

Assessing Predictive Factors for Extended Hospitalization at Acute Psychiatric Admission

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Objective: This study examined whether information obtained early in the hospitalization process can be used to assess a patient's need for extended care. **Methods:** A sample of 2,430 inpatients who were admitted to a state psychiatric facility during a one-year index period (January through December 1997) were randomly assigned to a primary sample or a replication sample. Data were collected on demographic characteristics and history of previous hospitalization. The Brief Psychiatric Rating Scale–Anchored Version (BPRS-A) was administered to patients within 48 hours of admission, and four new subscales derived from ratings of newly admitted patients were calculated. Univariate and multivariate analyses were conducted to identify factors associated with whether a patient was discharged to the community or transported to another hospital for extended care. **Results:** A discriminant analysis of the data correctly identified 70 percent of the patients who were referred for continued hospitalization and 80 percent of the patients who were discharged to the community. The main correlates of the need for extended inpatient services were, in descending order, scores on the BPRS-A resistance subscale, the number of previous referrals for extended hospitalizations, and scores on the BPRS-A positive symptoms and psychological discomfort scales. **Conclusions:** BPRS-A subscale scores should be considered to be at least as good as more traditional measures in predicting length of hospitalization. (*Psychiatric Services* 52:1367–1373, 2001)

With the advent of managed care, a premium has been placed on time-limited treatment in both inpatient and outpatient psychiatric settings. More effective psychotropic medications and a focus on symptom stabilization during hospitalization have resulted in a

daily census decline and a reduction in the average length of stay at many psychiatric institutions (1). However, a subset of patients continues to use mental health resources to a disproportionate degree, as measured by length of hospitalization or repeated admissions over time (2–4).

This disproportionate use is problematic for two reasons. First, longer hospital stays do not necessarily mean better mental health care, improved social adjustment, diminished psychopathology, or fewer readmissions (5,6). This raises the question of why a cohort of patients continues to require extended hospitalization as well as the rationale for extending services when the utility of doing so is questionable. Second, given that patients with longer hospital stays generally also have more admissions (7) and longer previous admissions (8), questions have been raised as to whether these patients are receiving comprehensive mental health services provided in a competent manner.

In response to these concerns, researchers have focused on identifying demographic, psychiatric, and hospitalization variables that may be associated with high levels of service use. In general, the conclusions drawn from these studies are remarkably inconsistent (9). For example, when service use is defined as rehospitalization over a given period, the relationships between rate of rehospitalization and factors such as ethnicity, gender, age, employment, education, and socioeconomic status are equivocal (9–15). More support can be found for a relationship between psychiatric diagnosis and rehospitalization; individuals with schizophrenia or other psychoses are rehospitalized more often (11,12,16,17).

A secondary diagnosis of substance abuse or a comorbid personality dis-

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order also appears to be associated with recidivism (11,14). Other patient variables related to recidivism include a greater number of previous hospitalizations (9,18–20), greater impairment in self-care skills (21), increased propensity toward violence (11,22), and greater medication noncompliance (9,23,24).

A considerable body of research has focused on the variables associated with length of hospital stay. The findings across these studies also are equivocal. For example, although some studies suggest that female patients are more likely to receive extended services (22,25), others have shown that demographic variables, including age, are poor predictors of length of stay (25–28).

Psychiatric diagnosis is a less convincing predictor of length of hospitalization than of recidivism. For example, some studies suggest that diagnosis is unrelated to length of stay (22,29,30), whereas others have found that individuals who have a diagnosis of a psychotic disorder are more likely to receive extended services (27,31,32). Moreover, axis II diagnoses (33), cognitive impairment (31,34), and co-existent substance use problems (31,32) have all been identified as correlates of length of stay. Other important variables may include homelessness (22,35), unemployment (31,36), marital status (8), social skill deficits (26), physical illness (37), patient resistance (22), use of electroconvulsive therapy or antipsychotic medication during hospitalization (31,38), type of insurance (39), and weather severity (40). It has been suggested that some of the discrepancies among these studies may be the result of several inherent methodological weaknesses (9), including underutilization of both descriptive and multivariate statistics and a lack of generalizability of findings because of nonrepresentative samples.

Given the inconsistencies in the literature, it is conceivable that alternative data, such as those obtained during the initial assessment in the hospital, may be more useful than “traditional” predictors in determining use of mental health services. For example, Swett (41) concluded that a higher score on the Brief Psychiatric Rating Scale (BPRS) (42,43)—particular-

ly the thought disorder factor—predicted inpatient recidivism. Research that examines the usefulness of assessment data in predicting length of stay is sparse, although the utility of patient self-report measures (44), such as the Positive and Negative Syndrome Scale for schizophrenia (45) and the Scale for the Assessment of Negative Symptoms (46), show promise.

There also is some evidence to suggest that clinician-based measures, such as scores on the resistance and positive symptoms subscales of the BPRS (47), may account for significant variance in predicting length of stay (22). Although these preliminary results suggest that assessment data



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may be useful in identifying patients who are at risk of greater hospital use, further research is necessary to explore the robustness of the findings.

The study reported here was conducted to examine the relative utility of ratings on the BPRS–Anchored Version (BPRS-A) (48), demographic characteristics, and history of hospitalization in predicting within 48 hours of admission whether inpatients at a state psychiatric facility would be discharged to the community or transferred to another hospital for extended care at the end of their treatment at the facility. We selected extended care as a treatment out-

come because it represented cases in which short-term care had unequivocally been inadequate.

To directly address the statistical criticisms outlined by Klinkenberg and Calsyn (9), we present descriptive data followed by multivariate analyses. Moreover, we used a large representative sample to enhance the generalizability of the results. The study variables were chosen on the basis of previous research that suggested that they are associated with greater hospital use and because these data could be obtained at admission. We hypothesized that BPRS-A ratings at admission would be more useful than traditional predictors in identifying patients who were at risk of needing extended care.

Methods

Participants

The sample consisted of 2,430 patients who were hospitalized during an index period of one year—January through December 1997—at the Harris County Psychiatric Center, a university-affiliated, 250-bed psychiatric hospital that serves the greater Houston metropolitan area. If a patient had multiple admissions during the index period, only the last admission was used in the data analyses. Table 1 presents the patients' demographic characteristics, history of hospitalization, and diagnosis and outcome at discharge.

The SPSS (version 10.0) randomization procedure was used to divide the sample into two subsets, a primary sample for derivation of a predictive model and a replication sample to test the stability of the results. Each subset contained a total of 1,215 patients, with an equivalent number of patients who required extended hospitalization (N=198) and patients who were discharged to the community (N=1,017).

Measures

The BPRS-A is a clinician-based rating instrument consisting of 18 items that describe dimensions of psychopathology. Items are rated on a 7-point scale ranging from “not present” to “very severe,” with anchors in the form of behavior examples provided for each item's rating options.

To be consistent with previous research (49), item responses were weighted from 1 to 7. The reliability and validity of the BPRS have been well documented across studies (50). Similarly, adequate interrater reliability has been demonstrated for BPRS-A total score at admission (47,48).

A recent psychometric analysis that included interrater reliability and scale validity supported the application of four factor-derived dimensions of the BPRS-A in acute inpatient settings (47). The four subscales are resistance, which has as its component items uncooperativeness, hostility, excitement, and grandiosity; positive symptoms, with the component items of unusual thought content, conceptual disorganization, hallucinatory behavior, suspiciousness, and disorientation; negative symptoms, with the component items of blunted affect, emotional withdrawal, and motor retardation; and psychological discomfort, with the component items of depressive mood, anxiety, somatic concern, guilt feelings, and tension.

Procedure

The BPRS-A was completed by one of 16 attending faculty psychiatrists within 48 hours of a patient's admission. Ratings were not based on a single interview, but rather represented a summary of all the information available after the patient had been admitted to the facility. Because the scale items are fundamental constructs of psychopathology that are assessed through a routine mental status assessment and a comprehensive interview (50), the attending psychiatrists received no formal training on the BPRS-A. Adequate reliability estimates for BPRS-A total score and factor scores at admission (Cronbach's alpha range=.68 to .80; $N=1,556$) and interrater reliability across pairs of attending psychiatrists and the residents assigned to them (range of intraclass correlation coefficients=.57 to .84, $N=131$) have been demonstrated in research conducted at the Harris County Psychiatric Center (47).

BPRS-A scores, demographic information, and hospitalization data for each patient were gathered daily

from medical records and entered into a database.

Data analysis

Categorical data were analyzed with chi square analyses. Follow-up Fisher's exact tests were conducted on significant chi square analyses in the case of multiple levels of the independent variable—for example, marital status and ethnicity. For chi square analyses, effect sizes are reported with use of the phi statistic (ϕ) (51) (small=.10, medium=.30, large=.50). Continuous dependent variables were examined by using one-way analyses of variance, with discharge placement as the independent variable.

For continuous data, estimated eta-squared (est. η^2) (52) is presented as a measure of effect size (small=.01, medium=.06, large=.16). Variables that were demonstrated to be significantly different as a function of discharge status across both the primary and replication samples (conjoint $p<.003$) were retained for use in stepwise discriminant function analyses. This multivariate procedure was conducted to determine the relative value of variables established through replicated analyses in identifying patients who would subsequently need extended care. For these analyses, the F-to-remove statistic was used to determine the final set of variables. Standardized discriminant weights—that is, discriminant coefficients—are reported to indicate the relative value of variables to the discriminant function. In all stepwise regression analyses, data were tested to ensure that statistical assumptions were not violated. Box's M statistic was used to test the assumption of equal covariance matrices.

Results

Descriptive statistics for the entire sample and the two subsets—the primary sample and the replication sample—are presented in Table 2. Sixteen percent of the patients in the entire sample were transferred to extended care.

Univariate analyses

Demographic variables. Chi square analyses revealed a significant difference for marital status in both the pri-

Table 1

Characteristics of 2,430 psychiatric inpatients in a study to predict the need for extended psychiatric hospitalization

Characteristic	Number or mean \pm SD	%
Gender		
Male	1,356	56
Female	1,074	44
Age (years)	38 \pm 12	
Education (years)	11 \pm 4	
Ethnicity		
African American	1,025	42
Caucasian	977	40
Hispanic	362	15
Asian	49	2
Marital status		
Single	1,483	63
Married	366	15
Divorced	325	13
Separated	141	6
Widowed	75	3
History of admissions to Harris County Psychiatric Center		
First admission	1,100	45
Previously admitted	1,330	55
Number of previous admissions	5 \pm 4	
Days currently hospitalized	10 \pm 7	
Principal diagnosis at discharge		
Schizophrenia	802	33
Major depression	570	24
Bipolar disorder	503	21
Substance abuse	239	10
Psychosis not otherwise specified	232	9
Other	74	3
Outcome at discharge		
Discharge to the community	2,034	84
Extended hospitalization ¹	396	16

¹ Transferred to another state hospital for continued hospitalization

mary sample ($\chi^2=31.6$, $df=4$, $p<.001$, $\phi=.16$) and the replication sample ($\chi^2=21.43$, $df=4$, $p<.01$, $\phi=.13$). In the primary sample, single patients were more likely to be transferred for extended care ($\chi^2=47.7$, $df=1$, $p<.001$), whereas those who were married ($\chi^2=26.5$, $df=1$, $p<.001$), divorced ($\chi^2=5.08$, $df=1$, $p<.05$), or separated ($\chi^2=4.45$, $df=1$, $p<.05$) were more likely to be discharged to the community. Discharge status did not differ among widowed patients.

In the replication sample, the same

Table 2

Characteristics of patients at hospital admission, by whether they were subsequently transferred for extended hospitalization or discharged to the community¹

Variable	Entire sample (N=2,430)				Primary sample (N=1,215)				Replication sample (N=1,215)			
	Extended hospitalization (N=396)		Community discharge (N=2,034)		Extended hospitalization (N=198)		Community discharge (N=1,017)		Extended hospitalization (N=198)		Community discharge (N=1,017)	
	N or mean	%	N or mean	%	N or mean	%	N or mean	%	N or mean	%	N or mean	%
Demographic characteristics												
Gender												
Male	236	17	1,120	83	130	19	567	81	106	16	553	84
Female	160	15	914	85	68	13	450	87	92	17	464	83
Ethnicity												
Caucasian	135	14	851	86	58	12	425	88	77	15	426	85
African American	182	18	851	82	98	20	406	80	84	16	445	84
Hispanic	65	18	297	82	37	18	170	82	28	18	127	82
Asian	14	29	35	71	5	23	16	77	9	33	19	67
Marital status ²												
Single	306	20	1,211	80	159	21	600	79	147	20	611	80
Married	29	8	339	92	15	8	168	92	14	8	171	92
Divorced	40	12	287	88	16	10	146	90	24	14	141	86
Separated	14	10	128	90	4	7	71	93	10	13	57	87
Widowed	7	9	69	91	4	11	32	89	3	8	37	92
Employment history												
Ever employed	330	14	1,830	86	154	13	925	87	176	16	905	84
Never employed	66	23	204	77	44	28	92	72	22	17	112	83
Age (years)	38.1±12.4		38.4±12.3		36.9±11.7		38.6±12.4		39.2±13.1		38.1±12.1	
Education (years)	11.7±2.6		11.2±4.5		11.7±2.5		11.4±5.7		11.7±2.8		11.1±2.8	
Hospitalization history ²												
Previous admissions	4.8±4.6		2.7±3.0		4.7±4.2		2.7±2.8		5.0±4.9		2.8±3.2	
Previous extended hospitalizations	1.4±2.4		.3±1.0		1.3±2.1		.3±.9		1.4±2.6		.3±1.0	
Clinician ratings												
BPRS-A ³												
Total score ²	50.4±15.1		40.7±15.2		49.8±15.3		40.9±15.5		50.9±15.0		40.5±15.9	
Factor scores												
Resistance ²	13.4±5.9		8.5±4.9		13.4±5.7		8.5±4.9		13.4±6.1		8.4±5.0	
Negative symptoms	6.9±4.5		6.4±3.9		7.0±4.5		6.4±4.0		6.9±4.4		6.4±4.0	
Positive symptoms ²	17.2±6.3		11.8±6.4		17.1±6.4		12.0±6.4		17.4±6.2		1.6±6.4	
Psychological discomfort ²	10.7±5.5		12.5±6.3		10.3±5.2		12.5±6.4		11.2±5.8		12.6±6.2	

¹ Extended hospitalization means that the patient was transported to another state hospital for continued hospitalization.

² These variables were significantly associated with disposition in both the primary sample and the replication sample.

³ Brief Psychiatric Rating Scale–Anchored Version

pattern was evident. Single patients were more likely to be discharged to extended care ($\chi^2=48.58$, $df=1$, $p<.001$), and those who were married ($\chi^2=23.43$, $df=1$, $p<.001$), divorced ($\chi^2=4.36$, $df=1$, $p<.05$), or separated ($\chi^2=4.21$, $df=1$, $p<.05$) were more likely to be discharged to the community. Again, discharge status did not differ among widowed patients.

Discharge status among individuals in the primary sample differed as a function of gender ($\chi^2=9.1$, $df=1$, $p<.01$, $\phi=.09$), ethnicity ($\chi^2=14.5$,

$df=3$, $p<.05$, $\phi=.11$), and employment history ($\chi^2=11.2$, $df=1$, $p<.01$, $\phi=.10$); however, these variables were not significantly associated with discharge status in the replication sample.

Hospitalization variables. In the primary sample, patients who were transferred for extended care had more previous admissions to the Harris County Psychiatric Center than patients who were discharged to the community ($F=72.5$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.06$). They also had more previous transfers for extended

care ($F=130.63$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.10$). These findings held for the replication sample ($F=64.21$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.05$, and $F=106.37$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.08$, respectively).

Clinician ratings. As indicated in Table 2, patients in the primary sample who were transferred for extended care had higher BPRS-A total scores ($F=54.74$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.04$) and higher scores for resistance ($F=155.12$, $df=1$, 1,213, $p<.001$, est. $\eta^2=.11$) and for positive symp-

toms ($F=104.27$, $df=1$, $1,213$, $p<.001$, $est. \eta^2=.08$). However, patients who had higher scores for psychological discomfort were more likely to be discharged to the community ($F=21.30$, $df=1$, $1,213$, $p<.001$, $est. \eta^2=.02$).

Analyses of the replication sample demonstrated the reliability of BPRS-A admission scores in predicting type of patient discharge. Patients who were transferred for extended care had higher total scores ($F=81.19$, $df=1$, $1,213$, $p<.001$, $est. \eta^2=.06$) and higher scores for resistance ($F=153.01$, $df=1$, $1,213$, $p<.001$, $est. \eta^2=.11$) and positive symptoms ($F=136.97$, $df=1$, $1,213$, $p<.001$, $est. \eta^2=.11$). Again, patients with higher scores for psychological discomfort were more likely to be discharged to the community ($F=8.89$, $df=1$, $1,213$, $p<.01$, $est. \eta^2=.01$).

Multivariate analyses

The final stage of data analysis involved examining the classificatory power of the three types of predictor variables—BPRS-A scores, demographic characteristics, and history of hospitalization—through stepwise discriminant function analyses. Only the six significant replicated variables were included in these analyses: marital status, dichotomized as single versus marital history; number of previous admissions to the Harris County Psychiatric Center; number of previous transfers for extended care; and scores on the BPRS-A subscales for resistance, positive symptoms, and psychological discomfort. Because of their shared variance with the factor scores, BPRS-A total scores were not included in these analyses.

The first analysis was conducted on the primary sample. All variables except number of previous admissions to the Harris County Psychiatric Center were retained ($F=63.53$, $df=5$, $1,209$, $p<.001$). In descending order of importance, the discriminant coefficients were BPRS-A resistance score (.52), number of previous transfers for extended care (.51), BPRS-A psychological discomfort score (–.37), BPRS-A positive symptoms score (.32), and marital status (–.13).

Four variables were replicated in the identical analysis conducted on the second sample ($F=70.08$, $df=4$, $1,210$,

$p<.001$). Number of previous admissions to the Harris County Psychiatric Center and marital status were not retained. In descending order of importance, the discriminant coefficients were BPRS-A resistance score (.48), BPRS-A positive symptoms score (.45), previous referrals for extended care (.44), and BPRS-A psychological discomfort score (–.30).

A final discriminant analysis was conducted on the entire sample and included the four variables that had been identified as robust predictors across both the primary and replication samples. These four variables were also found to be significant predictors in this final analysis ($F=146.49$,

In
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$df=4$, $2,425$, $p<.001$); in descending order of importance, they were BPRS-A resistance score (.50), number of previous referrals for extended care (.49), BPRS-A positive symptoms score (.40), and BPRS-A psychological discomfort score (–.35). When this model was used, classification accuracy was 70 percent for extended hospitalization and 80 percent for community discharge. Overall classification accuracy was 78 percent.

Discussion

This study focused on outlining the relationship between the demographic, hospitalization history, and clinical variables assessed at patients' admis-

sion to a psychiatric hospital and the patients' need for continued hospitalization. The use of four predictor variables in a discriminant function analysis accurately predicted in 78 percent of the cases whether a patient would be discharged to the community or would require extended care. As there are no statistical guidelines to address the magnitude of the proportional chance versus predictive accuracy differential (53), the clinical significance of our model must be evaluated.

Eighty-four percent of the patients in the sample were discharged to the community after short-term treatment at the hospital; therefore, on the basis of chance alone, the probability that medical personnel would have predicted this outcome was 84 percent. Our model correctly predicted this outcome in 80 percent of the cases; therefore, the utility of the model for identifying this population was minimal.

However, on the basis of chance alone, the probability of clinicians' correctly predicting that a patient would be transferred for extended care was only 16 percent. In this case, the model's accurate prediction in 70 percent of the cases represents a dramatic improvement in the ability to identify these individuals at admission. The replicability of our findings across two samples, together with an almost fourfold increase over that expected by chance, supported the clinical significance of this model.

In this model, three of the four variables most highly associated with the need for extended care were subscale scores on the BPRS-A. Given that these scores accounted for greater variance in predicting extended care than more traditional predictors, this finding is provocative, and it has several potential implications. First, as researchers have acknowledged, a multitude of variables have been associated with high levels of service use (9,54). Even though our data were collected from a sizable patient sample, several variables associated with length of stay were found to be unreliable. Thus, in this area of research, the importance of using a replication paradigm has been demonstrated. To further explore the validity of the findings, the potential

utility of BPRS-A subscales in predicting use of mental health services should be evaluated at other mental health facilities.

Second, many of the discrepancies among variables associated with extended care found in previous studies may reflect institution-specific differences in staff, treatment strategies, and the nature of aftercare services. The BPRS-A may provide standardized values that can help identify at-risk patients, regardless of treatment facility.

Third, considering the relative ease with which the BPRS-A can be integrated into clinical practice, this rating scale may be a practical and valuable screening tool when patients are admitted for acute care. It may be most valuable as a means of more efficiently targeting patients who need more intensive assessment as well as specialized therapeutic and pharmacological interventions. Fourth, because such patients also are most likely to return to the hospital (7), early identification may allow for more appropriate aftercare arrangements—for example, providing family education and ensuring medication compliance. Finally, the BPRS-A may be a particularly valuable predictive and diagnostic measure for patients who are admitted involuntarily or in a psychotic state and are thus unwilling or unable to cooperate in their own evaluation.

Conclusions

Use of the BPRS-A may improve patient assessment procedures and serve as a mechanism for facilitating more appropriate prerelease interventions and aftercare services (55). Whether use of the data obtained with the BPRS-A constitutes an improvement over the treating psychiatrist's unaided predictions is still a question that requires empirical study. Further investigation is necessary to explore the generalizability of our findings as well as the practicality of using BPRS-A data in a prospective manner to identify at-risk patients and to evaluate how early identification influences the selection of treatment strategies and whether such practices reduce the number of patients who need extended hospitalization. ♦

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