

ORIGINAL RESEARCH

Usefulness of Aggressive Behaviour Risk Assessment Tool for prospectively identifying violent patients in medical and surgical units

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Accepted for publication 26 April 2011

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KIM S.C., IDEKER K. & TODICHEENEY-MANNES D. (2012) Usefulness of Aggressive Behaviour Risk Assessment Tool for prospectively identifying violent patients in medical and surgical units. *Journal of Advanced Nursing* 68(2), 349–357. doi: 10.1111/j.1365-2648.2011.05744.x

Abstract

Aim. The aim of this study is to evaluate the usefulness of the Aggressive Behaviour Risk Assessment Tool for prospectively identifying violent patients in medical-surgical units.

Background. Although patient violence against nurses is a serious occupational hazard, there is a lack of simple screening tools with acceptable sensitivity and specificity for identifying potentially violent patients in medical-surgical units.

Methods. A prospective cohort study involving patients admitted to six medical-surgical units at an acute care hospital was conducted from August 2009 to December 2009. Primary nurses completed the 17-item checklist within 24 hours of admission. A second identical checklist was completed by another nurse to assess the inter-rater reliability. Following a violent event or just prior to discharge, the violent event outcome section was completed to collect information about violent event, if any. A multivariate logistic regression model with backward elimination was used to select a set of parsimonious items that best predict violent behaviours.

Results. Fifty-six patients out of 2063 (2.7%) had one or more violent events. A parsimonious set of ten items were selected for the tool. Receiver Operating Characteristics analysis of Aggressive Behaviour Risk Assessment Tool showed that the area under the curve was 0.82 (95% Confidence Interval, 0.75–0.90). The sensitivity and specificity at the cut-off score of 1 were 70.9% and 89.3%, respectively. The Cohen's Kappa for inter-rater reliability was 0.647.

Conclusion. The Aggressive Risk Assessment Tool is a simple, easy-to-use assessment tool with acceptable inter-rater reliability, sensitivity and specificity that may be useful for prospectively identifying violent patients in medical-surgical units.

Keywords: inter-rater reliability, medical-surgical units, patient violence, risk assessment tool

Introduction

Patient violence against nurses is a serious occupational hazard with global implications. In 2002, World Health Organization in collaboration with International Council of Nurses and others issued the Framework Guidelines for Addressing Workplace Violence in the Health Sector, that estimated the cost of stress and violence to be approximately 0.5–3.5% of GDP per year (International Labour Office/International Council of Nurses/World Health Organisation/Public Services International 2002). In a report based on analysis of 2004–2005 Workplace Health Indicator Tracking and Evaluation database from four of six health authorities in the province of British Columbia, Canada, the incidence rates of patient violence against nurses in acute-care medical or surgical units were estimated to be 1.27–1.89 per 100,000 nurse hours (Kling *et al.* 2009). Patient violence against nurses can range from verbal abuse, threatening, harassing, to physical assaults that could result in psychological or physical harm (Gacki-Smith *et al.* 2009). These violent behaviours can be preventable with proper aggressive risk screening and management strategies (Phillips 2007).

Background

Studies have suggested that there are common behavioural indicators preceding the aggressive and violent events (Pryor 2005, Chapman & Styles 2006, Luck *et al.* 2007).

Since only a small fraction of patients admitted to medical or surgical units actually commit violent acts, a focused preventive strategy directed at the high risk patients may be more effective than a universal precaution (DelBel 2003, Irwin 2006). A brief, easy-to-use violence risk assessment tool for busy nurses in medical-surgical units is needed for early identification of potentially violent patients and initiation of focused preventive measures.

For patients admitted to psychiatric units, many tools have been developed to assess risks of violence. The Brøset Violence Checklist (BVC) assesses confusion, irritability, boisterousness, verbal threats, physical threats and attacks on objects with promising sensitivity and specificity (Woods & Almvik 2002, Almvik *et al.* 2007). The Violence Risk Screening-10 (V-RISK-10) includes specific psychiatric questions such as previous and/or current mental illness or personality disorder (Bjorkly *et al.* 2009). Similarly, Violence Screening Checklist (VSC) includes presence of psychiatric diagnoses such as schizophrenic or manic diagnosis and suicidal behaviour (McNiell *et al.* 2003). However, these tools were specifically designed for patients with psychiatric

disorders and may not be useful for patients in the medical-surgical units.

There are only a few screening tools available for identifying the patients at risk for violence in the general medical-surgical settings (Chapman *et al.* 2009). The M55 Violence Risk Assessment Tool (M55) has been used in Canada to flag potentially violent patients admitted into an acute care hospital (Kling *et al.* 2006). A retrospective case-controlled study of 268 patients reported sensitivity of 71% and specificity of 94% in identifying violent patients among 81 who had the M55 tool completed appropriately. However, a prospective cohort study of 2063 evaluable patients conducted as a part of our study showed that the sensitivity was only 41%. In addition, four of the M55 items were found to contribute minimally towards identifying violent patients.

Another potentially useful tool is the STAMP violence assessment framework which was constructed from a qualitative nursing study in an emergency department setting (Luck *et al.* 2007). The acronym STAMP includes Staring and eye contact, Tone and volume of voice, Anxiety, Mumbling and Pacing, which were identified as potential violent behaviours from nurses' perspectives. However, the reliability and validity of STAMP in identifying potentially violent patients has not been reported.

The psychometric properties of violence assessment tools need to be established with satisfactory sensitivity, specificity and inter-rater reliability to determine the tools' usefulness. Tools with low sensitivity would identify too small a fraction of the violent patients and allow many violent patients to slip through without being identified (Altman & Bland 1994c, Loong 2003). On the other hand, the tools with low specificity would mislabel too many non-violent patients as being potentially violent. In addition, a tiered system of violence risk assignment, i.e. low, medium and high risk based on the score, could potentially allow stepwise intensity of preventive measures (Forster *et al.* 2005). Inter-rater reliability should be tested from the direct observation of patients' behaviours rather than from the information of violence incident reports. Therefore, using a brief, easy-to-use violence risk assessment tool with high sensitivity and high specificity would help identify most of the potentially violent patients with low rates of misclassification of non-violent patients as violent.

Patient violence is endemic to all healthcare settings, however, there is a dearth of brief screening tools that can assist nurses in the medical-surgical units in identifying the patients at risk for violence. Therefore, there is a need for an assessment tool with satisfactory psychometric properties useful for predicting the violent behaviours during the hospitalization.

The study

Aim

The primary aim of this study was to evaluate the usefulness of the Aggressive Behaviour Risk Assessment Tool (ABRAT) for predicting violent behaviours among patients admitted to acute care medical-surgical units. For the purpose of this study, the dependent variables of violent events include verbal abuse, threat of physical attack, sexual harassment, physical attack and triggering of Code 55 for summoning security personnel.

The specific objectives were:

- to assess the incidence of violent behaviours in medical-surgical units in an acute care hospital;
- to select a set of parsimonious items from a checklist to construct a simple, easy-to-use tool, ABRAT, for assessing risk of violent behaviours;
- to determine the optimal cut-off scores of ABRAT using ROC analysis; and
- to estimate the inter-rater reliability, sensitivity and specificity of ABRAT.

Design

A prospective cohort study design was used to collect the data from patients admitted to six different medical-surgical units in an acute care hospital in southern California from August 2009 to December 2009. In preparation for the data collection, an educational roll-out was carried out over a period of approximately 1 month to familiarize the nursing staff with the study and data collection tool.

Participants

The inclusion criteria were adult patients older than 18 years of age admitted to the any of six medical-surgical units in the hospital during the study period. Patients admitted to emergency department, maternal child health unit or intensive care units were excluded from the study.

Instrument

There were four sections of the data collection tool on a single sheet. The first section was the 17-item checklist assembled by combining the items from the published 11-item M55 tool, the five-item STAMP concept and an investigator-developed item (Kling *et al.* 2006, Luck *et al.* 2007). An identical second checklist was printed on the back page, which was used to assess inter-rater reliability. The

third section, violent event outcome section, collected the information about occurrence of violent events during the hospitalization. Finally, the fourth section collected additional information surrounding the physical attack or Code 55 activation, such as medical explanations for the aggressive behaviour, detailed description of the event and any resulting injury.

The M55 tool was previously used in a general acute care setting to flag patients at risk of violent behaviours (Kling *et al.* 2006). The sensitivity and specificity of the M55 tool were reported as 71% and 94%, respectively. The STAMP concept was constructed from a nursing violence assessment framework, which includes the observable behavioural indicators for potential violent patients including staring and eye contact, tone and volume of voice, anxiety, mumbling and pacing (Luck *et al.* 2007). This nursing assessment framework was developed from a qualitative study among nurses but the psychometric properties have not been formally tested. The last item, 'history of mania or signs/symptoms of mania', was included to capture psychiatric patients at risk of aggressive or violent behaviour. To ensure the completeness of documentation, 'none of the above' item was included.

Ethical considerations

The Institutional Review Board of the hospital reviewed the study and granted the approval. The informed consent was waived since there were no more than minimal risks involved in this study and the violent risk assessment was a part of routine nursing assessment.

Data collection

The primary nurse made the initial assessment of the patients for aggressive behaviour risk using a 17-item checklist within 24 hours of admission. The patients were re-assessed by another nurse using a second identical 17-item checklist to assess the inter-rater reliability. A violent event outcome section was completed following any violent episodes or prior to discharge. At the time of discharge, the nurse checked the 'none of the above' box, if none of the violent behaviours had occurred. The data collection tool was kept in each patient's bedside chart during the hospitalization and placed in the study binder after patient's discharge.

Data analysis

SPSS software version 16.0 (SPSS Inc, Chicago, IL, USA) was used for data analyses. Two-sided statistical significance level at 0.05 was set for all data analyses. Descriptive statistics was

performed to summarize the demographic characteristics and the incidence of violent events. Bivariate correlations using Kendall's tau test were generated among the dichotomous dependent variables and the dichotomous independent predictor variables from the 17-item checklist. The dependent variables in this study were code 55/physical attack, threat of physical attack, sexual harassment and verbal abuse, which were defined as violent events.

The independent variables with significant correlation with the dependent variables were entered into the multivariate logistic regression model with backward elimination to select a set of parsimonious items that best predict the violent events (Tabachnick & Fidell 2007). The resulting set of parsimonious items was named Aggressive Behaviour Risk Assessment Tool (ABRAT). To examine the inter-rater reliability of ABRAT, percentage rater agreement between the two nurses and Cohen's Kappa statistics were calculated.

For testing the potential utility of the ABRAT, the Receiver Operating Characteristics (ROC) Analysis was performed in differentiating between the non-violent and violent behaviours (Altman & Bland 1994b, Fawcett 2005). From the ROC analysis, the optimal cut-off scores with acceptable sensitivity and specificity of ABRAT were determined (Altman & Bland 1994c, Loong 2003). The Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were also calculated (Altman & Bland 1994a).

Results

Sample characteristics

Data were collected from 2726 patients admitted to six medical-surgical units during the study period. A total of 2063 (75.7%) evaluable patients had both 17-item checklist for aggressive behaviour risk within 24 hours of admission and the violent event outcome section completed prior to discharge and were included in the data analyses. Table 1 shows the demographic characteristics of the overall patient population. About 40% of the patients were ≥ 70 years of age and the majority of patients were women (50.9%) and Caucasians (72.9%).

Violent behaviours

Fifty-six patients out of 2063 (2.7%) had one or more violent events, including 35 episodes of verbal abuse (1.7%), 26 physical attacks (1.3%), 15 threats of physical attack (0.7%), 12 Code 55 (0.6%) and three sexual harassments (0.1%). Some patients had more than one type of violent event. Fifty percent of the patients were ≥ 70 years of age and the majority

Table 1 Demographic characteristics ($N = 2063$)

Characteristics	Overall ($N = 2063$)	Violent patients		
		($n = 56$)	ABRAT ≥ 1 ($n = 255$)	ABRAT ≥ 2 ($n = 58$)
Age, years				
18–29	137 (6.6)	5 (8.9)	20 (7.8)	6 (10.3)
30–49	395 (19.1)	12 (21.4)	43 (16.9)	11 (19.0)
50–69	684 (33.2)	8 (14.3)	53 (20.8)	11 (19.0)
≥ 70	814 (39.5)	28 (50.0)	137 (53.7)	29 (50.0)
Gender				
Male	979 (47.5)	36 (64.3)	120 (47.1)	32 (55.2)
Female	1051 (50.9)	19 (33.9)	132 (51.8)	25 (43.1)
Ethnicity				
Caucasian	1503 (72.9)	47 (83.9)	209 (82.0)	49 (84.5)
Black	56 (2.7)	2 (3.6)	5 (2.0)	1 (1.7)
Hispanic	179 (8.7)	4 (7.1)	14 (5.5)	5 (8.6)
Asian	106 (5.1)	0 (0)	6 (2.4)	1 (1.7)
Other	84 (4.1)	0 (0)	6 (2.4)	1 (1.7)
Missing	132 (6.4)	3 (5.4)	15 (5.9)	1 (1.7)

Values are expressed as n (%). Percentage may not add up to 100% because of missing data or rounding.

of patients were men (64.3%) and Caucasian (83.9%) (Table 1).

The bivariate correlation analyses revealed that all 17 items of the initial checklist had significant correlation with at least one or more violent events (Table 2) and were entered into the multivariate logistic regression model. As shown in Table 3, ten items from the checklist emerged as potential positive predictor variables of violent events: physically aggressive/threatening (OR = 165), mumbling (OR = 27.8), history or signs/symptoms of mania (OR = 14.3), history of physical aggression (OR = 9.2), confusion/cognitive impairment (OR = 6.7), anxiety (OR = 6.7), shouting/demanding (OR = 6.2), staring (OR = 5.7), threatening to leave (OR = 4.3) and agitation (OR = 2.3). These items were included in the new instrument, Aggressive Behaviour Risk Assessment Tool (ABRAT). Two items, tone of voice and pacing were negative predictors of violent events and were not included in ABRAT.

Aggressive Behaviour Risk Assessment Tool

The ten-item ABRAT incorporated six items from the M55 tool, three items from the STAMP concept and one item developed by the investigators. Table 4 shows the ABRAT single-item prevalence, sensitivity and specificity. The five most prevalent ABRAT items were confusion/cognitive impairment, anxiety, agitation, shouting/demanding and history of physical aggression with single-item sensitivity ranging from 16.1% to 37.5% and single-item specificity

Table 2 Bivariate correlation between 17-items in checklist and violent events ($N = 2063$)

	Code 55 or physical attack	Threat of attack/ weapon/fist	Verbal abuse/ insults/intimidation	Sexual harassment
History of physical aggression	0.261***	0.166***	0.179***	0.126***
Physically aggressive/threatening	0.515***	0.282***	0.179***	0.158***
Verbally hostile/threatening	0.330***	0.254***	0.219***	0.190***
Shouting/demanding	0.158***	0.191***	0.183***	-0.004
Confusion/cognitive impairment	0.232***	0.114***	0.100***	0.041
Drug/alcohol intoxication	0.029	0.093***	0.120***	0.153***
Auditory/visual hallucination	0.066**	0.101***	0.063**	-0.002
Threatening to leave	0.128***	0.132***	0.218***	-0.003
Agitation	0.210***	0.112***	0.145***	-0.005
Staring	0.118***	0.086***	0.052*	-0.002
Tone of voice demeaning/sarcastic	0.104***	0.158***	0.045*	-0.003
History or sign/symptoms of mania	0.042	0.144***	0.138***	-0.003
Suspicious	0.060**	-0.005	0.132***	-0.002
Withdrawn	-0.012	-0.008	-0.013	0.126***
Anxiety	0.024	0.085***	0.175***	0.068**
Mumbling	-0.007	-0.005	0.121***	0.217***
Pacing	-0.006	-0.004	0.070**	-0.002

Kendall's Tau * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table 3 Multivariate logistic regression model predicting violent patients

Indicators	OR	95% CI	P value
Physically aggressive/threatening	165	20–1330	< 0.001
Mumbling	27.8	3.6–215	0.001
History or sign/symptoms of mania	14.3	2.4–86.7	0.004
History of physical aggression	9.2	2.4–35.2	0.001
Confusion/cognitive impairment	6.7	3.1–14.4	< 0.001
Anxiety	6.7	2.6–17.7	< 0.001
Shouting/demanding	6.2	1.6–24.3	0.008
Staring	5.7	0.5–62.6	0.152
Threatening to leave	4.3	0.8–24.6	0.100
Agitation	2.3	0.8–7.1	0.141
Tone of voice	0.05	0.0–2.7	0.139
Pacing	0.05	0.0–0.8	0.037

OR, odds ratio; CI, confidence interval.

from 94.1% to 99.5%. However, the percentage of patient becoming violent from the most prevalent aggressive indicator, confusion/cognitive impairment, was only 15.1% (21 out of 139 patients became violent).

The Receiver Operating Characteristics (ROC) analysis of ABRAT showed the AUC (Area Under Curve) of 0.82, with a 95% Confidence Interval of 0.75–0.90 ($P < 0.001$) (Figure 1). Table 5 shows the characteristics of ABRAT cut-off scores based on the ROC analysis. The sensitivity and specificity at the cut-off score of 1 were 71.4% and 89.3%, whereas they were 42.9% and 98.3%, respectively, at the cut-off score of 2. The Positive Predictive Values (PPV) at the

cut-off scores of 1 or 2 were 15.7% or 41.4%, respectively, indicating that if one or two items of ABRAT are positive, there are 15.7% or 41.4% likelihood of the patient becoming violent during hospitalization. The Negative Predictive Values (NPV) at cut-off scores of 1 or 2 were 99.1% or 98.4%, respectively, indicating almost certain absence of violence below the respective cut-off scores. The demographic characteristics of patients at a cut-off score of 2 appear to be quite similar to those of the violent patients (Table 1).

Figure 2 shows the percentage of violent patients at various ABRAT scores. Among the 1808 patients with ABRAT score of zero, 0.9% became violent and with score of 1, 8.1% became violent. As the ABRAT scores increased further, the percent of violent patients continued to increase and with scores ≥ 4 , 85.7% became violent.

The inter-rater reliability of ABRAT between two nurses expressed as the inter-rater agreement percentage were 92.9% and 96.5% at the cut-off scores of 1 and 2, respectively, and Cohen's Kappa values were 0.658 ($P < 0.001$) and 0.470 ($P < 0.001$), respectively (Table 5).

Discussion

The results from this prospective cohort study indicate that the ten-item ABRAT may be a useful tool for identifying potentially violent patients in medical-surgical units with acceptable sensitivity, specificity and inter-rater reliability. At the cut-off score of 1, ABRAT has a moderate sensitivity and specificity of 71% and 89%, respectively. At a higher cut-off

ABRAT items	Prevalence, n (%)	Violent Pts*, n (%)	Sensitivity (%)	Specificity (%)
Confusion/cognitive impairment	139 (6.7)	21 (15.1)	37.5	94.1
Anxiety	62 (3.0)	9 (14.5)	16.1	97.4
Agitation	40 (1.9)	12 (30.0)	21.4	98.6
Shouting/demanding	27 (1.3)	10 (37.0)	17.9	99.2
History of physical aggression	21 (1.0)	10 (47.6)	17.9	99.5
Threatening to leave	15 (0.7)	6 (40.0)	10.7	99.6
Physically aggressive/threatening	14 (0.7)	12 (85.7)	21.4	99.9
History, signs/symptoms of mania	12 (0.6)	3 (25.0)	5.4	99.6
Staring	8 (0.4)	2 (25.0)	3.6	99.7
Mumbling	7 (0.3)	3 (42.9)	5.4	99.8

Table 4 ABRAT single-item prevalence, sensitivity and specificity (N = 2063)

*Percent violent patient with the ABRAT scores.

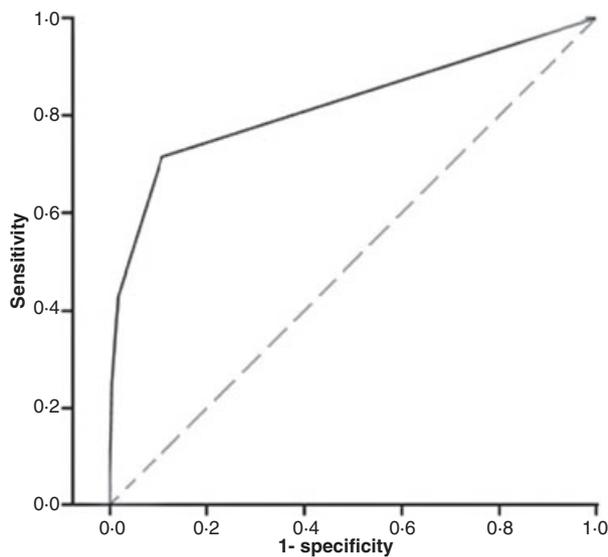


Figure 1 ABRAT receiver operating characteristics (ROC) curve. Diagonal broken line represents the line of no discrimination with AUC (Area Under the Curve) of 0.5. Solid curve represents the ABRAT with AUC of 0.82 (95% CI 0.75–0.90; $P < 0.001$).

score of 2, ABRAT has a lower sensitivity of 43% but a high specificity of 98%. These cut-off scores were selected through the ROC analysis, which shows the operating characteristics of various cut-off scores in the form of a curve (Figure 1). The diagonal line represents a test that is completely useless with AUC of 0.50 (Altman & Bland 1994b). Further away from the diagonal line and greater the AUC, the more useful is the

test. The AUC of 0.82 for ABRAT and good separation from the diagonal line reflect the favourable characteristics of the tool. The inter-rater reliability as assessed by inter-rater agreement percentage does not take into account that vast majority of the patients had ABRAT score of zero. Cohen’s Kappa statistics takes this into account and according to the criteria of Landis and Koch for determining the strength of agreement, the kappa values of 0.470 and 0.658 indicate moderate and substantial inter-rater agreement, respectively (Landis & Koch 1977). Thus, these study results support the satisfactory psychometric properties of ABRAT in predicting violent patients.

We propose three categories of violence risk based on ABRAT scores at admission to medical-surgical units. The patients with ABRAT score of zero would be classified as having low risk of becoming violent, score of 1 as medium risk and score of ≥ 2 as high risk. In the current study, only 0.9% of 1808 patients with ABRAT score of zero at admission became violent during their hospitalization, whereas 8.1% of 197 patients and 41.4% of 58 patients with ABRAT scores 1 and ≥ 2 became violent (Figure 2). Although these results need to be confirmed, the ability to prospectively alert healthcare providers of patients with medium or high risks of violence could contribute towards designing strategies for preventing violence and reducing injuries from such events.

The ten-item ABRAT was assembled by combining the six items from M55, three items from STAMP and one item developed by the investigators. Of the three most

ABRAT cut-offs	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Inter-rater reliability (Cohen’s Kappa)
1	0.714	0.893	0.157	0.991	0.658
2	0.429	0.983	0.414	0.984	0.470

Table 5 Characteristics of the ABRAT Score cut-offs

What is already known about this topic

- Patient violence against nurses in medical-surgical units is a serious occupational hazard.
- Many validated screening tools for identifying potentially violent patients in psychiatric units exist, but very few tools are available for patients in general medical-surgical units.
- A valid and reliable screening tool for identifying potentially violent patients in the medical-surgical units is needed.

What this paper adds

- Approximately three percent of the patients admitted to medical-surgical units were found to be violent.
- A simple, easy-to-use ten-item Aggression Behaviour Risk Assessment Tool was assembled to prospectively identify patients at medium or high risk of violence in the medical-surgical units.
- The Aggression Behaviour Risk Assessment Tool is a promising tool with acceptable inter-rater reliability, sensitivity and specificity.

Implications for practice and/or policy

- The ten-item Aggression Behaviour Risk Assessment Tool could help reduce workplace injury to nurses and other personnel through early identification of potentially violent patients in the medical-surgical units.
- Further studies are needed to confirm the usefulness of the Aggression Behaviour Risk Assessment Tool in various clinical settings.

prevalent items, confusion/cognitive impairment, anxiety and agitation, the anxiety item was from STAMP and the other two were from the M55. In general, these items have high single-item sensitivity but the specificities were the poorest among the ten items. Of the three items with highest percentage of violent patients, physically aggressive/threatening, history of physical aggression and mumbling, the mumbling item was from STAMP and the other two were from the M55. In general, these items have reasonable single-item sensitivity and high specificity except for the mumbling item that had very low single-item sensitivity. The investigator-developed item, history or signs/symptoms of mania, specifically identifies patients with a psychiatric diagnosis, which apparently was of low prevalence among this population.

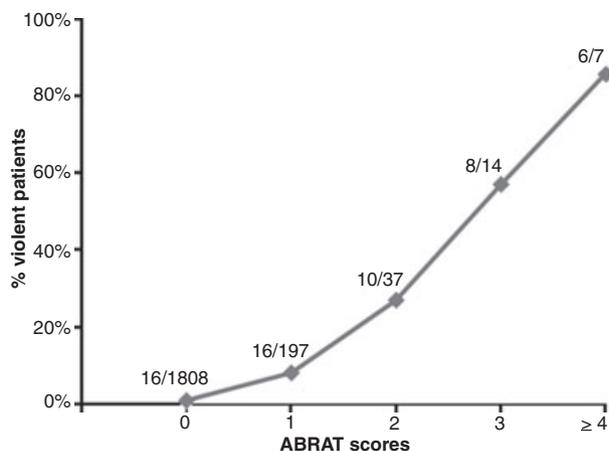


Figure 2 Percentage of violent patients vs. ABRAT Scores. The ratios shown are violent patients/total patients with the respective ABRAT scores.

Verbal abuse including insults or intimidations, physical attacks and threats of physical attack were the three most frequent violent events in the current study. Similar findings were also reported in a study among nurses conducted in general hospital units (Whittington *et al.* 1996, O'Connell *et al.* 2000). Although verbal abuse or threats of physical attack may not appear to be as serious as actual physical assaults, the actual impact on nurses may be equally distressing (Winstanley & Whittington 2004).

The availability of a simple, reliable and valid instrument could facilitate rapid triaging of potentially violent patients and enable early focused interventions to protect the staff and the patients from potential injuries. Such a tool could also help educate staff in identifying impending violent situations. Further research is necessary to determine whether such strategies are effective in preventing violence and managing potentially violent patients in medical-surgical units.

Study limitations

There are several limitations to this study. First, approximately a quarter of the original patient population were excluded from analyses because of missing data from either the 17-item checklist or violent event outcome section. However, these patients excluded from analyses appear to have similar demographic characteristics compared to those included. Second, although this study included a relatively large sample size from multiple medical-surgical units, the study was conducted at a single hospital, which may limit the generalizability of the study findings. Third, this was an exploratory study to test usefulness of a checklist assembled

by combining the items from three sources. Therefore, the results from this study need to be confirmed and the potential benefits of using this tool need to be assessed prior to adoption of this tool in nursing practice. Fourth, this study did not include any preventive measures. Primary, secondary or tertiary preventive measures based on structured risk assessments need to be developed and tested for optimal use of ABRAT.

Conclusion

Aggressive Behaviour Risk Assessment Tool is a simple, easy-to-use assessment tool with promising sensitivity and specificity that may be useful for identifying potentially violent patients in medical-surgical units. Although these results need to be confirmed before broad adoption of ABRAT, the ability to prospectively alert hospital workers of the patients at medium or high risks of violence could help development of preventive strategies for reducing injury from violent events.

Funding

This study was supported in part by Scripps Memorial Hospital, La Jolla and Evidence-Based Practice Institute, Consortium of Nursing Excellence, San Diego, CA, USA.

Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

SK, KI and DT were responsible for the study conception and design. KI and DT performed the data collection. SK performed the data analysis. SK was responsible for the drafting of the manuscript. SK, KI and DT made critical revisions to the paper for important intellectual content. SK provided statistical expertise.

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