

# A SYSTEMATIC REVIEW OF VIOLENCE RISK ASSESSMENT TOOLS CURRENTLY USED IN EMERGENCY CARE SETTINGS

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## Violence risk assessment in emergency care settings

**Aim:** To examine the psychometric properties, acceptability, feasibility and usability of violence risk assessment tools currently used in emergency care.

### Methods

#### Design

Systematic literature review

#### Included papers

Intervention study (n=4)  
Tool development/testing (n=4)

#### Countries

Australia (n=4) USA (n=4)

#### Setting

Emergency dept. (n=7)  
Mixed (n=1)

### Findings

#### Tools

- ✦ Existing violence risk assessment tools (n=3) developed for use with mental health patients.
- ✦ Adaption of existing tool (n=1).
- ✦ Newly developed tools (n=3).

#### **Psychometric properties\***

- ✦ Predictive validity: moderate to good
- ✦ Interrater reliability: moderate
- ✦ Usability: Good

\*Where tested

### Implications

Violence risk assessment can identify patients in emergency care who are at risk of becoming violence



No evidence to support choosing one tool over another

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# A SYSTEMATIC REVIEW OF VIOLENCE RISK ASSESSMENT TOOLS CURRENTLY USED IN EMERGENCY CARE SETTINGS

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## Contribution to Emergency Nursing Practice

- Workplace violence is common in emergency care settings and has negative consequences for patients, staff, and services. Structured violence risk assessment is commonplace in mental health settings and is gradually becoming more accepted within emergency care.
- This review has found that violence risk assessment tools may be feasible for use in emergency department. There is currently, however, insufficient high-quality evidence to draw conclusions about the predictive capability of these tools in emergency care settings.
- Violence risk assessment can identify patients in emergency care who are at risk of becoming violent, but the evidence to support choosing one tool over another is not yet available. Further research using these tools in emergency settings is needed before evidence-based recommendations can be made.

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## Abstract

**Introduction:** Violence risk assessment is commonplace in mental health settings and is gradually being used in emergency care. The aim of this review was to explore the efficacy of undertaking violence risk assessment in reducing patient violence and to identify which tool(s), if any, are best placed to do so.

**Methods:** CINAHL, Embase, Medline, and Web of Science database searches were supplemented with a search of Google Scholar. Risk of bias assessments were made for intervention studies, and the quality of tool development/testing studies was assessed against scale development criteria. Narrative synthesis was undertaken.

**Results:** Eight studies were included. Three existing violence risk assessment tools featured across the studies, all of which were developed for use with mental health patients. Three newly developed tools were developed for emergency care, and 1 additional tool was an adaptation of an extant tool. Where tested, the tools demonstrated that they were able to predict patient violence, but did not reduce restraint use. The quality issues of the studies are a significant limitation and highlight the need for additional research in this area.

**Discussion:** There is a paucity of high-quality evidence evaluating the psychometric properties of violence risk assessment tools currently used along the emergency care pathway. Multiple tools exist, and they could have a role in reducing violence in emergency care. However, the limited testing of their psychometric properties, acceptability, feasibility, and usability in emergency care means that it is not possible to favor one tool over another until further research is conducted.

**Key words:** Patient violence; Risk assessment; Workplace aggression; Workplace violence

## Introduction

Globally, staff working in emergency care settings experience violence from patients and visitors at a disproportionate rate. A recent international systematic review and meta-analysis<sup>1</sup> found that emergency departments had the highest 12-month prevalence of violence across all hospital settings. The same review found that nurses had the highest exposure to violence across occupational groups. For the purposes of our study, we use the term violence to describe any nonverbal, verbal, or physical behavior exhibited by a person that makes it difficult to deliver good care safely.<sup>2</sup> Staff working in emergency department appear resigned to the inevitability of experiencing such violence.<sup>3</sup>

Workplace violence has wide-ranging detrimental consequences.<sup>4</sup> Staff absence because of the physical or emotional effects of workplace violence has significant financial implications.<sup>5</sup> It is estimated that 2% of staff are lost as a consequence of workplace violence, leading to significant recruitment costs.<sup>6</sup> Violence also causes disruptions to patient care, with nurses losing concentration and working at reduced efficiency<sup>7</sup> and functioning at a heightened level of anxiety.<sup>8</sup> Violence also is associated with task delays and medication errors.<sup>9</sup>

Several structured tools have been developed to aid risk assessment of imminent violence, most commonly in mental health settings, but they are being used increasingly in other areas.<sup>10-12</sup> A recent scoping review by Cabilan and Johnston<sup>13</sup> identified 5 violence risk assessment tools with a history of use in ED settings; however, the review reported that 3 lacked any evidence of predictive validity. In fact, of the 5 tools identified, only 1, the Brøset Violence Checklist (BVC),<sup>14</sup> was intended for use as a risk assessment prediction tool rather than an aide memoire and was the only one whose psychometric properties were evaluated in an emergency care setting. The BVC was developed, and has been used with some success, to predict violence in mental health settings.<sup>15</sup>

With evidence that violence risk assessment tools are gradually finding their way into emergency care,<sup>16</sup> it is important not only to identify those that have been implemented but also to establish which tools are practical and effective. Therefore, we aimed to examine the psychometric properties, acceptability, feasibility, and usability of violence risk assessment tools that have been evaluated in emergency care. For the purposes of this review, the constructs of acceptability, feasibility, and usability will be interpreted broadly, respectively, relating to factors affecting users' willingness to adopt interventions, individual or structural factors affecting the extent to which interventions can be implemented effectively, and factors pertaining to the user experience.<sup>17</sup> In doing so, we aimed to explore the efficacy of undertaking violence

risk assessment in predicting and reducing patient violence and to identify which tool(s), if any, are best placed to do so.

## Methods

### DESIGN

We undertook a systematic review; our reporting follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.<sup>18</sup> The protocol for this review was registered at the International Prospective Register of Ongoing Systematic Reviews (CRD42021285461). The protocol was registered as a rapid review, but during conduct of the review, the team agreed that a full systematic review was preferable and achievable within existing resources.

### ELIGIBILITY CRITERIA

Eligible studies were (1) primary research; (2) published in peer-reviewed journals; (3) in English language; (4) published since 2007 (the earliest publication date of the tools identified by Cabilan and Johnston<sup>13</sup>); (5) evaluations of the psychometric properties, acceptability, feasibility, or usability of violence risk assessment tools; and (6) focused on emergency care pathways (emergency department and acute medical units [AMUs] or equivalent: for example, admission areas for acute medical patients with a length of stay up to 48 hours). Studies within specialist emergency care pathways (eg, pediatric, psychiatric) were excluded. For the purposes of our review, "violence" refers to both actual and threatened physical acts or verbal abuse perpetrated by emergency attendees (patients or their relatives/friends/companions) against others or objects.

As the broad constructs of feasibility, usability, and acceptability can be captured by both quantitative and qualitative data, we did not exclude any primary research studies based on methodological approach alone.

### SEARCH STRATEGY

A study by Bramer et al<sup>19</sup> found that optimal searches in systematic reviews should include the following databases: Embase, Medline, Web of Science, and Google Scholar. Accordingly, we used these 4 databases for our searches and added Cumulative Index to Nursing and Allied Health Literature Plus to ensure that we captured relevant nursing literature. Owing to the limited search functionality of Google Scholar, we only screened the first 200 references identified by this database, ranked by relevance.<sup>19</sup> Our search strategy was based on Cabilan and Johnston's<sup>13</sup>

TABLE 1

**Population or problem, intervention, comparison, outcomes, context framework**

Criterion	Description
Population or problem	Violence toward others, perpetrated by emergency care attendees
Intervention	Structured risk assessment tools
Comparison	Not applicable
Outcomes	Psychometric properties (including validity, reliability, internal consistency and predictive validity), feasibility, usability, and acceptability
Context	Emergency care pathways

strategy but was amended to capture literature related to our broader conceptualization of the emergency care pathway and to the relevant properties of tools identified. Our search terms were mapped according to the population or problem, intervention, comparison, outcomes, context framework (Table 1), see [Supplementary Tables 1-4](#) for full search terms.

Searches were undertaken in October 2021 and supplemented by regular ongoing searches for keyword terms via Google Scholar until July 2022. In addition, the authors of any relevant articles that were not published in peer-reviewed journals (eg, dissertations) were contacted to ensure that we did not miss any work they might have published. Screening by title and abstract was undertaken independently by 2 reviewers (D.S. and N.H.), with 1 reviewer (D.S.) then completing full-text screening. The shortlist of papers possibly eligible for inclusion was screened by a third reviewer (L.L.D.). Forward and backward chain searching was conducted on all eligible papers.

#### RISK OF BIAS AND QUALITY ASSESSMENT

All intervention studies were assessed for risk of bias using the Risk of Bias in Non-randomized Studies of Interventions tool.<sup>20</sup> The studies that described tool development/testing were assessed against scale development criteria described by Boateng et al<sup>21</sup>; criteria relating to factors and dimensionality were removed as these were not relevant to the development of risk assessment tools. Quality assessment of included studies was undertaken by D.S. and N.H. and checked by L.L.D. and G.D.

#### DATA EXTRACTION AND SYNTHESIS

Data were extracted by D.S. and checked independently by N.H. As presented in our protocol, predefined subheadings were amended and/or discarded as appropriate. These decisions were initially made by D.S. and later discussed with the whole team until consensus was reached.

Because of methodological and clinical heterogeneity in the included studies, we were unable to undertake a statistical meta-analysis; therefore, narrative synthesis was undertaken. Statistical information about predictive efficacy, interrater reliability, and intervention efficacy were extracted. Predictive efficacy data included sensitivity and specificity (true positive and true negative cases as proportions of all positive and negative predictions, respectively), positive predictive validity (odds of those predicted to be violent who actually went on to be violent), area under the receiver operating characteristic curve (AUC; a summary statistic [range 0-1] of a tool's overall ability to discriminate between positive and negative cases; interpretation AUC = 0.5 equivalent to chance, 0.7-0.79 acceptable, 0.8-0.89 excellent, 9.0-1.0 outstanding), and odds ratios (the odds that an individual who is violent was assessed as at increased risk of violence compared with the odds that a nonviolent individual was assessed as not at increased risk of violence). Information was extracted for all cut-off points reported. Information about interrater reliability involved kappa, a measure of agreement between independent raters: 0.40 to 0.59 = weak agreement, 0.60 to 0.79 = moderate agreement, 0.80 to 0.90 = strong agreement, and above 0.90 is almost perfect.<sup>22</sup> Information about intervention efficacy included *P* values indicating statistical significance and relative risk for all outcomes reported. Data about the feasibility and usability of tools were extracted where available.

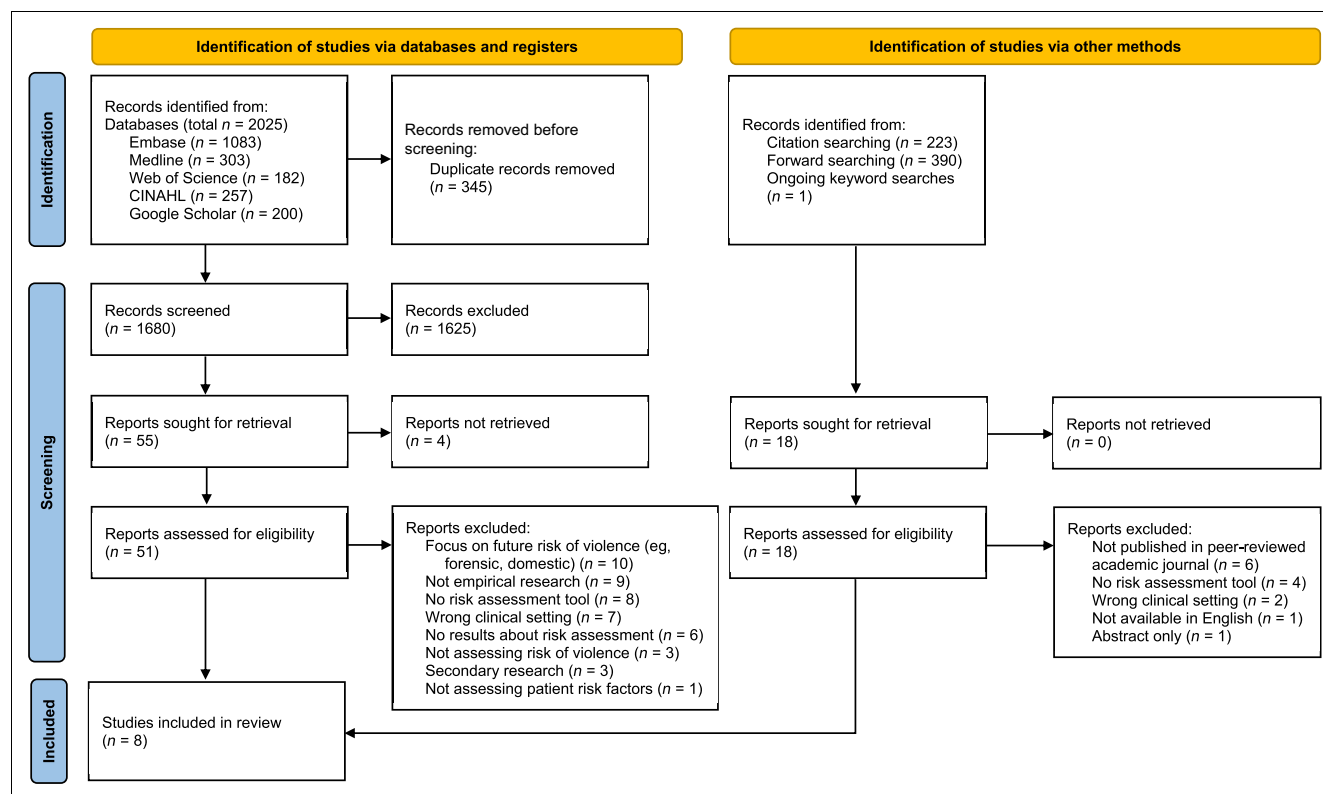
#### Results

##### SEARCH OUTCOME

As a result of the search strategy, 8 studies were deemed eligible for inclusion ([Figure](#)).

##### SUMMARY OF INCLUDED STUDIES

Of the 8 included studies, 2 used cohort designs, of which 1 was retrospective<sup>23</sup> and 1 prospective<sup>16</sup>; 2 used quality improvement designs<sup>24,25</sup>; 1 used a before-and-after design<sup>26</sup>; 1 used tool development methods<sup>27</sup>; 1 tested a



FIGURE

Preferred reporting items for systematic reviews and meta-analyses flow diagram. 18 CINAHL, Cumulative Index to Nursing and Allied Health Literature.

tool<sup>28</sup>; and 1 used nonparticipant observation.<sup>29</sup> Four studies were deemed intervention studies, with various outcomes,<sup>23-26</sup> whereas 4 aimed to test/develop tools.<sup>16,27-29</sup> Seven studies were conducted entirely in emergency departments, and 1<sup>29</sup> included observations of which 82.4% of the observations were conducted in the emergency department. No studies took place in AMUs or equivalent. Four studies were conducted in Australia<sup>16,26,27,29</sup> and 4 in the United States.<sup>23-25,28</sup>

### VIOLENCE RISK ASSESSMENT TOOLS

Three of the studies described the development and testing of new risk assessment tools.<sup>24,27,29</sup> These were all created for use within emergency care pathways. One was created using extant literature and expert opinion (Queensland Occupational Violence Patient Risk Assessment Tool [QOVPRAO])<sup>27</sup>; 1 supplemented this approach with chart audits, (Emergent Documentation Aggression Rating Tool [EDART])<sup>24</sup>; and 1 used nonparticipant observation (Violence Assessment Tool [VAT]).<sup>29</sup> Four studies tested

existing tools: the Behavioral Activity Rating Scale (BARS),<sup>23,25</sup> the BVC,<sup>16</sup> and the Dynamic Appraisal of Situational Aggression (DASA)<sup>28</sup> (Table 2). The final study combined the BVC with a response framework for use in the emergency department to create the behaviors of concern (BOC) chart.<sup>26</sup> All of the existing tools were originally developed either for use in mental health settings (BVC, DASA) or for use with patients with psychosis (BARS).

### QUALITY OF INCLUDED STUDIES

Four studies were assessed for risk of bias,<sup>23-26</sup> and all were deemed at serious risk (Table 3). Although no studies were excluded based on quality, we were unable to include data from 2 studies in our syntheses of predictive efficacy, validity, and reliability owing to serious risk of confounding. Schumacher et al<sup>23</sup> measured the predictive validity of the BARS in relation to administration of behavioral management (ie, sedation or physical restraint). However, these interventions were prescribed by medical staff on the basis of BARS scores, thus ensuring a circular relationship where

TABLE 2

**Risk assessment tools**

Tool	Included studies; developed by (if different)	Development setting/ country	Content	Scoring	Interpretation	Risk management
Behavioral Activity Rating Scale	Legambi et al, <sup>25</sup> Schumacher et al <sup>23</sup> ; Swift et al <sup>30</sup>	Setting not stated (developed to evaluate the effect of psychotropic medication on agitated behavior in patients experiencing psychosis), United States	Single-item question consisting of 7 categories: 1 = difficult or unable to rouse; 2 = asleep, but responds normally to verbal or physical contact; 3 = drowsy, appears sedated; 4 = quiet and awake (normal level of activity); 5 = signs of overt (physical or verbal) activity, calms down with instruction; 6 = extremely or continuously active, not requiring restraint; 7 = violent, requires restraint	1-7	1-4 = nonresponsive/no agitation 5-7 = increasing severity of agitation	None identified
BVC/BOC	BVC: Partridge and Affleck <sup>16</sup> ; Almvik and Woods <sup>14</sup> BOC: Senz et al <sup>26</sup>	BVC: secure mental health, Norway BOC: additional management matrix developed in emergency department, Australia	Six items: - confusion - irritability - boisterousness - physical threats - verbal threats - attacking objects	Each item scored 0 (absent) or 1 (present)	BVC 0 = low risk 1-2 = moderate risk ≥3 = high risk BOC 0 = low risk 1 = moderate risk ≥2 = high risk	BVC: None identified BOC: interventions identified for each level of risk by: general, nursing, medical, security
Dynamic Appraisal of Situational Aggression	Connor et al <sup>28</sup> ; Ogloff and Daffern <sup>31</sup>	Secure mental health, Australia	Seven items: -irritability -impulsivity -unwillingness to follow directions -sensitivity to perceived provocation -easily angered -negative attitudes -verbal threats	Each item scored 0 (normal for patient) or 1 (increase in described behavior)	0-1 = low risk 2-3 = moderate risk >3 = high risk	None identified

*continued*

TABLE 2  
Continued

Tool	Included studies; developed by (if different)	Development setting/ country	Content	Scoring	Interpretation	Risk management
Emergent Documentation Aggression Rating tool	Campbell et al <sup>24</sup>	Emergency department, United States	Single-item chart listing 6 behavior levels ranging from “no signs of aggression” to “danger to self and others” (multiple behaviors listed within each level)	0-5	0 = no signs of aggression 1 = early indicators 2-5 = increasing severity	Interventions identified for each level of aggression
Queensland Occupational Violence Patient Risk Assessment tool	Cabilan et al <sup>27</sup>	Emergency department, Australia	Three items: - Aggression history - Behavioral concerns - Clinical presentation	0 (absent) 1 (present/yes)	0 = low risk 1 = moderate risk 2-3 = high risk	None identified
Violence Assessment tool	Jackson et al <sup>29</sup>	Acute hospital, Australia	Eighteen behavioral cues: - Threat of harm - Aggressive statements or threats - Intimidation - Clenched fists - Resisting care - Prolonged or intense glaring - Name calling - Yelling - Increase in volume of speech - Irritability - Pacing near nurses’ area - Pacing in confined areas - Sharp or caustic retorts - Demeaning inflection - Belligerence - Demanding attention - Humiliating remarks - Mumbling	Not stated	Not stated	None identified

BOC, behaviors of concern; BVC, Brøset Violence Checklist.

TABLE 3  
Risk of bias table

Authors	Bias due to confounding	Bias in selection of participants	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall assessment
Schumacher et al <sup>23</sup>	Serious	Serious	Low	Serious	Moderate	Moderate	Low	Serious risk of bias
Campbell et al <sup>24</sup>	Moderate	Moderate	Low	Serious	Moderate	Moderate	Low	Serious risk of bias
Legambi et al <sup>25</sup>	Serious	Serious	Low	Moderate	Serious	Moderate	Low	Serious risk of bias
Senz et al <sup>26</sup>	Moderate	Moderate	Low	Serious	Moderate	Low	Low	Serious risk of bias

the outcome was inevitable if the predictor was positive. A similar confounder was noted in the quality improvement project described by Legambi et al,<sup>25</sup> where preassessment and postassessment data were collected on restraint use. The BARS was incorporated into the electronic health record, which automatically prompted staff to apply restraints on patients who scored 7 (violent). Although all studies were at low risk of bias in classification of interventions because risk assessment was routinely recorded, they were all at moderate to serious risk of bias owing to deviation from intended intervention. The 2 studies at moderate risk either did not provide adequate information on how nurses decided to undertake risk assessment<sup>25</sup> or only assessed patients once rather than at regular intervals.<sup>23</sup> The other 2 studies had more serious issues. Campbell et al<sup>24</sup> did not report whether restrained patients had been risk-assessed. Risk assessment occurred before the intervention as reported by Senz et al<sup>26</sup> as well as after, but no detail was provided about differences in how risk assessment occurred pre- or post-test.

Two studies detailed tool development,<sup>27,29</sup> and 2 tested pre-existing tools<sup>16,28</sup> (Table 4). Items for the newly developed tools were generated within emergency settings, through observation<sup>29</sup> and from the literature,<sup>27</sup> whereas items for the preexisting tools were generated in mental health settings.<sup>16,28</sup> Similarly, content validity and pretesting of questions occurred in mental health settings for the preexisting tools,<sup>16,28</sup> thus raising some concerns as neither tool was tested for these within the emergency care context. Researchers administered the tools in the development studies through observations<sup>29</sup> and from electronic records.<sup>27</sup>

DATA SYNTHESIS

Studies were grouped by risk assessment tool; however, only 2 tools featured in more than 1 study (the BARS and the BVC). The psychometric properties of the tools, where available, are presented in Table 5.

BARS

Legambi et al<sup>25</sup> examined restraint use before and after implementation of the BARS and found a nonsignificant difference. During the final weeks of BARS implementation, they administered the System Usability Scale (SUS) to emergency nurses. From 30 (31% response rate) responses, the BARS received a high SUS score (83.46; SD = 11.73), indicating good usability (citing Usability.gov, the authors note that SUS scores greater than 68 indicate good usability, even with a small sample size).



TABLE 4  
Critical appraisal of tool development studies table

Authors	Item generation	Content validity	Pretesting of questions	Administration	Sample size	Predictive validity testing	Interrater reliability
Jackson et al <sup>29</sup>	Good	Good	Good	Some concerns	Some concerns	Some concerns	Poor
Partridge and Affleck <sup>16</sup>	Some concerns	Some concerns	Some concerns	Some concerns	Good	Good	Some concerns
Connor et al <sup>28</sup>	Some concerns	Some concerns	Some concerns	Good	Good	Good	Some concerns
Cabilan et al <sup>27</sup>	Some concerns	Good	Poor	Poor	Good	Good	Good

However, only 13 (43%) reported feeling as though the BARS helped them to better detect and manage behavioral health patients (the primary target group requiring BARS assessment in the study emergency department). In their review of patient records, Schumacher et al<sup>23</sup> found that only 46% of patients with a psychiatric complaint received a BARS rating at triage, indicating low adoption of the tool.

#### BVC/BOC

Partridge and Affleck<sup>16</sup> calculated positive likelihood ratios (odds ratios) for the BVC using cut-off scores of 1, 2, and 3. Their findings showed that violent patients were 71.4 times more likely to have a score of  $\geq 3$  than nonviolent patients; they were 30.3 times more likely to have a score of  $\geq 2$  and 11.6 times more likely to have a score of  $\geq 1$ . The study found a predictive value of 16.7% for scores  $\geq 1$ , 34.3% for scores  $\geq 2$ , and 55.2% for scores  $\geq 3$ . This means that more than half the patients who scored 3 or more would go on to exhibit violent behaviors. When using 3 as a cut-off for BVC scores to indicate high risk of violence, sensitivity was 45.7%, and specificity was 99.4%, meaning that just under half of all violent patients and nearly all nonviolent patients were identified by the BVC.

Before implementation of the BOC, violence risk assessment was documented 30% of the time; after implementation, this increased to 82%.<sup>26</sup> Furthermore, before implementation, violence risk assessment was documented 54% of the time for patients with a mental health or drug and alcohol presentation, increasing to 100% after implementation. Senz et al<sup>26</sup> did not assess usability of the BOC; however, they explored nurses' confidence and abilities in a before-and-after survey. Despite statistically significant improvements in confidence to perform risk screening, there was no change in perceived ability to prevent violence.

#### DASA

Connor et al<sup>28</sup> calculated positive and negative predictive values for the DASA, comparing scores of  $\geq 1$  with scores of 0. They found that 23% of patients with a score of  $\geq 1$  would go on to be violent, and 95% of patients with a score of 0 would not exhibit violent behaviors. The summary AUC score of 0.79 fell in the "acceptable" category.

#### EDART

Campbell et al<sup>24</sup> found no statistically significant difference in restraint use before and after implementation of the EDART as assessed by a logistic interrupted time series

model with time  $F = 2.01, P = .13$ .<sup>24</sup> To explore the usability of the EDART, a survey was administered to emergency nurses 3 months into the study's implementation phase, receiving responses from 30 participants (62.5% response rate). Feedback about the EDART was overwhelmingly positive, with all respondents agreeing that the tool was easy to use and 28 of 30 reporting that the tool increased their ability to offer early interventions.

### QOVPRAO

In the development of the QOVPRAO, Cabilan et al<sup>27</sup> found that of the 34 risk items forwarded to end users for relevance rating, 5 achieved a relevant item-level content validity index (I-CVI) ( $\geq 0.78$ ), with consensus moderation used to direct the inclusion of additional risk items (despite achieving I-CVI scores below the 0.78 threshold). However, in a second round of content validity to rate the relevance of each of the tool's 3 risk domains, all 3 achieved I-CVIs above the 0.78 threshold. Sensitivity for the QOVPRAO domains ranged from 22% for aggression history to 55% for concerns with clinical presentation; specificity was high for all (92%-98%). The AUC using risk rating of low (no risk domains present), moderate (1 risk domain present), and high ( $\geq 2$  risk domains present) for the QOVPRAO indicated acceptable predictive validity (AUC = 0.77). Testing interrater reliability between a trained and an untrained assessor, the analysis revealed kappa values ranging from 0.60 to 0.75 for the tool's 3 domains ( $P < .01$ ), indicating moderate agreement.<sup>22</sup>

### VAT

Jackson et al<sup>29</sup> examined the association between the 18 behavioral cues in the VAT and subsequent violence. Patients who resisted health care were 11 times more likely to exhibit violent behaviors than those who did not; those who made aggressive statements were 7.2 times more likely; those who yelled were 6.8 times more likely; and those who used abusive language were 6.0 times more likely.

## Discussion

This review identified 8 studies that evaluated the psychometric properties of 7 violence risk assessment tools in emergency departments. The tools were either originally developed in mental health settings or specifically for ED

settings. Only 2 tools, the BARS and the BVC, featured in more than 1 study, limiting our ability to pool results. Our findings also are limited by the quality of the included studies, with some suffering from significant methodological flaws such as unmeasured confounding variables and deviations from the intended intervention(s). However, our review addresses an important gap in the literature. The paucity of evidence about these tools' performance in emergency settings stands in contrast to the significant body of literature on violent risk assessment in psychiatric settings,<sup>15</sup> despite the similarities in violence prevalence across these settings.<sup>32</sup>

Only 2 studies examined predictive validity, 1 each of the DASA and the QOVPRAO,<sup>27,28</sup> with both tools demonstrating moderate performance. In studies of the DASA in mental health settings, results have ranged from acceptable to outstanding,<sup>33-35</sup> reflecting similar findings to the 2 studies in this review. However, the clinical context should be factored into any comparisons drawn with findings from ED settings. Violence risk assessment does not occur in a vacuum. In psychiatric inpatient settings, where the DASA and BVC have seen most use and evaluation, patients are risk-assessed repeatedly throughout an inpatient stay, which will typically be much longer than in emergency care settings. Clinicians' familiarity with patients is likely to factor into their interpretation of patient behaviors and characteristics,<sup>36</sup> and the nature of violent incidents also may differ across these very different clinical contexts.<sup>37</sup> This underpins the importance of evaluating tools in the settings where they will be implemented, particularly as clinician expertise, preferences, and needs also will differ.

Clinical approaches to risk assessment, which involve unstructured clinical judgment, are largely subjective and reliant on the assessor's expertise, whereas actuarial approaches aim to eliminate bias by standardizing all aspects of the assessment. In mental health settings, this polarity has been somewhat addressed by the introduction of structured professional judgment approaches, which combine ratings of empirically derived risk factors together with consideration of idiosyncratic individual factors, eg, Short Term Assessment of Risk and Treatability.<sup>38</sup> Consideration could be given to the development of such approaches in the emergency department.

The tools included in this review all use an actuarial approach, although, as Doyle and Dolan<sup>39</sup> note, all risk assessment involves a degree of subjectivity. Only 1 study<sup>27</sup> evaluated interrater reliability, reporting moderate results. Some scholars have proposed that a combined clinical-actuarial approach would be optimal for ED settings,

TABLE 5  
Properties of risk assessment tools

Tool; included studies	Outcome	Cut-off	Predictive efficacy	Content validity	Reliability	Intervention efficacy
BARS; Legambi et al <sup>25</sup>	Restraint use	-	-	-	-	1. No statistically significant difference in restraint use following implementation ( $\chi^2 = 0.72, P = .40$ )
BOC; Senz et al <sup>26</sup>	Planned and emergency security responses (code gray); mechanical restraint	-	-	-	-	1. Reduction in planned Code Grays (RR 2.22) and emergency Code Grays (RR 0.75, absolute risk reduction 0.18%). 2. No reduction in mechanical restraint use.
BVC; Partridge and Affleck <sup>16</sup>	Violence	1 2 3 $\geq 1$ $\geq 2$ $\geq 3$ 3	OR 11.6 OR 30.3 OR 71.4 PPV 16.7% PPV 34.3% PPV 55.2% Sens. 45.7% Spec. 99.4%	Not assessed in emergency care, only in mental health settings	-	-
DASA; Connor et al <sup>28</sup>	Violent or aggressive behavior	Score: 1+ vs 0	PPV 23% vs 5% AUC 0.77	Not assessed in emergency care, only in mental health settings	-	-
EDART; Campbell et al <sup>24</sup>	Restraint use	-	-	-	-	1. No statistically significant difference in restraint use before and after implementation (logistic interrupted time series model with time $F = 2.01, P = .13$ )

continued

TABLE 5  
Continued

Tool; included studies	Outcome	Cut-off	Predictive efficacy	Content validity	Reliability	Intervention efficacy
QOVPROA; Cabilan et al <sup>27</sup>	Occupational violence	Aggression history	OR 9.0 Sens. 22% Spec. 98%	I-CVI 0.86	K 0.60-0.75	-
		Behavioral	OR 13.6 Sens. 31% Spec. 98%	I-CVI 0.95		
		Clinical	OR 7.1 Sens. 55% Spec. 92%	I-CVI 0.89		
		Risk rating 0, 1, 2+ Moderate risk	AUC 0.77 Sens. 61% Spec. 91%	-		
		High risk	Sens. 37% Spec. 97%			
VAT; Jackson et al <sup>29</sup>	Violence	Resisting health care	OR 11	-	-	-
		Aggressive statements	OR 7.16	-		
		Yelling	OR 6.79	-		
		Abusive language	OR 5.98	-		

AUC, area under the curve; BARS, Behavioral Activity Rating Scale; BOC, behaviors of concern; BVC, Broset Violence Checklist; DASA, Dynamic Appraisal of Situational Aggression; EDART, Emergent Documentation Aggression Rating Tool; I-CVI, item-level content validity index; OR, odds ratio; PPV, positive predictive value; QOVPROA, Queensland Occupational Violence Patient Risk Assessment Tool; RR, relative risk; Sens., sensitive; Spec., specificity; VAT, Violence Assessment Tool.

allowing clinicians to use the empirical categories set out in an actuarial tool to aid, rather than replace, clinical judgment.<sup>40</sup> In contrast, emergency nurses have expressed the need for a standardized tool that focuses on objective risk factors, particularly as ED risk assessments must be rapid.<sup>13</sup> Other studies have similarly concluded that clinicians prefer risk assessment to contain an element of structure, with some suggesting that reliance on clinical judgment alone puts less experienced staff at a disadvantage.<sup>41</sup> In fact, numerous studies have found that staff with less experience (both clinically and in the emergency department specifically) are more likely to experience patient violence in emergency settings.<sup>42,43</sup> Cabilan et al<sup>27</sup> point out that a structured approach to risk assessment does not preclude sensitivity to context and argue that a multidimensional approach, addressing both static and dynamic risk factors, is most appropriate.

Even if a tool improves violence prediction, if it is not implemented properly, it is essentially useless. We found variability in levels of implementation but cannot identify why this was the case. Usability of the BARS and the EDART were examined, with both reporting positive findings,<sup>24,25</sup> whereas an evaluation of nurses' confidence and perceived ability to prevent violence before and after implementation of the BOC reported mixed findings.<sup>26</sup> None of the included studies explicitly assessed feasibility or acceptability. Whereas lengthy risk assessment tools may be impractical in ED settings,<sup>27</sup> the BARS, a single-item tool, had low adoption.<sup>23,25</sup> Lack of understanding and enthusiasm for the tool were cited as possible reasons for this outcome, perhaps pointing to the importance of a strong implementation strategy.<sup>23</sup>

The true success of these tools should, of course, ultimately be measured in terms of reductions in violence rather than simply its prediction. Patient violence is harmful in and of itself, yet the interventions used to manage patient violence can be equally damaging. The use of physical, mechanical, and chemical restraint can be physically and psychologically harmful to all involved.<sup>44</sup> This review found no or nonsignificant reductions in violence after tool implementation, but this is based on limited and poor-quality evidence, so no firm conclusions can be drawn. Measuring outcomes in terms of restraint use or emergency security responses is, in our view, mistaken because the aim of prediction is to facilitate the early intervention of less coercive measures.

The only strong recommendation that we can make as a result of this review is about what needs to be done

to address our identified gap in the literature. Ideally, large-scale, multisite randomized controlled trials are needed to provide good-quality evidence on the use of violence risk assessment tools in emergency settings, exploring their efficacy in terms of predicting and also reducing violent incidents. Based on the recency of the included literature, we anticipate that small-scale studies will continue to proliferate, and we hope that in the not-too-distant future, systematic review with meta-analysis will be achievable.

### Strengths and Limitations

The strength of our findings is limited by the quality of the included studies. However, the lack of strong evidence in this area is a significant finding in itself. By excluding unpublished literature, we may have missed relevant research, although we sought to mitigate this by directly contacting the authors of all relevant unpublished literature to ascertain whether the work was taken further. Finally, the generalizability of our results is limited by the geographical distribution of our included studies, which were all conducted in the United States or Australia. Given the significant body of literature exploring patient violence globally,<sup>32</sup> it was disappointing that we could not capture any evidence about violence risk assessment more widely. Similarly, the fact that no studies took place in the AMU limits the assumptions we can make about the tools' suitability for this clinical area. By uncovering these gaps in the literature, this review has highlighted important areas for future research.

### Implications for Emergency Nurses

Violence risk assessment can identify patients in emergency care settings who are at risk of becoming violent. However, there is currently insufficient high-quality evidence to draw conclusions about the predictive capacity, acceptability, feasibility, and usability of existing tools in emergency care settings. In the meantime, researchers and emergency nurses looking to implement violence risk assessment strategies should take steps to ensure a strong implementation strategy to maximize uptake. Such strategies may include the use of a violence risk assessment tool, and, in the absence of any strong evidence for choosing one over another, we

recommend choosing the tool that aligns most strongly with the specific context it will be used in.

## Conclusion

Patient-perpetrated violence is a significant problem in emergency care settings globally. Despite its prevalence, there is a paucity of high-quality evidence evaluating the psychometric properties of violence risk assessment tools currently used along the emergency care pathway. Multiple tools exist, however, and the recency of much of the evidence evaluating their effectiveness indicates that this clinical issue is gaining traction. There is a long way to go before violence risk assessment is as established in emergency care settings as it is in mental health settings. Finding out which tools are most effective in predicting and preventing violence would be a good starting point; the evidence to support choosing one tool over another is not yet available, but the evidence from this review suggests that we are well on our way.

## Data, Code, and Research Materials Availability

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing, we confirm that we have followed the regulations of our institutions concerning intellectual property.

## Author Disclosures

Conflicts of interest: None to report.

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## Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2022.11.006>.

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SUPPLEMENTARY TABLE 1

**DATABASE: MEDLINE****Search terms:**

- |     |                              |  |
|-----|------------------------------|--|
| 1   | Subject headings<br>Keywords | Risk assessment<br>risk* adj3 assess*, risk* adj3 screen*, risk* adj3 checklist*, risk* adj3 tool*, risk* adj3 scale*, risk* adj3 measur*, risk* adj3 instrument*, "Staring and eye contact, Tone and volume of voice, Anxiety, Mumbling, and Pacing", STAMP, "17-cue assessment tool", "17-cue violence assessment tool", "Staring, Tone, Anxiety, Mumbling, Pacing, Emotions, Disease progress, Assertive, Resources", STAMPEDAR, "Violence Risk Screen Decision Support in triage", VRSDSiT, "Broset Violence Checklist", BVC   |
| AND |                              |  |
| 2   | Subject headings<br>Keywords | Emergency Medical Services, Emergency Service Hospital [exp]<br>"emergency room*", "emergency department*", "emergency service*", "emergency ward*", "emergency care", "accident and emergency", "accident & emergency", "emergency health service*", triag*, "ED", "ER", "A&E", "acute medical unit*", "AMU", "clinical decision unit*", "CDU", "acute admissions unit*", "acute assessment unit*", "AAU", "acute medical receiving unit*", "AMRU", "assessment and diagnostic unit*", "ADU", "emergency assessment unit*", "EAU", "emergency care unit*", "ECU", "EMAU", "medical assessment unit*", "MAU", "medical assessment and planning unit*", "MAPU", "medical admissions unit" |
| AND |                              |  |
| 3   | Subject headings<br>Keywords | Workplace violence, Aggression [exp], Violence<br>violen*, aggress*, assault*, attack*, harass*, verbal adj3 abus*, physical adj3 abus*, "verbal hostility"  |
| AND |                              |  |
| 4   | Subject headings<br>Keywords | Psychometrics, Reproducibility of results [exp]<br>"psychometric properties", valid*, reliab*, "internal* consisten*", feasib*, acceptab*, usab*, predict*, evaluat*   |

**Key:** Commas indicate terms combined with OR; [exp] = search term exploded

## SUPPLEMENTARY TABLE 2

## DATABASE: Embase

## Search terms:

- |     |                              |  |
|-----|------------------------------|--|
| 1   | Subject headings<br>Keywords | Risk assessment [exp]<br>risk* adj3 assess*, risk* adj3 screen*, risk* adj3 checklist*, risk* adj3 tool*, risk* adj3 scale*, risk* adj3 measur*, risk* adj3 instrument*, "Staring and eye contact, Tone and volume of voice, Anxiety, Mumbling, and Pacing", STAMP, "17-cue assessment tool", "17-cue violence assessment tool", "Staring, Tone, Anxiety, Mumbling, Pacing, Emotions, Disease progress, Assertive, Resources", STAMPEDAR, "Violence Risk Screen Decision Support in triage", VRSDSiT, "Broset Violence Checklist", BVC   |
| AND |                              |  |
| 2   | Subject headings<br>Keywords | Emergency Health Service [exp], Emergency Ward [exp]<br>"emergency room*", "emergency department*", "emergency service*", "emergency ward*", "emergency care", "accident and emergency", "accident & emergency", "emergency health service*", "triag*", "ED", "ER", "A&E", "acute medical unit*", "AMU", "clinical decision unit*", "CDU", "acute admissions unit*", "acute assessment unit*", "AAU", "acute medical receiving unit*", "AMRU", "assessment and diagnostic unit*", "ADU", "emergency assessment unit*", "EAU", "emergency care unit*", "ECU", "EMAU", "medical assessment unit*", "MAU", "medical assessment and planning unit*", "MAPU", "medical admissions unit" |
| AND |                              |  |
| 3   | Subject headings<br>Keywords | Workplace violence {prevention}, Aggression {prevention}, Violence {prevention}, Verbal hostility {prevention}, Assault {prevention}<br>violen*, aggress*, assault*, attack*, harass*, verbal* adj3 abus*, physical* adj3 abus*, "verbal hostility"  |
| AND |                              |  |
| 4   | Subject headings<br>Keywords | Psychometry [exp], Reproducibility [exp], Validity [exp], Reliability [exp], Usability<br>"psychometric properties", valid*, reliab*, "internal* consisten*", feasib*, acceptab*, usab*, predict*, evaluat*  |

**Key:** Commas indicate terms combined with OR; [exp] = search term exploded; {text in braces} = subheadings selected (NB. where not specified, all subheadings were included)

## SUPPLEMENTARY TABLE 3

**DATABASE: Web of Science****Search terms:**

- 1 AND (TS=(risk\* NEAR/3 assess\*) OR TS=(risk\* NEAR/3 screen\*) OR TS=(risk\* NEAR/3 checklist\*) OR TS=(risk\* NEAR/3 tool\*) OR TS=(risk\* NEAR/3 scale\*) OR TS=(risk\* NEAR/3 measur\*) OR TS=(risk\* NEAR/3 instrument\*) OR TS=("Staring and eye contact, Tone and volume of voice, Anxiety, Mumbling, and Pacing") OR TS=(STAMP) OR TS=("17-cue assessment tool") OR TS=("17-cue violence assessment tool") OR TS=("Staring, Tone, Anxiety, Mumbling, Pacing, Emotions, Disease progress, Assertive, Resources") OR TS=(STAMPEDAR) OR TS=("Violence Risk Screen Decision Support in triage") OR TS=(VRSDSiT) OR TS=("Broset Violence Checklist") OR TS=(BVC))
- 2 AND (TS=("emergency room\*") OR TS=("emergency department\*") OR TS=("emergency service\*") OR TS=("emergency ward\*") OR TS=("emergency care") OR TS=("accident and emergency") OR TS=("accident & emergency") OR TS=("emergency health service\*") OR TS=("ED") OR TS=("ER") OR TS=("A&E") OR TS=("acute medical unit\*") OR TS=("AMU") OR TS=("clinical decision unit\*") OR TS=("CDU") OR TS=("acute admissions unit\*") OR TS=("acute assessment unit\*") OR TS=("AAU") OR TS=("acute medical receiving unit\*") OR TS=("AMRU") OR TS=("assessment and diagnostic unit\*") OR TS=("ADU") OR TS=("emergency assessment unit\*") OR TS=("EAU") OR TS=("emergency care unit\*") OR TS=("ECU") OR TS=("EMAU") OR TS=("medical assessment unit\*") OR TS=("MAU") OR TS=("medical assessment and planning unit\*") OR TS=("MAPU") OR TS=("medical admissions unit\*"))
- 3 AND
- 4 (TS=("psychometric properties") OR TS=(valid\*) OR TS=(reliab\*) OR TS=("internal\* consisten\*") OR TS=(feasib\*) OR TS=(acceptab\*) OR TS=(usab\*) OR TS=(predict\*) OR TS=(evaluat\*))

**Key:** TS = Searched in 'Topic' field

## SUPPLEMENTARY TABLE 4

## DATABASE: CINAHL Plus

## Search terms:

- 1 Subject Risk assessment, Clinical assessment tools  
headings
- Keywords risk\* adj3 assess\*, risk\* adj3 screen\*, risk\* adj3 checklist\*, risk\* adj3 tool\*, risk\* adj3 scale\*, risk\* adj3 measur\*, risk\* adj3 instrument\*, "Staring and eye contact, Tone and volume of voice, Anxiety, Mumbling, and Pacing", STAMP, "17-cue assessment tool", "17-cue violence assessment tool", "Staring, Tone, Anxiety, Mumbling, Pacing, Emotions, Disease progress, Assertive, Resources", STAMPEDAR, "Violence Risk Screen Decision Support in triage", VRSDSiT, "Broset Violence Checklist", BVC
- AND
- 2 Subject Emergency Service, Emergency Medical Services  
headings
- Keywords "emergency room\*", "emergency department\*", "emergency service\*", "emergency ward\*", "emergency care", "accident and emergency", "accident & emergency", "emergency health service\*", "triag\*", "ED", "ER", "A&E", "acute medical unit\*", "AMU", "clinical decision unit\*", "CDU", "acute admissions unit\*", "acute assessment unit\*", "AAU", "acute medical receiving unit\*", "AMRU", "assessment and diagnostic unit\*", "ADU", "emergency assessment unit\*", "EAU", "emergency care unit\*", "ECU", "EMAU", "medical assessment unit\*", "MAU", "medical assessment and planning unit\*", "MAPU", "medical admissions unit\*"
- AND
- 3 Subject Workplace violence, Aggression, Violence, Verbal abuse, Patient assault, Assault and battery  
headings
- Keywords violen\*, aggress\*, assault\*, attack\*, harass\*, verbal adj3 abus\*, physical adj3 abus\*, "verbal hostility"
- AND
- 4 Subject Psychometrics, Measurement issues and assessments [exp]  
headings
- Keywords "psychometric properties", valid\*, reliab\*, "internal\* consisten\*", feasib\*, acceptab\*, usab\*, predict\*, evaluat\*
- Key:** Commas indicate terms combined with OR; [exp] = search term exploded

**Google Scholar**

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*NB. 256 character limit*

2007-2021: ((risk AND assess) OR (risk AND tool)  
OR (risk AND instrument)) AND (emergency OR

“acute medical unit”) AND (violence OR aggression  
OR assault OR attack OR abuse) AND (psychometric  
OR validity OR reliability OR predictability OR feasi-  
bility OR usability)

*Results then limited to top 200 (by relevance)*