# The Brief Psychiatric Rating Scale as an Acute Inpatient Outcome Measurement Tool: A Pilot Study

Roy V. Varner, M.D.; Y. Richard Chen, Ph.D.; Alan C. Swann, M.D.; and Frederick G. Moeller, M.D.

**Background:** Recent guidelines for length of stay at psychiatric hospitals may have an unacceptable impact on patient outcome at discharge. A valid measurement tool is needed to evaluate significant patient change during brief hospitalization, typically 7 days, and to provide early prediction of unfavorable short-term outcome. This study examines the utility of the Brief Psychiatric Rating Scale (BPRS) as such a tool.

*Method:* During a 2-month testing period, the BPRS was administered to 87 successive adults admitted to an acute general psychiatric inpatient unit at admission, 2 days, 7 days, and weekly thereafter until discharge. Total BPRS scores and 4 subscores were used in the data analysis, which included paired t tests and correlation analyses.

**Results:** Mean BPRS total scores demonstrate significant (p < .001) patient improvement at days 2, 7, and 14 of the hospital stay. Changes in subscores and their relationship to eventual outcome vary across diagnostic groups.

*Conclusion:* The BPRS appears to be a useful inpatient outcome measure since it is capable of demonstrating significant change during brief stays of 1 week or less. Subscale scores may provide more specific prediction of change and may help clarify outcome in individual patients who show insignificant change by total score.

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**P**ressures to shorten the length of hospital stays have been joined by health care industry demands for patient-outcome data.<sup>1</sup> Unfortunately, shorter length of stay, typically targeted at 7 days or less, may not allow time for full response to treatment compared with the longer stays of the past.<sup>2</sup> Given the need for a short length of stay, it is important to distinguish those patients with early favorable outcome from those requiring longer or more vigorous treatment.

The Brief Psychiatric Rating Scale (BPRS) has been in use since 1962, but was developed primarily for controlled psychoactive drug trials and similar research.<sup>3,4</sup> Further refinement during its first 18 years of use, including questions of reliability and validity, has been summarized.5 Recent literature has suggested broader, more routine clinical uses for the BPRS.<sup>6-15</sup> Several examples illustrate possible use in supporting treatment outcome accountability as an outcome measure in psychosocial rehabilitation programs,<sup>6</sup> as a potential correlate of subjective quality-of-life appraisal in schizophrenic patients,<sup>7</sup> as a predictor of inpatient readmission,<sup>12</sup> and as an aid to the determination of suicidality in schizophrenia,<sup>15</sup> among others. We were unable to find a reference reporting clinical use of the BPRS over the brief time spans that are now the norm for acute inpatient episodes. We hypothesized that the BPRS could demonstrate significant change in patient symptoms during a brief hospitalization, that early BPRS change could help predict the appropriateness of early discharge and/or degree of later improvement, and that subscale scores might be of more value than the total score for some individual patients, according to diagnosis, in demonstrating such early response.

## METHOD

Data were collected for about 8 weeks during March and April 1996 from consecutive patients newly admitted to a single 23-bed general adult inpatient unit in the University of Texas Harris County Psychiatric Center. Four staff psychiatric nurses were selected to administer the BPRS to the study patients as part of their routine nursing duties. All 4 had participated in extensive group training under the direction of a staff psychiatrist with 20 years of BPRS experience.<sup>16</sup> Interrater reliability was established during training by using videotaped clinical interviews followed by a rating/discussion format using the 18-item "anchored" version of the BPRS.<sup>17</sup> The anchored BPRS is reported to aid reliability by the addition of expanded definitions and instructions for each scale item and was used throughout the study. In the present study, no formal measurement of reliability was made, and there was no systematic blinding for previous ratings. However, earlier ratings were not available at the time of subsequent rat-

Received June 25, 1999; accepted Nov. 8, 1999. From the Department of Psychiatry and Behavioral Sciences, the University of Texas, Houston, Medical School, Houston.

Reprint requests to: Roy V. Varner, M.D., 2800 S. MacGregor, Houston, TX 77021 (e-mail: rvarner@mind.hcpc.uth.tmc.edu).

ings, and the nurse raters were blind to the goal of the project and its hypotheses. Each nurse rater was the same from admission to each subsequent testing interval since they served as primary nurses assigned to specific patients. All ratings were reviewed for apparent clinical validity by 1 of 2 attending psychiatrists, both with BPRS experience. It was anticipated that the size of the baseline patient sample would gradually decrease at subsequent rating points, reflecting variable length of stay in this naturalistic study. Therefore, the cutoff interval for data analysis was ultimately set at 14 days. The baseline sample (N = 87) consisted of 41 women and 46 men with an ethnic distribution of white (N = 42), African American (N = 28), Hispanic (N = 13), and other (N = 4). The mean  $\pm$  SD age was  $34.6 \pm 9$  years, mean number of total hospitalizations was 2.2 (range, 1-9), and the mean study length of stay was  $16.8 \pm 8.9$ days (range, 1-42 days).

The baseline BPRS was administered to

all 87 patients as near to admission as possible, on days 2 and 7, and weekly thereafter until discharge. Patients received typical psychoactive drug treatment: a neuroleptic. for schizophrenia; a mood stabilizer, often in combination with a neuroleptic, for mania; and an antidepressant for nonbipolar depression. Similarly appropriate medication was used for a heterogeneous "other" patient category, mainly patients with substance-induced psychotic or mood disorders and an assortment of not otherwise specified (NOS) conditions. The reported final DSM-IV discharge diagnoses were a consensus of attending physician, nurse rater, social worker, and psychiatric resident diagnoses. Discharge criteria were based solely on observed clinical improvement and attainment of individualized treatment plan goals; the BPRS scores were not considered. For data analysis, the 4 general diagnostic categories derived from each patient's discharge DSM-IV primary diagnosis were schizophrenia (N = 13); mania, including the mixed subcategory (N = 30); depression, including major depression and depressive episode of bipolar (N = 20); and other (N = 24). The "other" category contained diagnostic groups insufficient in size to be included separately in the data analysis. However, they were included in the "all-patients" category (i.e., the entire baseline sample of 87 patients) to determine the importance of factor scores or changes in scores regardless of diagnosis. All data analyses were based on the original 0 to 6 scoring system for each of the 18 BPRS items where 0 means not present or not observed, and 6 means extremely severe. Additionally, we included 4 subscales that had been derived from early BPRS development.<sup>4</sup> Each subscale represents the sum score of 3 items: (1) thinking disturbance: con-

Table 1. Brief Psychiatric Rating Scale Mean  $\pm$  SD Total Scores and Subscale Scores by Patient Category

Patient Category	Baseline	Day 2	Day 7	Day 14
All patients	N = 87	N = 82	N = 73	N = 58
Total score	$18.20 \pm 9.79$	13.91 ± 9.78***	9.54 ± 8.63***	$7.40 \pm 7.62^{***}$
Thinking disturbance	$3.67 \pm 3.63$	2.39 ± 2.81***	1.79 ± 2.73***	1.19 ± 2.13***
Withdrawal-retardation	$2.93 \pm 3.36$	$2.46 \pm 2.99$	$1.86 \pm 2.99$	1.43 ± 2.51**
Hostility-suspiciousness	$3.22 \pm 2.98$	1.98 ± 2.81**	1.33 ± 2.82***	$1.19 \pm 2.28 * * *$
Anxiety-depression	$5.57 \pm 4.66$	$4.52 \pm 4.44$	$2.40 \pm 2.90 * * *$	1.97 ± 2.74***
Schizophrenia	N = 13	N = 13	N = 10	N = 7
Total score	$19.62 \pm 8.76$	$14.15 \pm 10.20$	8.80 ± 7.53*	$5.00 \pm 5.66^{***}$
Thinking disturbance	$4.38 \pm 2.88$	$3.31 \pm 2.52$	$2.30 \pm 2.50$	$0.57 \pm 1.51*$
Withdrawal-retardation	$3.08 \pm 3.93$	$2.23 \pm 2.13$	$2.30 \pm 2.37$	$1.86 \pm 2.40$
Hostility-suspiciousness	$5.62 \pm 3.61$	$2.62 \pm 3.71$	$1.70 \pm 3.76*$	$0.43 \pm 1.11^{***}$
Anxiety-depression	$2.92 \pm 3.39$	$2.92 \pm 3.97$	$1.00 \pm 2.21$	$1.57 \pm 2.70$
Mania	N = 30	N = 27	N = 25	N = 22
Total score	$19.50 \pm 12.60$	$15.63 \pm 11.48 **$	11.64 ± 9.45**	$6.91 \pm 5.63^{***}$
Thinking disturbance	$4.47 \pm 4.60$	3.11 ± 3.43*	$2.20 \pm 2.65 **$	1.23 ± 2.11***
Withdrawal-retardation	$2.80 \pm 3.56$	$3.26 \pm 3.95$	$1.96 \pm 3.70$	$1.00 \pm 1.55*$
Hostility-suspiciousness	$3.93 \pm 3.18$	$2.44 \pm 3.07*$	1.68 ± 2.85**	$1.64 \pm 1.92*$
Anxiety-depression	$4.77 \pm 4.93$	3.56 ± 4.31*	2.28 ± 2.10**	1.14 ± 1.31**
Depression	N = 20	N = 20	N = 18	N = 14
Total score	$17.30 \pm 8.77$	$14.35 \pm 8.77$	8.94 ± 9.38*	$8.29 \pm 10.44$
Thinking disturbance	$2.55 \pm 2.77$	$1.10 \pm 1.83*$	$0.83 \pm 1.82*$	$0.71 \pm 1.50*$
Withdrawal-retardation	$3.30 \pm 3.53$	$2.15 \pm 2.24$	$2.28 \pm 3.18$	$2.00 \pm 4.00$
Hostility-suspiciousness	$2.20 \pm 2.24$	$1.60 \pm 2.77$	$1.28 \pm 3.14$	$0.93 \pm 3.48$
Anxiety-depression	$7.90 \pm 3.94$	$7.55 \pm 4.74$	$3.50 \pm 3.48^{***}$	$3.57 \pm 4.08 **$
*p < .05. ** p < .01. *** p < .001.				

ceptual disorganization, hallucinatory behavior, unusual thought content; (2) withdrawal-retardation: emotional withdrawal, motor retardation, blunted affect; (3) hostilitysuspiciousness: hostility, suspiciousness, uncooperativeness; and (4) anxiety-depression: anxiety, guilt feelings, depressive mood.

For the first step of data analysis, significance for the differences between baseline mean BPRS total scores and day-2, day-7, and day-14 mean BPRS total scores was tested for the all-patients category using the paired t test. Since patients with differing diagnoses are presumed to have varied clinical presentations and rates of improvement, the next step was to repeat the same analysis for each of 3 identified diagnostic categories. The differences for all 4 BPRS subscale scores between baseline and the other 3 timepoints were also studied with the same analytic strategy. The statistical significance level was defined as p < .05. A correlational analysis was conducted to determine if score differences between baseline and day 2 could predict differences between day 2 and day 14.

#### RESULTS

Mean  $\pm$  SD total scores and subscores at 4 rating points over 2 weeks for 4 diagnosis-based categories are presented in Table 1. While obvious differences in magnitude of statistical significance appear throughout this report, the relatively small sizes of the study samples preclude conclusive interpretation of these differences.

BPRS total scores demonstrate significant change from baseline to each subsequent rating interval for the allpatients category. A similar finding is present for patients with mania. Schizophrenic and depressed patients do not demonstrate significant change until day 7. Schizophrenic patients continue to demonstrate significant change at day 14, while depressed patients demonstrate essentially no further change during the same interval.

Three of the subscores-thinking disturbance, hostilitysuspiciousness, and anxiety-depression-demonstrate significant change at day 7 for the all-patients category, but differ according to diagnostic category: schizophrenic patients demonstrate significant change only for the hostility-suspiciousness subscore; manic patients demonstrate significance for all 3 of these subscores, even at day 2; depressed patients demonstrate significant change for thinking disturbance, none for hostility-suspiciousness, and an unequivocal change for anxiety-depression. None of the 4 patient categories demonstrate significant change at day 7 for withdrawal-retardation.

A correlation analysis of BPRS total score difference between baseline and day 2 for the all-patients category demonstrated high correlation with the difference between baseline and day 14 (r = 0.53, p < .0001). A similar high correlation was present for each of the 4 subscores (thinking disturbance:  $r = 0.33_{\odot} p = .0021$ ; withdrawal-retardation: r = 0.46, p = .0001; hostilitysuspiciousness: r = 0.46, p = .0001; anxiety-depression; r = 0.48, p = .0001).

### DISCUSSION

Despite previous BPRS use, primarily in psychopharmacology research, we sought to investigate its application exclusively as a clinical inpatient tool. We hoped to demonstrate the following possibilities.

- 1. The BPRS could demonstrate significant change during brief, acute psychiatric lengths of inpatient stay, typically 7 days. Total BPRS scores indicate that the BPRS can demonstrate significant change by day 7 in all 4 patient categories and even as early as day 2 for the all-patients and mania categories. Significant change from baseline is also seen at day 14 for all-patients, schizophrenia, and mania categories, but not for the depression category, which remains unchanged, possibly owing to the delayed full effect of antidepressant medications.
- 2. Early change might predict both the appropriateness of early discharge and degree of later improvement. The correlation between change at day 2 and at day 14 was investigated to determine whether the extent of initial change would potentially be able to predict the need for longer hospitalization. Correlation analysis reveals that early change at day 2 correlates with further significant

change at day 14 for the all-patients category in both total and subscale scores. The reason for the relationship between the day 2 BPRS score and the day 14 score is unclear. Two possible reasons for the association include cooperation with treatment and response to medications. It is possible that many patients responded positively to the structure and supervision of the hospital and were more likely to take medication. Another possible explanation involves response to medication. Some authors have hypothesized that there are subpopulations of patients who show a rapid response to neuroleptics.<sup>18</sup> Our results show that early change has the potential to predict eventual outcome. Further studies should investigate whether there is a threshold for lack of change at day 2 that could predict that a patient would be unlikely to improve during a brief hospitalization.

Since change in BPRS total and subscale score from 7 to 14 days is relatively less than the change from baseline to day 7, a 7-day hospitalization may be sufficient before discharging many patients, especially those demonstrating substantial improvement at day 2. Some patients will require a stay exceeding 7 days owing to clinical reasons or psychosocial factors not related to rating scale dimensions. Extensive use of the BPRS by others in controlled schizophrenia drug trials was usually based on a minimum of a 21-day stay to demonstrate adequate improvement.5

3. Subscale scores, rather than total scores, might help predict which patient diagnostic categories would show the best early response during a brief hospitalization. Total BPRS score in schizophrenia has been suspected of adding error variance since it measures many items not typically associated with schizophrenia,<sup>19</sup> and we have speculated that this might apply to other diagnoses as well. Total BPRS score change might also be inconclusive for certain patients whose lower (i.e., less impaired) baseline total scores have reduced potential for dramatic improvement compared with higher baseline scores. The differing pattern of subscore improvement according to diagnosis (see Table 1) suggests potential advantage over total scores for such patients. While subscores for thinking disturbance do not demonstrate a significant change until day 14 for schizophrenia, a significant change does occur at day 2 in both mania and depression, possibly correlating better with clinical improvement than would total score in some patients with those latter diagnoses. Hostility-suspiciousness subscore demonstrates a significant change at day 7 for schizophrenia, perhaps a more useful measure for some patients

in this diagnostic group. Similarly, the anxietydepression subscore is possibly a more useful outcome measure than total BPRS score for some depressed patients at day 7. Since withdrawalretardation shows the weakest treatment effect of the 4 BPRS subscales, it does not appear to be useful in demonstrating early response in any of the patient categories, whether by itself or compared with total score.

The fact that there was no systematic blinding for previous ratings was a potential source of bias since raters might tend to overstate improvement in patients on their service. Several factors, however, mitigated against such bias: (1) as described in Method, earlier ratings were unavailable to the raters at the time of subsequent ratings, so, in effect, raters were blinded; (2) raters were unaware of the goal or hypotheses of the study; and (3) amount and time course of improvement varied by diagnostic group and BPRS subscales. While the absence of a rigorous formal blind was not ideal, we believe it did not alter the basic nature of our results. Furthermore, a formal blinding strategy might have distorted the clinical structure of the unit and reduced the generalizability of the findings to routine clinical settings.

The purpose of this study was to demonstrate the ability of the BPRS to quantify numerically what may seem apparent intuitively. Clinical intuition that a patient has somehow "improved" is no longer sufficient for maintaining funding sources needed for inpatient care. Our search was for a standard, relatively user-friendly instrument such as the 18-item anchored BPRS that would provide reasonable quantitative outcome support within the brief periods of hospitalization now demanded. We feel that this study shows the BPRS to have great promise for fulfilling that need. Ultimate value of the subscales compared with total scores for some patients grouped by diagnosis awaits correlation with various parameters in larger clinical samples, perhaps using other recent versions of this well-known instrument.

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