	37	15.9
Serious or chronic medical condition	121	51.9

[a] Diagnostic categories are not mutually exclusive. Substance Dependence includes alcohol, cocaine, and opioid dependence diagnoses. Psychosis includes diagnoses of schizophrenia, psychosis NOS, and bipolar disorder with psychotic features. Mood includes diagnoses of depression NOS, major depression, and bipolar disorder without psychotic features. Anxiety includes post-traumatic stress disorder, obsessive–compulsive disorder, and anxiety disorder NOS. Comorbid sub. dep. and other MH disorder means simultaneous diagnoses of substance dependence and illnesses from the psychosis, mood, and anxiety categories. Comorbid axis II and other MH disorder means simultaneous diagnoses of personality disorder and illnesses from the psychosis, mood, and anxiety categories

associated variables were identified, they were entered into multiple regression analyses aimed at the prediction of rehospitalization status. Rehospitalization status was first found to be associated with being unmarried, having a lower GAF score at admission into inpatient care, having a lower lowest GAF in the year prior to the study, having more inpatient psychiatric days during the prior year, having more lifetime psychiatric inpatient treatments, having a longer course of illness, having increased levels of perceived treatment support from significant others, and having a greater level of intent to attend outpatient medical and psychiatric appointments. These results are summarized in Table 2.

Significantly related variables were then entered in a hierarchical logistic regression with treatment contact status as the dependent variable. Within all regressions, predictor variables were entered in two steps, with demographic and illness variables entered in the first block and cognitive and social variables entered in the second block. This approach controlled for the effects of demographic and illness variables (by treating them as covariates), allowing for each area to be examined both in isolation as well as together within the final prediction model.

The prediction model based on demographic and illness variables (block one) was significant ($\chi^2(6) = 57.21$, $P < 0.001$). Several variables contributed to this model, with number of inpatient days during the prior year (Wald = 4.73) and number of lifetime psychiatric admissions (Wald = 13.30) meeting significance. The addition of cognitive and social variables (block two) did not significantly improve the predictive value of the model ($\chi^2(2) = 4.13$, $P > 0.05$, with neither of the variables meeting significance. The final prediction model was significant ($\chi^2(8) = 63.06$, $P < 0.001$) and accounted for 9.5% of the variance in readmission status. The results of these analyses are summarized in Table 3.

Analyses then focused on identifying relationships between the predictor variables and time until readmission, using only those veterans who were readmitted to inpatient psychiatric care during the follow-up period ($N = 186$). Earlier readmission was associated with a lower lowest GAF score from the prior year ($r = 0.18$), more inpatient psychiatric

Table 2 Predictor variables significantly associated with treatment attrition status ($N = 233$)

Variable	Readmitted % ($N = 186$)		Not readmitted % ($N = 47$)		χ^2 (1)
Marital status—married	16.4		30.9		6.41**
Variable	Readmitted		Not readmitted		
	M	SD	*M*	SD	*t*
Illness severity measures					
GAF at intake to study	39.66	10.04	44.01	8.12	−3.23**
Lowest GAF in year prior to study	37.01	10.30	43.01	7.71	−4.91**
Inpatient days in year prior to study	10.22	10.43	5.81	6.65	3.92**
Lifetime psychiatric admissions	13.30	3.68	5.61	5.93	5.93**
Years since first psychiatric admission	15.53	10.13	12.58	10.53	2.10*
Cognitive measures					
Perceived treatment support—sig. other	12.96	9.86	15.51	8.70	−2.05*
Intent to attend medical/psychiatric appts	0.86	0.05	0.81	0.11	1.97*

* $P < 0.05$. ** $P < 0.01$

Table 3 Summary of hierarchical logistic regression analyses for variables predicting psychiatric readmission ($N = 233$)

Variable	Step 1			Step 2		
	B	SE B	Wald	B	SE B	Wald
Marital status	−0.72	0.43	2.78	−0.22	0.49	0.99
GAF score at intake into study	0.05	0.04	1.56	0.05	0.04	1.58
Lowest GAF score in year prior	−0.01	0.04	0.06	0.03	0.04	0.42
Inpatient days in year prior	−0.10	0.04	4.73*	−0.12	0.05	4.63*
Lifetime psychiatric hospitalizations	−0.15	0.04	13.30**	−0.15	0.04	13.32**
Length of mental illness	0.01	0.02	0.24	0.02	0.02	0.69
Perceived treatment support from sig. other				0.03	0.03	0.99
Intent to attend medical/psychiatric appts				−4.73	3.15	2.26
χ^2 for change in model		57.21**			4.13	

* $P < 0.05$. ** $P < 0.01$

days in the prior year ($r = -0.24$), more lifetime psychiatric admissions ($r = -0.24$), having a chronic medical condition (no condition: $M = 31.14$, SD = 21.29 weeks; having condition: $M = 23.84$, SD = 21.01 weeks $t(185) = 2.09$, $P < 0.05$), having a psychotic diagnosis (psychotic diagnosis: $M = 19.33$, SD = 18.17 weeks; no psychotic diagnosis: $M = 28.79$, SD = 19.14 weeks, $t(185) = 2.15$, $P < 0.05$), and an income below the poverty level (less than poverty level: $M = 16.08$, SD = 15.17 weeks; 1–2 times poverty level: $M = 19.53$, SD = 17.67, 2+ times poverty level: $M = 18.55$, SD = 18.33; $F(2, 184) = 2.95$, $P < 0.05$).

Using significantly related predictor variables, a hierarchical regression was computed. The model resulting from demographic and illness variables (block one) was significant ($F(6, 180) = 2.40$, $P < 0.05$, $r^2 = 0.13$)), with number of inpatient days in the year prior to the study ($\beta = -0.29$) meeting significance. The addition of cognitive and social variables (block two) did not add to the predictive power of the model ($F(1, 178) = 0.56$, n.s.) and none of the variables in this block achieved significance. The overall model resulting from these variables was significant ($F(7, 179) = 2.13$, $P < 0.05$, $r^2 = 0.14$), predicting 14% of the variance in time to readmission. These results are summarized in Table 4.

Survival Analyses of Psychiatric Readmission

A survival plot was created for the entire sample of 233 veterans. To better describe this graph, several points of interest were identified and compared. Upon reviewing the regressions performed on attrition status and time to attrition, number of prior year psychiatric hospitalization days appeared to play an important role in readmission. In order to further explore this relationship, two new survival plots were generated based on a median split on number of past-year inpatient days ($M = 6$ days), with one plot representing the rate of readmission of veterans with six or fewer inpatient days in the prior year ($N = 133$) and another plotting the rate of readmission of veterans with seven or more inpatient days in the prior year ($N = 100$). These two groups were significantly different in percent of patients engaged in care after 2 years and time to readmission. These results are presented in Table 5 and Fig. 1.

Table 4 Summary of hierarchical regression analysis for variables predicting time to psychiatric readmission ($N = 186$)

Variable	Step 1			Step 2		
	B	SE *B*	β	*B*	SE *B*	β
Lowest GAF in year prior to study	0.22	0.23	0.10	0.26	0.24	0.12
Serious/chronic medical condition status	−0.36	4.34	−0.01	0.15	4.40	0.00
Psychotic diagnosis status	6.59	6.36	0.11	6.19	6.36	0.11
Inpatient days in year prior to study	−0.61	0.25	−0.29*	−0.57	0.26	−0.27*
Lifetime psychiatric hospitalizations	−0.04	0.18	−0.03	−0.08	0.19	−0.05
Income	−4.92	2.70	−0.18	−5.19	2.72	−0.19
Expectations of symptom improvement				−0.31	0.41	−0.08
R^2		0.13			0.14	
F for change in R^2		2.40*			0.56	

* $P < 0.05$

Table 5 Psychiatric readmission survival analysis results: total sample and sample split by psychiatric inpatient days in prior year ($N = 233$)

Survival %	Total sample ($N = 233$)			Low treatment ($N = 133$)			High treatment ($N = 100$)		
	N	Week	Slope[a]	*N*	Week	Slope[a]	*N*	Week	Slope[a]
100	233	0	n/a	133	0	n/a	100	0	n/a
75	176	17	−3.24	99	23	−1.38	71	9	−2.50
50	115	46	−2.01	54	76	−0.63	49	28	−1.32
25	57	94	−1.21	n/a[b]	n/a[b]	n/a[b]	23	77	−0.51
Final	47	104	−1.12	33	104	−0.41	14	104	−1.12

	Final %	Overall slope[a]	Final %	Overall slope[a]	Final %	Overall slope[a]
Overall	20.20	−1.79	41.30	−0.74	17.70	−0.83

Variable	Low treatment ($N = 133$)	High treatment ($N = 100$)	*df*	χ^2
Psychiatric readmission status	41.30%	17.7%	1	8.97**

Variable	*M*	SD	*M*	SD	*df*	*t*
Time to psychiatric readmission	34.47	26.63	20.04	20.70	137.56	3.68**

[a] Slope measured in average number of patients readmitted for psychiatric hospitalization per week for the period between that and the previous point in the survival plot. [b]Data are not presented for number of patients, week, or slope for the low treatment group at 25% survival as this group did not experience enough loss to meet the 25% survival point

** $P < 0.01$

Discussion

Veterans who were readmitted for additional inpatient care during the 2-year follow-up period were characterized by increased numbers of inpatient psychiatric days during the

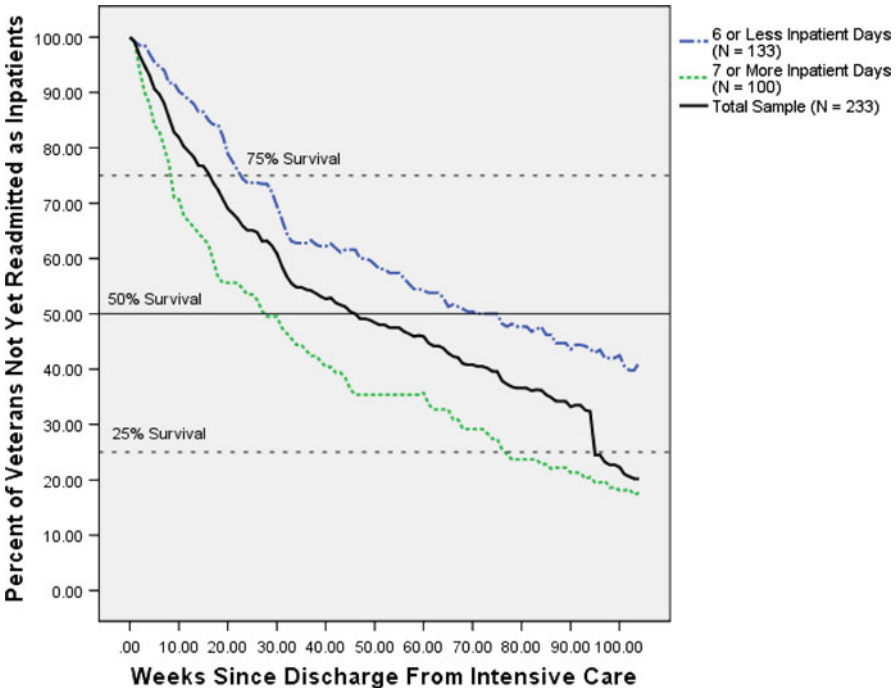

Fig. 1 Psychiatric readmission split by number of past inpatient days

prior year and increased number of lifetime inpatient psychiatric treatments. These findings are consistent with previous work in this area [3, 7]. The combination of these two variables suggests that patients most likely to require the use of emergency-level psychiatric care are those whose symptoms are both chronic and severe. Earlier time to readmittance was similarly predicted by the number of inpatient psychiatric days in the previous year, as veterans with more inpatient days in the prior year required sooner admission than veterans with fewer prior inpatient days. This finding is also consistent with previous work in this area [27].

Across the course of the two-year follow-up, 79.8% of the total patient pool was readmitted for additional inpatient psychiatric care. Significantly different levels of readmission were found for patient groups based on their inpatient service use in the prior year: 58.7% readmission for patients with six or fewer prior inpatient days and 82.3% readmission for patients with seven or more inpatient days. Considering the plots further, the two sub-groups have significantly different line slopes, with the "high treatment" group losing 25% of its patients to readmission more than twice as fast, and 50% of its patients nearly three times as fast as the "low treatment" group.

However, a lack of relationships between other variables in this study makes it difficult to determine the reasons for the strong relationships between past and future emergency psychiatric service use. One reason for this heavy reliance on inpatient care might be that some psychiatric patients do not feel that outpatient care is effective in managing their symptoms. While there is undoubtedly a segment of psychiatric patients for which treatment does not resolve all symptoms (estimates of compliant yet symptomatic patients: 50% [28]; 30–50% [29]; 20–50% [30]), outpatient treatments seem to be largely effective in addressing psychiatric symptoms [29].

The ongoing high rate of emergency service utilization also suggests that there may be a subset of patients who depend on emergency services for symptom management. Some researchers have suggested that such "treatment dependence" has developed within HSUs, with some patients feeling that they are incapable of managing their treatment without intensive supervision by treatment professionals [31]. Such a perspective represents a significant barrier in the transition of psychiatric patients from inpatient to outpatient psychiatric care, as patients may not allow outpatient treatments the opportunity to reduce their symptoms and may seek out additional intensive inpatient care at the first signs of symptom exacerbation.

The lack of any significant relationships between short-term treatment engagement and later hospitalization is noteworthy, as this relationship has been found in several previous investigations into this area [2, 32]. Similarly, the lack of relationships between treatment cognitions and readmission is a concern as the presence of such a relationship would allow for the development of interventions aimed at the reduction of readmission. Further, the absence of any relationship between readmission and diagnosis suggests that there are likely several pathways to readmission, with different patients requiring emergency-level services based on different symptoms and circumstances. Such heterogeneity illustrates the difficulty in finding any specific measures that explains why some patients require additional services while others are able to remain stabilized in less-intensive care. Perhaps more consistent, intervention-shaping information will result from a comparison of more diagnostically or symptomatically homogeneous groups.

Conclusions and Future Directions

This study suggests that the process of readmission to emergency psychiatric services for HSU patients is heterogeneous and influenced by a variety of individual factors. It is likely that this process is fluid, with patients entering and leaving inpatient care repeatedly over time for different reasons. It should be noted that the survival analysis approach does not allow for the distinction between important treatment groups such as patients readmitted because they are active in pursuing treatments which are not effective in addressing their symptoms (e.g., medications not a good fit for psychotic symptoms) and persons who are readmitted because of a lack of participation in treatment (e.g., using drugs and alcohol). Distinguishing between these two (and possible other) treatment patterns could be an important first step in understanding and intervening in the process of readmission. While traditional survival analysis techniques allowed a partial investigation into the relationships between these variables, future work using repeated event survival analysis and evaluating the antecedents of admissions could provide insights into the way these variables play out in care.

Finally, the limited value of cognitive factors in predicting attrition suggests that cognitive models (such as the TPB) may not be a good fit for predicting treatment utilization in high utilizing psychiatric patients. Other models that consider emotional or motivational factors might allow for additional insights into important treatment-related factors for HSU patients.

This study represents an in-depth investigation into the role that patient cognitions play in the process of readmission to emergency psychiatric care, as well as an evaluation of the role of other clinical variables in predicting readmission in high-utilizing psychiatric patients engaged in outpatient "care as usual" following an inpatient psychiatric stay.

It will be important, in a changing health care environment to continue to delineate reasons for and patterns of high utilization in this vulnerable, often under-served popultion.

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Author Biographies

Nicholas W. Bowersox, PhD is a clinical psychologist employed in a postdoctoral fellowship at the Ann Arbor VA Medical Center in Ann Arbor, MI.

Stephen M. Saunders, PhD is an associate professor and director of Clinical Training at Marquette University in Milwaukee, WI.

Bertrand D. Berger, PhD is the Acute Mental Health Program manager at the Milwaukee VA Medical Center and an assistant professor in the Department of Psychiatry and Behavioral Medicine at the Medical College of Wisconsin.