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Clinical Rating Scales in Suicide Risk Assessment[1]

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Abstract: *This study explores the usefulness of clinical rating scales in the assessment of suicidal risk in an urban psychiatric teaching hospital. Admission for clinically evaluated suicide risk was the outcome variable because actual suicide occurs rarely. Six clinical scales identified high-risk patients: the Modified SAD PERSONS scale, revised Beck Depression Inventory, Beck Anxiety Inventory, Beck Hopelessness Scale, Beck Scale for Suicidal Ideation (BSS), and the High-Risk Construct Scale (NEW). It was hypothesized that patients who scored highly on the clinical scales were more likely to be admitted. Five of the scales had previously established psychometric properties, while one was new and untested. For our patient population, the established scales had 100% sensitivity and negative predictive value, but lower specificity and positive predictive value (range = 38–90% & 28–71%). We performed a correlation matrix and regression analysis to determine which scale(s) best predicted admission based upon suicidal concerns. The previously untested NEW scale was the best predictor followed by the BSS. Clinical rating scales cannot predict suicide in the individual and strict cut-off scores should not be used to dictate admission to hospital. However, the information provided can be a valuable adjunct to suicide risk assessment in psychiatric and non-psychiatric emergency settings.* © *2000 Elsevier Science Inc.*

Introduction

The evaluation of suicidal patients is a difficult and stressful aspect of emergency psychiatric care. Patients at imminent risk for suicide usually require protective admission to a psychiatric unit where they can be safely treated [1]. Exceptionally, they may be treated in the community, provided adequate supports and secure arrangements are in place. The decision to admit or to discharge a potentially lethally suicidal patient is a critical one. Experienced psychiatrists evaluate suicidality through the course of a complete psychiatric history and examination using established demographic and individual suicide risk factors [2]. However, standardized clinical rating scales may be an effective adjunct to emergency assessment. Previous research shows they are especially helpful for health care workers with limited psychiatric training [e.g., family physicians, emergency department (ED) physicians, and clinical clerks] [3]. In time-sensitive situations, scales can be useful in streamlining assessments (e.g., at triage) and making them more efficient. Clinical rating scales cannot accurately predict suicide in individual cases, as suicide is an extremely rare event with countless contributing factors [2,4,5]. However, they can provide an estimate of "suicidal risk," which may help to guide patient management. For instance, a score exceeding an established cut-off could be used to alert staff to high-risk patients at the time of triaging, or to indicate the need for referral to psychiatry, in a general hospital ED.

Although there are well over 20 recognized "suicide prediction" scales, reviews of their clinical utility are relatively sparse [6]. The purpose of this study was to determine whether one or a combination of clinical rating scales could be used as an aid to the assessment of suicidal risk in an urban teaching psychiatric hospital. We compared these scales to clinical assessments by the psychiatric emergency room team at The Centre for Addiction and Mental Health (CAMH) (Clarke Division). It was predicted that patients who scored highly on the clinical scales were more likely to be admitted. The following five clinical scales were chosen based on their psychometric properties, ease of administra-

[1] Information about the rating scales can be obtained from the author.

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tion, and because they represent a variety of underlying constructs: the Modified SAD PERSONS scale (MSPS) [7], the revised Beck Depression Inventory (BDI) [8], Beck Anxiety Inventory (BAI) [9], Beck Hopelessness Scale (BHS) [10], and the Beck Scale for Suicidal Ideation (BSS) [11]. Previous research shows that depression, anxiety, hopelessness, and suicidal ideation are all clinical correlates of increased suicide risk [6,13–15]. A new scale, the High-Risk Construct Scale (NEW), with items derived from the high-risk clinical practice of Dr. I. Sakinofsky and from the literature on suicide [12], was also tested.

With the exception of the MSPS, none of the clinical rating scales have been used in an emergency setting to guide the decision to admit patients based on suicide risk. In a previous study, the MSPS (scores $\geq$6) identified the need for hospitalization with a sensitivity of 94% and a specificity of 71% in patients expressing suicidal ideation in a general, adult ED [7]. The BHS measures the degree of pessimism and negativity about the future. Of all the above Beck scales, it is the best predictor of eventual suicide with scores of nine and above indicating significant risk [13,14]. The BAI has not been validated previously as a measure of suicidality. However, Weissman et al. [16] found that panic disorder and panic attacks were associated with increased risk of suicidal ideation and suicide attempts relative to other psychiatric disorders. Subsequent work indicated that though severe anxiety symptoms were not an independent risk factor [17], their presence increases short-term (within one year) suicide risk in patients with a co-existing major affective disorder [18].

Method

Sample

The Clarke Institute of Psychiatry is a division of the Center for Addiction and Mental Health (CAMH). It is a research institute, a center for inpatient and outpatient care, and a teaching hospital. It is located in a largely commercial, non-residential area of downtown Toronto, Canada. The emergency department evaluates over 3000 people a year. An ED team consisting of a social worker or psychiatric nurse, a resident in psychiatry, a staff psychiatrist and frequently a clinical clerk carries out evaluations.

Subjects for this study were 55 consenting adults (over age 18 years) representing consecutive emergency assessments between the hours of 11 A.M. and 9 P.M. on weekdays from July 3 to August 21, 1996. The majority of assessments take place during this period, but the ratio of admissions to assessments does not differ significantly from other times of the day (or night) or over the weekend. To be included in the study, subjects had to be capable of attending, understanding, and responding to questionnaire items. As a result, violent, extremely agitated, acutely psychotic patients, and severely mentally retarded patients were not included. Patients intoxicated with alcohol, street drugs, or medications were also excluded.

Instruments

Modified SAD PERSONS Score (MSPS). The SAD PERSONS Score (SPS) uses a simple mnemonic [3] representing 10 major demographic risk factors found in the literature on adult suicide. Some of the items (e.g., patient age and gender) are objective, while others rely on the subjective judgment of the evaluator (e.g., loss of rational thinking). The MSPS uses the original SPS mnemonic with a modified scoring system. Total scores range from 0 to 14.

Beck Depression Inventory (BDI). The BDI is a self-report 21-item scale used to assess the current severity of depression. Each item is rated on a four-point scale (0 to 3) with possible total scores ranging from 0 to 63. Scores provide a measure of the severity of self-reported depression: 0–9 minimal, 10–16 mild, 17–29 moderate, and 30–63 severe.

Beck Anxiety Inventory (BAI). The BAI is a self-report 21-item scale that measures the symptoms of anxiety that are largely independent of depression. Each symptom is rated on a four-point scale (0 to 3) with possible total scores ranging from 0 to 63. Scores provide a measure of the severity of self-reported anxiety: 0–7 minimal, 8–15 mild, 16–25 moderate, and 26–63 severe.

Beck Hopelessness Scale (BHS). The BHS consists of 20 true-false statements that measure the degree of pessimism and negativity about the future. Keyed responses are summed to give a score of 0 to 20. Scores provide a measure of the severity of self-reported hopelessness: 0–3 minimal, 4–8 mild, 9–14 moderate, and 15–20 severe.

Beck Scale for Suicidal Ideation (BSS). The BSS is a self-report 19-item scale preceded by five screening items. The BSS and its screening items are intended to assess a patient's thoughts, plans and intent to commit suicide. All 24 items are rated on a three-point scale (0 to 2). In this study, scores from the five screening items were included in the overall score. Therefore, total scores could range from 0 to 48. No specific cut-off scores exist to classify severity or guide patient management. Increasing scores reflect greater suicide risk, and any positive response merits investigation [11].

High-Risk Construct Scale (NEW). The NEW scale draws upon five psychological constructs ("perturbation," "cognitive constriction," "adamance," "lethality," and "reasons for living") associated with acute suicidality. Each construct constitutes an axis that is rated on a five-point scale (0 to 4). The score on the last axis ("reasons for living") is subtracted from the total. Hence, total scores range from −4 to 16, with higher scores indicating a greater hypothetical risk. Specific cut-off scores to classify severity or guide patient management have not yet been established.

Procedure

For each patient, the first author attended either the intake interview (conducted by a nurse or social worker) or the initial psychiatric interview (conducted by a resident or staff psychiatrist). Afterwards, the research project was explained, and willing patients signed the consent form. The first author then interviewed the patient and obtained the additional information required for the MSPS and the NEW scale. Next, the patient was given the self-report clinical scales as a questionnaire package in the following order: BDI, BAI, BHS, and BSS. The patient completed the four scales alone, but the first author was readily available to answer questions. Scores from the six clinical scales were not communicated to the rest of the ED team unless the patient revealed acute suicidality not disclosed previously during the emergency assessment. Endorsing any of the following statements "I would like to kill myself"/"I would kill myself if I had the chance" (item 9, BDI), "I cannot keep myself from committing suicide" (item 9, BSS), or "I am sure that I will make a suicide attempt" (item 15, BSS) was taken as an indication of immediate suicide risk and the physician informed. Psychiatric diagnoses were made by the emergency physicians according to DSM IV criteria or were taken from the patient's medical chart.

Results

Subjects

A total of 106 patients were assessed (57% male; mean age=36.3 years, SD 10.6; range 18.9 to 73.8) over the course of the study (Table 1). Of this total population, 55 (52%) patients met the criteria and agreed to be interviewed by the investigator. This experimental sample consisted of 31 (56%) men and 24 (44%) women (mean age=34.7 years, SD 10.9). Scores for the MSPS and NEW scale were obtained for each of these patients. However, only a subset of this group, 28 (51%) patients, were willing to complete the self-report questionnaire package containing the BDI, BAI, BHS, and BSS. Patients refused based upon reasons including the inability to concentrate due to fatigue or anxiety (41%) and dislike of questionnaires (35%). The experimental subsample consisted of 17 (61%) men and 11 (39%) women (mean age=33.1 year, SD 10.8). The proportion of patients that was admitted was 30% for all the patients assessed (n=106), 29% of the larger experimental sample (n=55) and 25% of the subsample (n=28). There was no statistical difference in the rates of admission between the three groups.

Table 1. Experimental groups

Sample	n	Mean age/SD (years)	Gender (%)	Scores obtained	Patients admitted
Total population	106	36.3/10.6	M=57 F=43		32 (30%)
Experimental sample	55	34.7/10.9	M=56 F=44	MSPS, NEW	16 (29%)
Experimental subsample	28	33.1/10.8	M=61 F=39	MSPS, NEW, BDI, BAI, BHS, BSS	7 (25%)

The physicians, as part of the complete emergency assessment, made a psychiatric diagnosis for each patient. The distribution of primary psychiatric diagnoses was: Mood Disorders (42%), Anxiety Disorders (15%), Psychotic Disorders (13%), and Adjustment Disorder (9%). Eight patients (15%) had a previous primary diagnosis of a Personality Disorder, or predominantly exhibited traits of a Personality Disorder. Eight patients (15%) had a primary or secondary diagnosis of a Substance-Related Disorder. The majority of patients were single (75%) and unemployed (72%).

Clinical Rating Scales: Scores

The mean MSPS and NEW scale scores for the experimental sample of 55 were 5.7 (SD 2.5) and 4.0 (SD 4.2), respectively (Table 2). The mean score for the MSPS suggests this is a moderately high-risk group for suicide [7]. Mean scores for the sub-sample of 28 on the BDI, BAI, BHS, and BSS were, respectively, 31.2 (SD 15.2), 32.1 (SD 12.9), 11.9 (SD 6.3), and 15.7 (SD 12.9). In comparison with previous reports [8], the sub-sample was moderately to severely depressed, anxious and hopeless. The BSS has no validated cut-off scores that categorize the severity of suicidal risk [11].

Sensitivity, Specificity, and Predictive Value

Table 3 illustrates the sensitivity, specificity, and positive and negative predictive values for the clinical rating scales with previously established cut-off scores (MSPS, BDI, BAI, and BHS). No validated cut-off scores exist for the BSS and the NEW scale. Cut-off scores for these two scales were derived post-hoc based on values that provided the best combination of sensitivity, specificity, and predictive values. Two patients were excluded from the analysis because they were admitted for reasons unrelated to suicide risk. The clinical rating scales had extremely high sensitivity (92–100%) and negative predictive value (96–100%), but lower specificity (38–90%) and positive predictive value (28–71%).

The BSS had the best specificity (90%) and positive predictive value (71%), while the BAI had the worst (38% and 28%, respectively).

Linear Association: Correlation Matrix

The MSPS, NEW, BHS, and BSS scales are significantly correlated to the decision to discharge or admit ($P<.05$). The scales are highly intercorrelated ($P<.05$).

Regression Analysis

A stepwise multiple linear regression was run (.05 criterion of entry) to determine which scale, or combination of scales, was the best predictor of the decision to admit based upon suicidal concerns. Alone, the NEW scale was the best predictor ($R^2=.37$, $\beta=.61$) and no other scale could add predictive increments. If forced into the model first, the BSS ($R^2=.36$, $\beta=.60$) and the BHS ($R^2=.22$, $\beta=.47$) were also good predictors. No combination of scales has significantly greater predictive power than the NEW scale or the BSS alone.

Completed Suicide

One suicide occurred during the study. The patient was admitted involuntarily because the ED team judged her to be at very high risk of suicide. She committed suicide as an inpatient very shortly after her admission. This patient had scores of 9 and 5 on the MSPS and the NEW scale, respectively. She refused to complete the written questionnaire package.

Discussion

The mode of administering the clinical scales had a profound effect on patient participation in this study. Half the patients refused to complete the written questionnaires (BDI, BAI, BHS, and BSS) resulting in a very limited sample size. The nature of the patients' presenting complaints (e.g., anxiety, agitation, and depression) appeared to represent a

Table 2. Mean scores for six clinical rating scales

	MSPS Range: (0–14)	NEW Range: (−4–16)	BDI Range: (0–63)	BAI Range: (0–63)	BHS Range: (0–20)	BSS Range: (0–48)
n=55	5.7 (SD 2.5)	4.0 (SD 4.2)				
n=28	5.5 (SD 2.5)	3.6 (SD 4.3)	31.2 (SD 15.2)	32.1 (SD 12.9)	11.9 (SD 6.3)	15.7 (SD 12.9)

Table 3. Sensitivity, specificity, and predictive values for six clinical rating scales

Scale	Cut-off score validated (y/n)[a]	Sensitivity (%)	Specificity (%)	Negative pred. value (%)	Positive pred. value (%)
MSPS	≥6 (y)	100	60	100	45
NEW	≥5 (n)	92	63	96	42
BDI	≥30 (y)	100	55	100	36
BAI	≥26 (y)	100	38	100	28
BHS	≥15 (y)	100	71	100	45
BSS	≥24 (n)	100	90	100	71

[a] y = cut-off score previously validated: n = cut-off score not previously validated.

barrier to their ability and willingness to complete written questionnaires. This is an important limitation given that severe anxiety symptoms and decreased concentration have proven to be "short-term" predictors of suicide (within one year) [15,18]. In addition, acute intoxication with alcohol, street drugs, or medications excluded patients from this study. Alcohol and substance abuse appear to be independent risk factors for suicidal ideation [19], and recent alcohol abuse is an acute predictor of suicide behavior [18,20]. Due to these constraints, we failed to obtain data on a large subset of potentially suicidal patients. In contrast, many more patients agreed to discuss, and openly expressed, their thoughts and feelings about suicide "one-on-one" with the interviewer. Perhaps clinical rating scales administered in an interview format have a calming effect in addition to their value as an assessment tool.

However, using an interview format leads to several potential disadvantages. It may be less objective due to intra- and inter-rater variability, as well as interviewer bias and skill level. In this study the NEW scale required the interviewer to subjectively rate the patients along several abstract psychological axes based upon a very limited interaction.

Further, administering scales in an interview format requires trained staff, and it is more time consuming and labour intensive. For these reasons, written questionnaires may be more practical in a very busy general ED. However, the results of this study strongly suggest that for a self-selected psychiatric population, as with The CAMH (Clarke Division) Emergency Services, patient participation is far greater when clinical scales are administered verbally.

The clinical scales were liberal in their assessment of suicidal risk and severe depression, anxiety, and hopelessness relative to the decision to admit or discharge patients made by the ED team. The scales had very high sensitivity but low specificity, resulting in many "false positives" (i.e., patients with scores exceeding the cut-offs that were not admitted). Strictly adhering to the cut-off score would

Table 4. Correlation matrix

	Disch/Admit	MSPS	NEW	BDI	BAI	BHS
	.57					
MSPS	$P=.000$					
	.55	.68				
NEW	$P=.000$	$P=.000$				
	.38	.61	.67			
BDI	$P=.06$	$P=.001$	$P=.000$			
	.24	.44	.49	.82		
BAI	$P=.23$	$P=.03$	$P=.01$	$P=.000$		
	.46	.61	.67	.63	.50	
BHS	$P=.02$	$P=.001$	$P=.000$	$P=.001$	$P=.009$	
	.61	.75	.90	.76	.62	.73
BSS	$P=.001$	$P=.000$	$P=.000$	$P=.000$	$P=.001$	$P=.000$

Disch = discharged; Admit = admitted.

result in unnecessary admissions, for which there is great pressure to avoid given the current climate of bed shortages and fiscal restraint. The BSS was an exception; applying a cut-off score of 24 or greater for admission yielded excellent sensitivity (100%) and specificity (90%). However, the originators of this scale have not published specific cut-off scores. They maintain that any positive score on this scale, for which all questions relate to suicidal ideation, indicates significant risk [11].

There are no reports in the literature of the BDI, BAI, BHS, or the BSS being used specifically as a guide to admitting patients based upon suicidal risk. Of the four scales, the BHS has demonstrated the strongest association with suicidal intent [13,14].

Psychiatric outpatients with scores of nine or greater on the BHS were found to be 11 times more likely to commit suicide (relative risk) than those were with scores below nine [14]. In this study, the BHS had the second best specificity and positive predictive value, while the BDI and BAI had considerably worse values. However, hopelessness may not be an ideal indicator of suicide risk in emergency settings because it is a predictor of suicide in the "long-term" (beyond 1 year) [18]. Schnyder et al. [21] that showed that mental health professionals may overvalue hopelessness as an acute contributor to suicide. Suicide attempters more commonly described feelings of emptiness and despair, and emphasized a "loss of control" as a relatively more important factor prior to their attempt.

The MSPS was the only scale tested for which cut-off scores are specifically intended to dictate the need for admission based upon suicidal risk. A score of six or greater identified the need for hospitalization with a sensitivity 94% and a specificity of 71% [7]. In our study, the MSPS's sensitivity and specificity were 100% and 60%, respectively. The discrepancy in results likely stems from differences between the two experimental populations. The Clarke ED serves a self-selected psychiatric population while Hockberger and Rothstein's study was conducted in a general hospital ED. Our population likely had more chronically ill psychiatric patients who scored higher on all the clinical scales. The Clarke ED team may have a high threshold for admission with these patients if they are thought not to be acutely at risk.

The preceding discussion highlights the fact that cut-off scores derived from measures of sensitivity and specificity depend heavily upon the original population tested. Therefore, such values should not be adhered to rigidly as a basis for admission with patients from differing clinical populations. Rather, a range of scores might be more appropriate to guide patient management. Ideally, even this range should be validated for the particular clinical population. Alternatively, cut-off scores could be used early in the assessment (e.g., at triage) to identify potentially high-risk patients or to indicate the need for referral to psychiatry in non-psychiatric EDs. The scales would dictate the decision to investigate further, rather than to hospitalize the patient.

The correlation matrix and linear regression analysis were intended to determine which clinical scale, or combination of scales, best predicts the need for hospitalization in potentially suicidal patients. In this study, the NEW scale, alone, proved to be the best predictor of admission. Many patients were willing to complete this scale because it involves an interview rather than a written questionnaire. However, this scale assesses patients along highly abstract psychological axes, which makes it likely to have low inter- and intra-rater reliability. As this test was newly formulated, these and its other psychometric properties (e.g., construct and discriminatory validity, internal consistency) have not been established. Therefore, while this test holds promise for the future it can not yet be recommended for general clinical use.

Of the remaining scales, the BSS is most highly associated and the best predictor of admission based upon suicidal concerns. This is not surprising given that the BSS was developed specifically to measure suicide risk based on patients' thoughts and wishes about suicide. The remaining clinical scales measure variables (depression, anxiety, and hopelessness, social and demographic factors) that are probably less specifically associated with acute suicidality. According to the results of this study, the BSS would be the clinical scale of choice at present. Unfortunately, the self-report questionnaire format was an impediment to its use. The original BSS, called the Scale for Suicide Ideation (SSI), was designed to be rated by a physician following a clinical interview. The SSI was modified to include a standardized sequence of administration and prompt questions. The resulting Modified Scale for Suicidal Ideation (MSSI) was suitable for use by paraprofessionals and had favourable psychometric properties [22]. The MSSI could provide a very useful clinical tool for health care professionals with limited psychiatric training, who are involved in the suicide risk assessments.

However, a problem with the BSS/MSSI is that

they rely almost entirely on the patient responding truthfully to questions about their suicidal thoughts and intentions. Previous research shows that while suicide "attempters" readily report their intentions, suicide "completers" often conceal their thoughts and plans [4].

Conclusions

Assessing the risk of suicide is an extremely difficult and complex task when applied to the individual. Certainly, no single clinical scale or combination of scales can replace the need for a complete individual psychiatric assessment. The intention of this study was to explore which clinical scales might provide a useful adjunct to this challenging process. Verbal administration of clinical scales appears to be most useful and realistic for use with an emergency psychiatric population. The High-Risk Construct Scale (NEW) (Sakinofsky and Cochrane, 1996; unpublished) merits further investigation and validation. The BSS was the best preexisting assessor of suicidal risk. This clinical scale has been modified for use by paraprofessionals in a standardized semi-structured interview format. In general, the clinical scales appeared to overestimate suicidal risk. However, they bring additional information to a suicide risk assessment by highlighting important concepts and risk factors, which is likely most helpful to relatively inexperienced health care providers (e.g., junior residents) or those less familiar with psychiatry. They may be most useful in alerting ED teams to high-risk patients early in an assessment or to indicate the need for psychiatric referral in general hospital ED settings.

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