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The emergency physician's assessment of suicide risk in intentional self-poisoning using the modified SAD PERSONS scale versus standard psychiatric evaluation in a general hospital in South India: A cross-sectional study

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Abstract

Introduction: The reliable identification, by emergency physicians, of those with intentional self-poisoning at risk of repeating attempts is crucial, particularly in countries with a shortfall of mental health professionals.

Methods: This cross-sectional study of intentional self-poisoning in India compared an emergency physician's assessment for the need for psychiatric referral, using the modified SAD PERSONS Scale (MSPS) as an interview guide, with a standard psychiatric interview.

Results: In 67 consecutive adults with intentional self-poisoning, MSPS cut-off scores of 5 or more best approximated psychiatric assessments for the need for psychiatric referral (positive likelihood ratio 2.9, 95% confidence interval [CI] 0.8–10.2; negative likelihood ratio 0.5, 95% CI 0.3–0.8).

Conclusions: MSPS-guided emergency physicians' assessments after self-poisoning showed modest concordance with psychiatric assessments of suicide-risk. Concordance with psychiatric assessments may improve if risk factors prevalent in different settings are identified and incorporated in the MSPS.

Keywords

Suicide risk-assessment, self-poisoning, sensitivity, specificity, diagnostic odds ratio

Introduction

Suicide rates are as high as 71 per 100,000 in rural South India, with hanging (54%) and pesticide ingestion (31%) contributing to the major causes of suicidal deaths.[1] Psychiatric illnesses, such as depression and psychotic disorders, are less common causes for suicide in India, compared to psychosocial stressors resulting in adjustment disorders, and social isolation.[1,2] The lack of effective regulation of the sale and storage of pesticides has resulted in a high burden of impulsive self-poisoning with highly toxic pesticides and plant poisons in response to stress, and death often results owing to limited access to timely and appropriate emergency services.[1–3]

It is important to differentiate between those with low suicidal intent and those with continuing high suicidal intent who require admission. The determination of risk factors that predict future suicidal attempts requiring psychiatric follow-up is crucial in planning disposition of patients surviving attempts at

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self-harm presenting to emergency services. Although these assessments are more reliably performed by mental health professionals, the lack of availability of such professionals attached to emergency services in many low- and middle-income countries results in emergency-care personnel, many of whom may have had little training, *de facto* undertaking these assessments.

Checklists, brief interview guides and screening instruments or scales to stratify risk, and appropriately plan admission, referral, or disposition have been shown to reduce repeat episodes of self-harm and suicidal attempts.[4,5] However, there are concerns that cultural, population, and context-specific risk factors used in these instruments could affect the discriminatory ability of these abbreviated assessments. Where experienced mental health professionals are available, such checklists have been limited in their routine use.

In this study we compared the accuracy of a widely used screening instrument, the modified SAD PERSONS scale (MSPS),[6] used by an acute-care physician against the reference standard of a standard psychiatric interview, in assessing immediate and short-term suicidal risk, in order to plan further management of people with intentional self-poisoning presenting to emergency services.

Methods

Setting and study population

This cross-sectional study was conducted in the adult acute care medical unit (AMCU) attached to the emergency department (ED) of a 2700-bed teaching, general and multi-specialty referral hospital in South India, serving about 6000 outpatients daily. Adults presenting after hanging or traumatic suicidal attempts are referred after triage to trauma care specialists. Medical emergencies, including cases of self-poisoning who are referred by private treatment facilities or practitioners from the districts, or from the three neighbouring states, are referred to AMCU physicians working in the adult ED.

Consecutive adult patients referred to adult ED services with intentional self-poisoning over a 1-month period were assessed. Those with hemodynamic instability, respiratory distress or with altered sensorium at admission were assessed when well and prior to discharge.

The modified SAD PERSONS Scale

The MSPS was selected for evaluation owing to its brevity and simplicity, lack of psychological constructs needing specialised training, and the availability of cut-off scores validated in previous studies in emergency care settings.[4,6] The MSPS scores 1 point for each of 10 risk factors identified as present.[7] Each risk factor contributed to the mnemonic that is the name of the scale. These are: sex (male); age (<19 years or >45 years); depression or hopelessness (depressed mood, poor concentration, disturbed sleep and poor appetite); previous attempts or psychiatric care; ethanol or drug use (chronic use or recent heavy use); rational thinking loss (organic brain syndrome or psychosis); social support failure (no close family, friends, job or religious affiliation); organised plan or attempts (suicidal attempt was well planned, or consequence serious); no spouse (separated, divorced or widowed); stated intent (suicide note or other statements).[6] In addition, the MSPS weights four risk factors with an additional point each (depression, rational thinking loss, organised attempt and stated intent), yielding a total score of 14. The recommended cut-off scores of the MSPSare 0–5 (low risk), 6–8 (moderate risk) and 9–14 (high risk) with scores of $\geq$6 denoting the need for psychiatric referral for immediate admission or psychiatric follow-up. This cut-off score had a sensitivity ranging from 94–100% and a specificity of 60–71%; with a 100% negative predictive value (NPV) for a score of $\leq$5 in previous validation studies.[4,6]

Comparisons

We compared the MSPS-guided assessment of one AMCU physician against the standard psychiatric assessment of a consultant psychiatrist with similar years of clinical experience. The AMCU physician used the MSPS as a structured interview guide to facilitate clinical assessments of suicide risk, classifying study participants as at high, moderate or low risk as above. We also compared the performance of the MSPS using thresholds of 4, 5, 6 and $\geq$7 to the psychiatrist's assessment of the need for referral to psychiatric services versus no psychiatric referral.

Both assessments occurred independently on the same day. The assessment by the psychiatrist was the reference standard for this study and is the standard of care used when psychiatric referrals are made for assessments after instances of self-poisoning at this hospital.

Ethical issues

All participants provided written informed consent. The Institutional Review Board (research and ethics committees) of the hospital approved the study protocol and the information sheet used to obtain consent.

Statistical analyses

We calculated the sensitivity, specificity, positive and negative predictive values, positive and negative likelihood ratios, posterior probabilities of a positive and negative test result, diagnostic odds ratios (DOR) and overall accuracy of the different MSPS cut-off scores, with their 95% confidence intervals (CI), against the psychiatrist's assessment for the need for psychiatric referral We interpreted likelihood ratios (LRs) for a positive test result (+LR)>1 as indicating greater concordance with psychiatric assessment and values between 0 –1 as indicating poor concordance. For LRs for a negative test result (-LR), we interpreted values <1 as indicating good concordance. We used the DOR as a single indicator of the performance of the MSPS against the psychiatric diagnosis, since high sensitivity of the MSPS may be offset by low specificity, or vice versa, and a single measure to evaluate the performance of a screening test would be useful.[8] We interpreted DOR values (along with the 95% CI) that were >1 as indicating better discriminatory performance (concordance with psychiatric assessments); and a DOR of 1 or lower to denote poor discriminatory performance.[8] We assessed the overall performance of the different MSPS cut-off scores against the reference standard, by selecting the cut-off score that best approximated psychiatric assessments using the LRs, and the posterior probabilities of a positive and negative test result, with DORs and 95% CIs greater than 1, and higher overall accuracy.

Results

Of 69 consecutive eligible adults referred with intentional self-poisoning during the study period, two patients succumbed shortly after arrival to emergency services, and before assessment. We recruited 67 patients (44% men; mean age, 20 years; age range, 17–85 years). Over 70% came from lower socioeconomic circumstances and from rural habitats. The most common agents used by study participants were pesticides and plant poisons (79%); benzodiazepine overdose was rare. A clear psychiatric diagnosis of a mood disorder or psychosis was made in only 30%, though psychiatric referral was deemed appropriate in 85% of those evaluated by the psychiatrist (Table 1).

Table 1. Sociodemographic details, clinical features and modified SADPERSON's scale- assisted risk factor assessment in 67 consecutive adults presenting with self-poisoning.

	Mean (SD)	*n*	%
Sociodemographic details			
Age(years)	20.7 (15.0)	67	100
Married		35	52
Lower socioeconomic status		51	76
Rural habitat		49	73
Agent used for self-poisoning			
Pesticide		42	63
Plant poison		11	16
Rat poison		1	1.5
Psychotropic medication (other than sedatives)		6	9.0
Benzodiazepines		1	1.5
Non-steroidal anti-inflammatory drug		1	1.5
Crushed glass bottle		1	1.5
Other		4	6.0
Risk factors (Modified SAD PERSONS Scale-guided physician's assessment)			
Male		29	44
Age <19 years or >45 years		21	31
Depression or hopelessness		36	54
Previous attempt or psychiatric care		6	9
Alcohol problems		1	1.5
Rational thinking loss		2	3
Single, widowed or separated		32	48
Organised attempt		35	52
Social support absent		40	60
Suicide note		13	19
Psychiatrist's assessment			
Adjustment disorder		22	33
Mood disorder		17	25
Psychosis		3	5
Substance dependence		5	7
Needs further assessment		10	15
No psychiatric diagnosis		10	15
Needs psychiatric referral		57	85

The optimal balance between sensitivity, specificity, positive and negative likelihood ratios, posterior probabilities of a positive and negative test result, DORs and overall accuracy was achieved for MSPS cut-off scores of ≥5 (Tables 2 and 3).

MSPS cut-off scores of 6 or more, while 100% specific, had unacceptably low sensitivity as to reliably differentiate those that needed referral and follow-up from those who did not (Table 2). Lowering the threshold on the MSPS to 5 or more increased sensitivity while reducing specificity.Increasing the threshold to 7 or more reduced sensitivity even further.MSPS cut-off scores of 5 or more increased the probability of concordance with psychiatric assessments for psychiatric referral by 9% (Tables 2 and 3). The DOR of 5.5 for MSPS cut-off scores of 5 or more (Table 3) indicated that emergency physician's MSPS-guided assessments increased the odds of concordance

Table 2. Psychiatric referral: sensitivity, specificity and predictive values of MSPS scores versus psychiatric assessment.

Comparative assessments						
	Psychiatrist		Sensitivity	Specificity	+ve predictive value	−ve predictive value
MSPs cut off	Yes	No				
≥4	38 (TP)	4 (FP)	67% (53–79%)	60% (26–88%)	91%	24%
≤3	19 (FN)	6 (TN)			(77–97%)	(9–45%)
≥5	33 (TP)	2 (FP)	58% (44–71%)	80% (44–97%)	94%	25%
≤4	24 (FN)	8 (TN)			(81–99%)	(12–43%)
≥6	22 (TP)	0 (FP)	39% (26–52%)	100% (69–100%)	100%	22%
≤5	35 (FN)	10 (TN)			(84–100%)	(11–37%)
≥7	13 (TP)	0 (FP)	23% (13–36%)	100% (69–100%)	100%	19%
≤6	44 (FN)	10 (TN)			(75–100%)	(9–31%)

All values are at 95% CI.
CI, confidence interval; FP, false positive; MSPS, modified SAD PERSONS Scale;TP, true positive.

Table 3. Psychiatric referral: accuracy of the MSPS cut-off scores versus psychiatric assessment.

MSPS cut off score	+veLR	−veLR	Posterior probability of positive result %	Posterior Probability of negative result %	Diagnostic OR	Accuracy%
≥4	1.67 (0.76–3.40)	0.56 (0.3–1.04)	90 (81–95)	76 (63–86)	3.00 (0.76–11.92)	66 (56–73)
≥5	2.89 (0.82–10.20)	0.53 (0.34–0.81)	94 (82–98)	75 (66–82)	5.50 (1.07–28.25)	61 (51–66)
≥6	Infinity (1.05–Infinity)	0.61 (0.50–0.75)	100 (76–100)	78 (74–82)	Infinity (1.06–Infinity)	48 (38–48)
≥7	Infinity (0.6–Infinity)	0.77 (0.67–0.89)	100 (65–100)	81 (79–85)	Infinity (0.5–Infinity)	34 (25–34)

All values are at 95% CI.
CI, confidence interval; MSPS, modified SAD PERSONS Scale; OR, odds ratio; +veLR, positive likelihood ratio; −veLR, negative likelihood ratio.

with psychiatric assessments by five to six times, compared to MSPS scores of 4 or less. However the estimates of accuracy indicated that concordance of the MSPS-guided emergency physician's evaluation of suicidal risk with the psychiatrist's was modest.

Discussion

Summary of main results

This cross-sectional study, using a pragmatic design in routine service conditions at a busy ED, demonstrated that when using the MSPS as a structured interview guide to identify those in need of referral to mental health services due to continuing risk of suicide, or the risk of future suicidal attempts, a threshold of ≥5 is optimal. However, the MSPS was only 61% accurate (range, 51–66%) in correctly identifying those assessed by a psychiatrist as needing or not needing psychiatric referral.

Applicability to clinical practice

The MSPS items cover the usual risk factors used by psychiatrists in clinical interviews to assess and stratify suicide risk. Additional factors such as social adversity, coping styles, family history, reasons for living, and other background and contextual factors are used in psychiatric clinical interviews to supplement impressions about the current mental state and suicidal intent. Incorporating these in MSPS-guided interviews may increase accuracy in identifying those at high risk of repeat attempts of a serious nature in the short or medium-term, but may not be feasible practically without affecting the brevity afforded by the MSPS.

Other screening tools such as the Manchester four-question rule[9] are shorter. The reported sensitivity of 94% when used by emergency physicians was significantly higher than clinicians' assessment (sensitivity 85%), or that of mental health specialists (sensitivity 82%); however, the specificity was low at 26%.[9]

A screening instrument with a high sensitivity and low specificity would overburden mental health services in resource-poor countries. Had the four-question rule been used in this study, its discriminatory ability would have been poor since very few participants in this sample scored positive for these questions, particularly benzodiazepines used in overdose. This underscores the cultural and context-specific variations in risk factors for attempted suicide that affect the performance of screening instruments used in suicide risk-assessments. Sensitivity and specificity of any screening instrument are affected by the prevalence of the condition being evaluated. Though DORs are independent of the prevalence of the condition,[8] variations in the prevalence of the risk factors assessed by the MSPS in those being assessed could alter the estimates. This suggests that population and context-specific risk factors for suicidal attempts that are discriminatory and more prevalent would need to be incorporated in the MSPS, and this revised scale evaluated to assess whether accuracy would be enhanced.

Limitations

The main limitations of this study were its cross-sectional design, the relatively small sample size and the use of a psychiatrist's assessment as the reference standard instead of prospectively ascertained rates of repeat attempts at self-harm. In addition, we used a single physician's assessments in order to reduce interpreter variability, as opposed to using multiple physicians and different types of emergency room personnel, including triage staff, to enhance the generalisability of the results. This study also lacked a control for MSPS-guided physician assessments such as a physician's clinical assessment conducted without the MSPS. People with very high suicidal intent such as those presenting after hanging, or after other traumatic means of attempting suicide were not evaluated for practical reasons. Their inclusion would have provided a wider range of suicidal risk strata to evaluate the discriminating abilities of the MSPS and the cut-off scores used. These findings cannot also be readily applied to self-poisoning in children and adolescents.

Many of this study's limitations were addressed in a longitudinal study evaluating the original SAD PERSONS scale and the MSPS in 4019 consecutive referrals to psychiatric services in the emergency departments of two large hospitals in Canada over 18months. The ability of the scales to detect accurately whether the initial presentation was for a suicide attempt, and to predict suicide attempts in all those assessed (with or without a suicidal attempt at initial presentation) in the next 6 months was assessed.[10]

This study included 4019 patients accrued over the period of 18 months to two hospitals in Canada. Both scales performed poorly, though the MSPS outperformed the SAD PERSONS scale, in identifying persons at high risk of future attempts (sensitivity: 19.6% vs. 40%). Both had poor positive predictive properties (5.3% vs. 7.4%) in predicting future suicidal attempts (although their negative predictive values were more impressive at 98% each). The study concluded that in their present form these scales should not be used as the sole criteria to predict future suicidal attempts.[10]

Though this study's design had many features that improved reliability, some of the conclusions drawn regarding the use of the MSPS in assessing suicide risk are debatable. First, the study used the MSPS in a manner that it was not intended for. The MSPS was found by Hockberger and Rothstein[6] to be superior to the SAD PERSONS scale when used by physicians in predicting concordance with psychiatric risk assessments, not in differentiating suicidal attempts from other emergency presentations, or in predicting future suicide attempts.

Second, DORs for MSPS cut-off scores were not presented in the study report. However, using only five items from the MSPS, identified on logistic regression in the study to predict suicidal attempts in the following 6 months, increased the sensitivity in predicting suicidal attempts.[10] This observation concurs with our impressions that the distribution of the risk factors in the MSPS in different populations being assessed will vary, and will affect test performance with the MSPS. For examples, previous suicidal attempts or psychiatric illness were strong predictors of future attempts in the Canadian study, and while this is generally accepted as true, only 9% of our sample scored on this risk factor.

Our findings suggest that the MSPS used by a physician modestly improved concordance with psychiatrist assessments for the need for psychiatric referral. The ability of psychiatric assessments in predicting future suicide risk is an imperfect art; while many risk factors have been identified as having high predictive ability, their distribution is not uniform in all populations being assessed for suicidal risk. Also, there is currently no intervention that has been shown reliably to prevent repeat attempts at self-harm.[11]

Conclusions

The results of this study indicate that the routine use in emergency services of the MSPS-guided physician's assessments, with cut-off scores of 5 used to aid treatment planning, may improve the accuracy of suicide-risk assessments when a psychiatric evaluation is not possible. This could help bridge the shortfall of mental health professionals accessible to emergency services for suicide risk assessments after self-poisoning in low- and middle-income countries. Use of the suggested

MSPS cut-off scores to initiate appropriate management decisions after self-poisoning may also improve outcomes after intentional self-poisoning, though this remains to be formally evaluated.

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Declaration of conflicting interests

None declared.

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