ORIGINAL ARTICLE

Validity and reliability of the Persian version of Violence Risk Screening-10 Instrument (V-Risk-10) in admitted patients to the psychiatric ward

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Background: Violence Risk Screening Tool-10 (V-Risk-10) is one of the few instruments available for violence risk assessment in patients with a psychiatric diagnosis. The present study aimed to validate the Persian version of this instrument in patients admitted to the psychiatric ward. **Materials and Methods:** Eighty patients referred to a psychiatric hospital were enrolled in this cross-sectional methodological study. In the initial phase, seven senior psychiatry residents rated 20 cases independently at the time of their admission and total scale and subscale reliability were examined. Intraclass correlation coefficients were used to assess the inter-rater reliability. After initial confirmation of V-RISK-10 reliability, a senior psychiatry resident assessed 80 patients with V-RISK-10 in the emergency room. The incident of violent behaviors was recorded during the patients' admission period. The receiver operator characteristics curve (ROC-curve) analysis was used to measure the predictive accuracy of the instrument. The convergent validity was assessed by comparing V-RISK-10 scores between the three risk categories and the three outcome recommendations according to clinicians' overall clinical judgment. **Results:** A Cronbach's alpha coefficient was 0.99 for the total scale. During the research period, 47.5% of patients demonstrated various degrees of aggression and violent behavior. The ROC area under the curve was 0.89 ($P < 0.001$) with 87% sensitivity, 69% specificity, 72% positive predictive value, and 85% negative predictive value at the cutoff point of 8.5. **Conclusion:** Results indicate that the Persian version of V-Risk-10 is a reliable and valid screening tool for violence risk in patients who are admitted into psychiatric wards.

Key words: Inpatient psychiatry, reliability, screening, validity, violence risk assessment

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INTRODUCTION

Violent behaviors in psychiatric facilities are very prevalent (20% admitted patients) and serious threat both to the patients and the health-care workers and professionals.[1] For patients who commit violence, consequences can include the application of coercive or other restrictive measures. As well, violence among psychiatric patients may also contribute to a negative image of this patient group in the eyes of the public, an image that may be reinforced by the media and lead to greater stigmatization of this group of people.[2]

In a recent systematic review, d'Ettorre and Pellicani (2017) reported that act of violence against health-care personnel has substantial consequences and is responsible for almost 30% of the overall costs of ill health and accidents.[3] Some of the most prevalent consequences of violence against health-care professionals are fear, stress, post-traumatic stress disorder, guilt, self-blame, decreased job satisfaction, high staff turnover, decreased quality of patient care, and

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more frequent disability leaves.[4-6] All of these consequences underscore the need to find suitable methods for the risk assessment and management of psychiatric patients.[2] One of the challenges faced by clinicians in psychiatric wards is the assessment of patients' risk of violent behaviors.

Accurate risk assessment provides a valuable aid in clinicians'decision regarding patients' assessment and plan during the hospital stay and postdischarge period.[3] Accessibility of a standardized screening tool would provide a time-saving and valuable measure at the time of admission, during inpatients' stay, and at the time of discharge. As a result, there has been a growing interest in risk assessment and developing tools among health-care researchers. Some of the most commonly used and studied violence risk assessment tools are Violence Screening Checklist,[7] Historical Clinical Risk Assessment-20 (HCR-20),[8] Hare Psychopathy Checklist-Screening Version,[9] Broset Violence Checklist (BVC),[10] Dynamic Appraisal of Situational Aggression,[11] and Brief Psychiatric Rating Scale.[12] Most of these instruments seem to be more appropriate for the comprehensive assessment of forensic patients with a chronic diagnosis. Moreover, these tools are time consuming, require professional expertise, and are less suitable for routine daily use in acute settings.[2]

Very few tools were developed for assessing the risk of violence in acute psychiatric settings explicitly. It is important to develop tools for this purpose because acute psychiatry differs from forensic and long-term psychiatry in many ways, for example, the high frequency of admissions in acute psychiatric facilities and their obligation to accept all referred patients to these settings. In addition, in contrast to forensic settings where most or all patients are involuntarily admitted, a substantial proportion of acute patients are voluntarily admitted.[2]

Clinical Risk Assessment Screen of Inpatient Violence (V-Risk-10) is a brief violence risk assessment tool that has been validated through some previous studies.[13-16] This measure could be used in a time-saving manner by nonforensic-professionals for a wide range of patients.[7] Unfortunately, there is a lack of validated standardized violence screening tools in the Persian (Farsi) language. Therefore, the present study has been designed to translate and assess its reliability and validity for Iranian patients who are admitted to psychiatric inpatient facilities.

MATERIALS AND METHODS

Ethics

The study protocol has been approved by the Ethics Committee of the Medical School of the Islamic Azad University, Mashhad Branch (permit number: IR.IAU.MSHD.REC.1400.114). All enrolled patients or their companions have signed the written consent form. Participation was voluntary and patients or their companions were informed that their care would have not been affected if they had decided to opt out from the study.

Study designs

The study was a methodological study at the Ibn-e-Sina psychiatric university hospital in Mashhad, Iran. According to Yao *et al.*'s study[14] that reported Violence Risk Screening-10 (V-Risk-10) sensitivity is equal to 80%, a minimum sample size of 50 was calculated to be required for a power of 80% with a 95% confidence interval (CI). Finally, 80 patients were enrolled in the study.

By permission from the V-Risk-10 lead author, two bilingual translators, whose mother tongues were Persian, independently translated the original V-Risk-10 and compared the Persian and original English version of the questionnaire. Finally, the main researchers selected the one with more appropriate words. Then, another bilingual translator who was blind regarding the original questionnaire back-translated the questionnaire. The equivalence of the back-translated and original version was assessed by the research team and the final consensus version got confirmed to be used in the study. Content validity was determined using content validity ratio (CVR) and content validity index (CVI). CVR was determined by assessing the level of importance of each item based on three scales, namely Essential, Useful But Not Essential, and Not Necessary. Calculations were performed using the formula CVR = (ne-[N/2])/(N/2), in which ne is the number of experts that rated the item as essential and N is the total number of experts involved.[17] In this study, CVR values were set based on a total of 10 expert panels of 0.62[17] and CVR for all items was above 0.62. In addition, CVI value was computed for each item. Experts were asked to rate each scale item in terms of its relevance to the underlying construct. The four points used along the item rating continuum were 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. CVI was 3or4/N. For each item, CVI was computed as the number of experts giving a rating of 3 or 4, divided by N (Total numbers of experts who were involved).[18] In this study, CVI for all items was above 0.75.

Patients referred to the emergency room of Ibn-e-Sina psychiatric hospital for any reasons, who needed to be admitted to a psychiatric ward after evaluation by mental health professionals, were recruited through a convenience sampling method. Patients who did not stay in the hospital for at least 14 days were excluded.

Reliability test

In a pilot study, the inter-rater reliability of the translated V-Risk-10 was investigated. Seven volunteer senior

psychiatry residents had attended a brief introductory course about the use of V-RISK-10 as raters before the study started. Raters had the option of supervision by their request during completing V-RISK-10. Two independent raters separately completed the V-Risk-10 questionnaires on 20 patients before they were admitted to the psychiatric ward to calculate intraclass correlation coefficient (ICC).

ICC < 0.5 was interpreted as "poor," 0.5–0.74 as "moderate," 0.75–0.89 as "good," and ≥ 0.90 as "perfect" in terms of reliability.[19] The statistical method and result were specified below.

Outcome measures

After initial confirmation of V-RISK-10 reliability, a senior psychiatry resident trained in the procedure assessed 80 patients with V-RISK-10 in the emergency room. Patients were followed throughout their admission period for their violent behaviors by nurses working in the ward who already were trained.

Each verbal and physically violent behavior toward staff or other patients was recorded in the patient's violence record form. Verbal violence included insulting and mocking, threatening, scolding, and screaming in a way that creates fear in the staff or other patients in the section. Physical violence involves an attack that does not result in a physical harm, an attack that results in physical encounters, an attack with a device that leads to a physical collision, throwing a device to harm or threaten, an assault to kill, and an attack for sexual assault and sexual assault. No other risk assessment tools were used for patients during their hospital stay.

Clinical risk assessment screen of inpatient Violence Risk Screening-10

V-RISK-10 was developed by the Centre for Research and Education in Forensic Psychiatry in Oslo in 2000. A preliminary scheme consisting of 33 questions was first established based on the HCR-20 and the BVC, then the V-Risk 10 was created as a brief screening tool.[6] V-RISK-10 consists of 10 items:

1. Previous and/or current violence
2. Previous and/or current violent threats
3. Previous and/or current substance abuse
4. Previous and/or current severe mental illness
5. Personality disorders
6. Lack of insight into illness or behavior
7. Suspiciousness
8. Lack of empathy
9. Unrealistic planning
10. Exposure to future stress situations.

The scoring instruction guide for each item is:

- 0 = No (meaning the item definitely does not apply)
- 1 = Maybe/Moderate (meaning the item is possibly or to a limited extent present)
- 2 = Yes (meaning the item is definitely present).

Therefore, the lowest and the highest scores on V-Risk-10 would be zero and 30, respectively.

Based on the procedure in the original article for V-Risk-10 development,[6] after finalizing the scoring of the 10 items, the clinicians were asked to choose one of the three risk categories (low, moderate, and high) based on their overall clinical judgment. Finally, the clinicians were required to select one of the following three outcome recommendations:

- 1: No further risk assessment recommended
- 2: Further violence risk assessment recommended
- 3: Implementation of immediate risk management measures recommended.[6]

Statistics

Data were analyzed using SPSS version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficients. Acceptable value for Cronbach's alpha was defined as equal to or < 0.70.[20] Inter-rater reliability was assessed using ICCs for the V-Risk-10 overall score and for each item. The convergent validity of questionnaire was assessed by comparing V-RISK-10 scores between the three risk categories and the three outcome recommendations. One-way analysis of variance (ANOVA) was used for the analysis of possible differences between the V-RISK-10 sum scores and the selected category of risk level (low, moderate, and high). The one-way ANOVA was also used to estimate possible differences in sum scores between the three groups of outcome recommendations. *Post hoc* analysis using Bonferroni was performed to determine where the significant differences between the risk levels and also outcome recommendations occurred. Receiver operator characteristics (ROC) analysis was conducted with V-Risk-10 sum scores to measure the predictive accuracy of the instrument against the violent behavior (1 = patients have, 0 = patients don't have). The curve was drawn by plotting sensitivity on Y-axis and the 1 – specificity on X-axis [Figure 1]. A conventional 5% significance level and 95% CI were employed for all analyses.

RESULTS

A total of 80 patients between 17 and 64 years old were enrolled in the study. Descriptive statistics are provided in Table 1. The mean ± standard deviation of V-Risk-10 scores of the study sample was 10.71 ± 4.43. The calculated Cronbach's alpha coefficient was 0.8 for the whole instrument. The single measure and average measure ICC

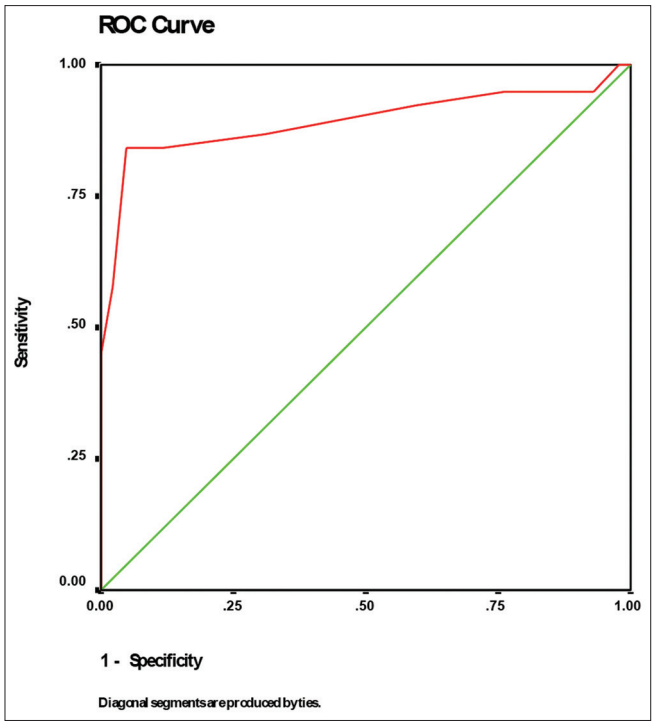

Figure 1: The receiver operator characteristics curve for Violence Risk Screening-10 in all patients

Table 1: Demographic characteristics of patients

Variable	Frequency (%)
Age (mean±SD)	39.32±12.22
Sex	
Male	55 (68.8)
Female	25 (13.3)
Psychiatric diagnosis	
Schizophrenia	31 (38.8)
Bipolar disorder	23 (28.8)
Substance abuse	10 (12.5)
Schizoaffective disorder	16 (20)
Marriage status	
Married	27 (33.8)
Never married	47 (58.8)
Divorced	6 (7.5)
Education	
Elementary	27 (33.5)
Middle school	20 (25.5)
High school	18 (2.5)
College	15 (18.8)
Occupation	
Unemployed	63 (78.8)
Employed	12 (15)
Student	5 (6.3)

SD=Standard deviation

for the sum of the 10 items were 0.993 (95% CI = 0.988–0.996) and 0.996 (95% CI = 0.994–0.998), respectively. The single measure and average measure ICC for the risk category were 0.87 (95% CI = 0.79–0.92) and 0.93 (95% CI = 0.88–0.96), respectively. The single measure and average measure ICC for each item was 1, except for item 8 which was 0.746 (95% CI = 0.61–0.84) and 0.85 (95% CI = 0.76–0.913), respectively. Of the 80 patients included in the study, violent behaviors were recorded for 38 patients (47.5%) by the nurses in the psychiatric ward.

The ROC for the occurrence of aggression revealed an area under the curve (AUC) of 0.89 (95% CI: 0.81–0.97 ($P < 0.001$) [Figure 1]. Different cutoff points were tested to explore the point at which sensitivity and specificity provided the best result on Youden's index.[21] It was revealed that the cutoff giving the best combination of sensitivity and specificity was approximately 8.5 points. At the cutoff point of 8.5, the instrument illustrated a sensitivity of 87%, specificity of 69%, a positive predicative value (PPV) of 72%, and a negative predictive value (NPV) of 85%. The ROC-AUC, sensitivity, specificity, PPV, and NPV of the test were also measured in regard to gender differences and age differences [Table 2]. As expected, male patients demonstrated more violent behaviors than female patients ($P = 0.048$), but opposite to expectation, there was no significant difference ($P = 0.4$) between the younger patients (younger than 40 years old) and older patients prevalence of violent behaviors. However, the sensitivity, specificity, PPV, and NPV of V-Risk-10 for both genders and age ranges were in an acceptable range [Table 2].

As demonstrated in Table 3, the results suggested a statistically significant difference between the V-Risk-10 sum scores and risk categories. The Bonferroni *post hoc* tests showed a significant difference ($P < 0.001$) between the low-risk category and two other categories also between each of the pair groups. Similarly, multiple comparisons suggested that there was a statistically significant difference between the V-Risk-10 sum scores and outcome recommendations. In addition, the Bonferroni *post hoc* tests showed a significant difference ($P < 0.001$) between each of the pair groups. This means that the tool has a good convergent validity.

DISCUSSION

The present study aimed to investigate the validity and reliability of the Persian (Farsi) translation of the V-Risk-10 among a population of admitted patients with a psychiatric diagnosis. The ICC of the scale was 0.99 which suggests a high inter-rater reliability. The reported ICC in the studies conducted by Bjørkly *et al*., Hartvig *et al*., and Yao *et al*. was 0.77, 0.87, and 0.89 respectively.[7,13,14] Some differences between the present study and previous ones could explain this observation. Compared to previous studies, the present study had fewer numbers of raters (seven) with more coherent educational backgrounds (all were senior psychiatry residents). Moreover, the mean completion time

Table 2: The differences in Risk-V-10 characteristics for patients' sex and age

	ROC-AUC	95% CI	*P*	Frequency of violent behavior (%)	Cut off	SN (%)	SP (%)	PPV (%)	NPV (%)
Total	0.890	0.81-0.97	<0.001**	38/80 (47.5)	8.5	87	69	72	85
Gender									
Male	0.914	0.828-1.00	<0.001**	28/55 (51)	8.5	90	81.5	68	88
Female	0.843	0.687-0.999	0.004**	10/25 (40)	7.5	80	60	75	60
Age (year/old)									
≤ge	0.933	0.931-0.995	<0.001**	22/53 (41.5)	11.5	91	95	90	93
>40	0.852	0.714-0.990	0.002**	16/27 (59.3)	8.5	81	73	81	72

***P*<0.05 is considered significant. ROC=Receiver operator characteristics; AUC=Area under the curve; CI=Confidence interval; SN=Sensitivity; SP=Specificity; PPV=Positive predictive value; NPV=Negative predictive value

Table 3: Relationship between the V-risk-10 sum scores and risk categories and outcome recommendations

	Mean±SD	95% CI	*P**
Risk categories			
Low (*n*=45)	7.48±2.15	6.84-8.13	<0.001**
Moderate (*n*=19)	13.36±1.11	12.83-13.90	
Severe (*n*=16)	16.62±3.28	14.87-18.37	
Outcome recommendations			
1 (*n*=45)	7.71±2.29	6.99-8.43	<0.001**
2 (*n*=22)	13.31±3.24	10.88-13.75	
3 (*n*=16)	16.37±3.32	14.60-18.14	

*Multiple comparisons; Kruskal-Wallis; ***P*<0.05 is considered significant. 1=No further risk assessment recommended; 2=Further violence risk assessment recommended; 3=Implementation of immediate risk management measures recommended; CI=Confidence interval; SD=Standard deviation

of the screening tool in the present study was 10 min which is longer than the mean (5 min) reported by Bjørkly *et al*.[7]

The predictive validity of the test was confirmed by comparing the V-Risk-10 scores attained at the time of admission with the prospective reports on patients' aggression and violent behaviors. Furthermore, comparison of the V-Risk-10 scores of patients in the three risk categories and outcome recommendations confirmed the validity of the test, as well. As such, patients who were categorized to be at mild risk with no further requirement for risk assessment showed significantly lower violent behaviors during their admission.

The present findings demonstrated that V-Risk-10 at a cutoff point of 8.5 has 87% sensitivity, 69% specificity, 72% positive predictive value, and 85% NPV. The sensitivity, specificity, PPV, and NPV of the test remained significant for both genders as well as for younger and older patients. Hartvig *et al*. studied the validity and reliability of V-Risk-10 on 1017 patients. They reported a ROC-AUC of 0.83 with 81% sensitivity, 73% specificity, 24% PPV, and 97% NPV at the cut point of 8.5.[13] Yao *et al*. investigated the reliability and validity of Chinese translation of V-Risk-10 among Chinese psychiatric service users. At the cut point of around 8, their results demonstrated a ROC-AUC of 0.63 with 80% sensitivity, 38% specificity, 34% PPV, and 82% NPV.[14] Both of the above-mentioned studies reported a lower PPV compared to the current study (72%). This could be due to the fact that the prevalence of violent behaviors in the current study (47.5%) was higher than both previous studies; the prevalence of violent behaviors was reported 29% and 9% by Yao *et al*. and Hartvig *et al*., respectively.[13,14]

The results of another study by Yao *et al*. entitled validation of the violence risk screening-10 instrument among clients discharged from a psychiatric hospital in Beijing revealed that the receiver operator characteristic curve yielded an AUC of 0.62. At the cutoff point of 4.5, its sensitivity/specificity was 79.2%/33.3%, and the corresponding PPV/NPV was 9.9%/94.5%.[16] The predictive accuracy of this instrument was lower compared with the results of the present study and was also less accurate. The reason for this difference may be that the present study was performed on patients admitted to the hospital and Yao *et al*. study was performed on patients discharged from the hospital.

Although V-Risk-10 has been primarily introduced as an inpatient screening tool, it seems this measure is also reliable in outpatient. Roaldset *et al*. reported the validity of V-Risk-10 as a violence screening tool post discharge from a psychiatric facility.[15] Therefore, further studies regarding the application of V-Risk-10 could offer further applications for this measure. The fact that V-Risk-10 is a short, not-time-consuming, easy-to-use, reliable, and accurate screening tool could make it a favorable test among health-care professionals. This measure could be used as a time-saving, easy-to-use, and valuable tool at the time of admission to reliably decide whether the patient is being considered high risk for violent behavior and correspondingly needs further assessment or preventive plans. This could potentially reduce the hideous consequences of violence against health-care professionals.

The current study has a number of limitations that should be considered when interpreting our findings. One of the limitations of the present study was the lack of follow-up of patients after discharge from the hospital. Another possible limitation may be the underreporting of violent incidents by the staff because the reliable judgment of violent behavior,

especially threats, is not always easy to obtain. Finally, because the study was conducted only among psychiatric inpatients it is possible that our findings will not generalize to other contexts.

Since the study was conducted in only one center, multicenter studies are recommended in Iran. Furthermore, a future study is suggested using the V-RISK-10 Persian version to determine its long-term predictive accuracy for assessing risk for community violence on discharge.

CONCLUSION

The Persian translation of V-Risk-10 seems to be a reliable and valid screening tool for violence risk in Persian-speaking patients who are admitted into psychiatric wards and can be useful for use in clinical settings and future research.

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Conflicts of interest

There are no conflicts of interest.

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