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The validity and utility of violence risk assessment tools to predict patient violence in acute care settings: An integrative literature review

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ABSTRACT

Aim: To examine risk assessment tools to predict patient violence in acute care settings.

Methods: An integrative review of the literature. Five electronic databases – CINAHL Plus, MEDLINE, OVID, PsycINFO and Web of Science were searched between 2000 and 2018. The reference list of articles were also inspected manually. The PICOS framework was used to refine the inclusion and exclusion of the literature, and the PRISMA statement guided the search strategy to systematically present findings.

Results: Forty-one studies were retained for review. Three studies developed or tested tools to measure patient violence in general acute care settings, and two described the primary and secondary development of tools in emergency departments. The remaining studies reported on risk assessment tools that were developed or tested in psychiatric inpatient settings. In total 16 violence risk assessment tools were identified. Thirteen of them were developed to assess the risk of violence in psychiatric patients. Two of them were found to be accurate and reliable to predict violence in acute psychiatric facilities and have practical utility for general acute care settings. Two assessment tools were developed and administered in general acute-care and one was developed to predict patient violence in emergency departments.

Conclusion and recommendations: There is no single, user-friendly, standardised evidence-based tool available for predicting violence in general acute care hospitals. Some were found to be accurate in assessing violence in psychiatric inpatients and have potential for use in general acute care, require further testing to assess their validity and reliability.

Keywords: Violence risk assessment tool, integrative review, violence prevention, acute care, nurse

INTRODUCTION

Violence in hospitals compromises patient, visitor and staff safety (Spencer *et al*. 2013). Identifying patients who are at a high risk of committing violent acts is the first step towards

the development of effective violence prevention programs (NICE 2015; Policy and Strategic Project Division 2005). However, most violence risk assessment tools have been developed for use in psychiatric settings (Daffern, 2007; Dolan & Doyle, 2000; Singh *et al*. 2011) and may not be useful for the general hospital environment. This review examines the current evidence to determine the most effective violence risk assessment tools with potential for adaptation for use in general acute care settings.

BACKGROUND

Inpatient violence is a widely recognised hazard for nursing staff (Edward *et al.* 2016; Johnson 2009). A meta-analysis of 136 international studies of nurse exposure to violence reported that 36.4% of nurses experienced physical violence, 66.9% non-physical violence, 39.7% bullying, and 25% were subjected to sexual harassment (Spector *et al*. 2014). Of those who experienced violence, 32.7% reported having been physically injured in an assault (Spector *et al*. 2014). Higher levels of patient violence was experienced by majority of the acute care nurses within the Australian healthcare (Gilchrist *et al*. 2010, Policy and Strategic Project Division 2005). A survey of 94 medical-surgical wards from 21 hospitals in two Australian states found that 14% - 38% of the nurse experienced physical violence, threats of violence and emotional abuse during their last five shifts worked (Roche *et al*. 2010). Patient-related violence against nurses is often not-reported or under reported in Australia (Lyneham 2000).

Exposure to violence is a significant stressor within the work environment and can result in numerous physical health consequences for nurses including physical injury from assault, disability, and other physical symptoms. A systematic review of sequelae following workplace violence conducted by Lanctôt and Guay (2014) found 29 studies which examined the physical consequences of workplace violence. Consequences included physical injuries such as bruises, bites and lacerations with life-threatening injuries and permanent disability present in a small

percent of victims. Violent incidents impact on the mental health of those who experience them and the potential for emotional stress following a violent incident is high. Gates *et al*. (2011) found that nurses experienced post-traumatic stress disorder following a violent incident. In their sample of 230 emergency nurses, 94% of them displayed at least one of the post-traumatic stress symptoms - intrusion (such as intrusive thought, nightmares, re-experiencing), avoidance (such as numbing, avoidance of feelings) and hyperarousal (such as irritability, anger, and difficulty concentrating) which also affected the nurses' work productivity (Gates *et al*. 2011).

In order to reduce exposure of healthcare personnel to violence, an effective workplace violence prevention and management plan is required. A number of risk assessment tools are described in the research literature, however, the majority of these have been developed for psychiatric settings (Daffern 2007; Dolan & Doyle 2000; Singh *et al*. 2011) rather than general hospital wards. This review identifies those evidence-based tools that may have practical utility in general acute care hospitals.

AIM

The purpose of this literature review was to examine risk assessment tools to predict patient violence in general acute care hospitals.

METHODS

An integrative review was selected to appraise, analyse and integrate literature. This methodology allowed the inclusion of studies with diverse data collection methods including experimental, non-experimental, quantitative, qualitative and mixed-methods design (Whittemore & Knafl 2005) to obtain a comprehensive understanding of the violence risk assessment tools and their potential utility for the general acute care facilities. This methodological combination in integrative review plays a significant role in evidence-based

practice in nursing contributing to policy development on assessing patients (Whitemore & Knafl 2005, de Souza *et al*. 2010). To enhance the rigour of the review, the reviewers followed the five stages of Whittemore and Knafl's (2005) systematic framework which included: (1) problem identification; (2) literature search; (3) data evaluation; (4) data analysis and (5) presentation of findings. In combination with the integrative methodology, the PICOS framework (Population; Intervention; Comparator; Outcome; Study design) was used to refine the inclusion and exclusion of the literature (Schardt *et al*.2007). Further, the PRISMA (Moher *et al*. 2009) enabled the reviewers to structure the review and systematically present findings by identifying and screening potentially eligible studies and including the final number of studies.

Problem identification

As outlined in the introduction this review examined the evidence-based patient violence risk assessment tools which may have utility in general acute care hospitals. For the purpose of this review, patient violence was defined as any violence incidents conducted by adult patients and are assigned to one of four categories: verbal aggression; physical aggression against objects; physical aggression against self; and physical aggression against people (Yudofsky *et al*. 1986).

Literature Search

The second step in the integrative review was data collection through literature search. A computerized database search of the Cumulative Index of Nursing and Allied Health Literature (CINAHL Plus with full text), MEDLINE, OVID, PsycINFO and Web of Science was performed in August 2018. The search strategy flowed from a combination of MeSH terms and keywords, such as, 'violence risk assessment', 'inpatient violence', 'violence screening' 'violence checklist', 'psychopathy checklist', 'predict hospital aggression', 'predict hospital violence' and 'violence checklist'. The literature search was restricted to English language research articles which were published in academic journals between 2000 and 2018 in order to

review contemporary, evidence-based violence risk assessment tools. Studies investigating lateral violence in which nurses experienced violence from co-workers and/or violence from patient's family were excluded from the review. Grey literature and studies that examined violence risk in community, prison or paediatric hospital settings were also excluded. Hand-searching reference lists of retrieved articles, previous systematic reviews and commentary articles was conducted to ensure maximum coverage.

Search outcome

A total of 383 records were identified through the search strategy and exported into EndNote X7 library (Figure 1). The number of records was reduced to 320 after duplicates were removed. Of these, 246 records were excluded after reviewing the title and abstract of the studies. These articles were excluded because they did not evaluated tools in hospitals (n = 128), did not measure patient violence (n = 64), measured violence in children and/or adolescent (n = 22). Some of the articles (n = 31) were discussion papers or expert opinions, and one article was not written in English. A total of 74 articles were selected for full-text assessments. After a follow-up discussion between the reviewers, 33 studies were excluded because they did not examine the validity and reliability of the tools (n = 27), four of them were literature reviews and two included particularly forensic patients. In total 41 studies were included in this review. Of them, 32 evaluated one or more existing tools, three studies described the primary development and assessment of a tool, two described the development of a tool without further testing, and another four described the modification of an existing tool. Thirty-six of the included studies reported on tools used to predict violence in psychiatric hospitals. Only three studies developed or tested tools in general acute-care, and two described the development of a tool in emergency departments.

Data evaluation

Data evaluation or quality appraisal in an integrative review is the third stage. The assessment tools were examined in terms of their predictive validity and reliability, and practical utility. Assessing values for sensitivity, specificity, positive and negative predictive provided gold standard for the predictive accuracy of the tools (Parikh et al. 2008). The Area under the Receive Operating Characteristics (ROC) Curve (AUC) values plots the true positive rate (sensitivity) against the false positive rate (specificity) at different threshold levels also indicated the predictive validity of the tools and determined how well the risk assessment tool discriminated between violent and non-violent patients (Daffern 2007, Singh *et al*. 2011). AUC ranging from 0.50 (chance prediction) to 1.0 (perfect positive prediction), of more than 0.90 are considered to be excellent, 0.80-0.89 are good, and 0.75 is considered the lower boundary of a useful tool (Dolan & Doyle 2000). Inter-rater reliability information identified the degree of consistency between data collectors and therefore determined that data collected in the studies were correct representations of the violence measured (McHugh 2012). The practical utility of the tools were determined by: assessing the risk of violence within 12-24 hours; completing the tool within 5-15 minutes, completed by nurses without knowing patients' history of violence or medical conditions, and completed by nurses without having disease specific knowledge and expertise.

There is no gold standard for completing a literature review using an integrative review quality appraisal tools due to the inclusion of diverse methodologies, which results in a lack of homogeneity in research design (Whittemore & Knafl 2005). Therefore, the quality appraisal of the studies was conducted based on study design, sample size and characteristics, objective measurement of outcome, statistical analysis and representativeness of the study.

Data extraction and analysis

The fourth stage in this integrative review was data extraction and analysis which involved an iterative process between the stated research question and the data (Beyea & Nicoll 1998). A data extraction matrix was developed to systematically organize and synthesis information. To enhance rigour during this stage, a four-step systematic analytic method was adopted (Pentland *et al.* 2011). First, descriptive summary of the reviewed study such as name of the tool, source of development, development type, population type, sample size, sensitivity and specificity, positive and negative predictive values, inter-rater reliability and AUC-ROC value were recorded (Table 1). Second, the descriptive information was then compared and pattern established. Third, the process of the comparative analysis were examined by two reviewers, and information were put together to recognize the key concept. Finally, the major groups were further scrutinised to identify sub-groups of information. In addition, the risk items used in each tool were combined and summarised in Table 2.

RESULTS

In total 16 violence risk assessment tools were identified from the 41 reviewed studies. The tools are categorized into four major groups based on their follow-up assessment periods and clinical settings in which the tools were administered. The four major groups are: 1) Tools developed or administered in long-term psychiatric wards; 2) Tools developed or administered in 24-hour psychiatric wards; 3) Tools developed or administered in general acute-care; and 4) Tools developed or administered in emergency departments. The strengths and limitations of the tools are analysed in terms of their predictive validity, reliability, simplicity and feasibility for use in general acute-care settings. To measure imminent violence, these tools included items broadly categorised into static or dynamic factors or a combination of both. Static factors for violence, such as psychopathy or history of violence, are not subject to change through implementation of intervention over time. On the other hand, dynamic factors are behavioural

characteristics, such as impulsivity, which are subject to change spontaneously either through changes in the patients' mental state or other circumstances (Douglas & Skeem 2005). Many of these tools employ assessment approaches in which violence is predicted based on evidence-based risk factors associated with violence (actuarial approach) or clinicians' knowledge and experience (clinical judgement risk assessment approach), allowing clinicians to conduct a systematic, consistent and yet case-specific assessment (Douglas & Skeem 2005).

1. Tools developed or administered in long-term psychiatric wards

Four violence risk assessment tools were identified to predict violence in inpatient psychiatric settings with a three to twelve month follow-up period. Another seven tools were also identified which assessed violence risk within two-to-six weeks in psychiatric wards.

1.1 Psychopathy Checklist-Revised (PCL-R)/Screening Version (PCL-SV)

The PCL-R includes 20-risk items, which are divided into four domains: interpersonal traits; psychopathy; chronically unstable lifestyle; and past antisocial behaviour (Hare 2003). Each item is scored on a three point rating scale as 0 (absent), 1 (possibly present), and 2 (definitely present) with a maximum score of 40, with a score exceeding 30 indicating the presence of psychopathy (Dolan & Doyle, 2000). To evaluate the PCL-R in McDermott *et al*. (2008) study, patient files were reviewed by a multidisciplinary team, and aggressive behaviour was categorised as impulsive (unplanned aggression), predatory (planned aggression) and psychotic (delusions/hallucinations related aggression). The authors found that the PCL-R score was weakly associated with imminent impulsive aggression but was highly associated with predatory and psychotic aggression. Vitacco *et al*. (2009) examined the PCL-SV, a modified version of the PCL-R, and also found that the scores were weakly associated with patients' unplanned aggression, rendering the PCL-R/SV unsuitable to assess patients' unstable mental state in acute-care.

1.2 Historical, Clinical, Risk management (HCR-20)

The HCR-20 was designed to provide evidence based structured clinical guidance for assessing violence in patients with mental disorders (Webster *et al*. 1997). The tool comprises 20 static and dynamic risk factors distributed across three subscales. The Historical subscale (H10) measures psychopathy and history of violence as measured by the PCL-R/SV. The Clinical subscale (C5) measures dynamic risk factors through observation of a patient's current mental state and attitudes. The Risk Management subscale (R5) measures risk-related factors such as exposure to destabilisers (i.e. access to substances). Each item is rated as 0, 1, 2 in a similar manner to the PCL-R/SV, and summed for each subscale. Total scores range from 0-40 with higher scores indicating higher risk of violence. After rating the 20 items, evaluators then identify any clinical/historical factors and consider the relevance of each factor to a particular patient, and make a final risk judgement to estimate the risk as low, moderate or high for future violence.

In three studies (Arbach-Lucioni et al. 2011, Dolan & Blattner 2010, and Langton *et al*.2009) the predictive accuracy of the HCR-20 was reported as moderate-to-good (AUC range 0.69-0.86) for predicting violence in psychiatric patients. However, the C5 and R5 of the HCR-20 showed stronger predictive accuracy than the H10 in these studies. The pattern was confirmed by O'Shea *et al.* (2014), Gunenc *et al*. (2015) and Teo *et al.* (2012) who found that the C5 and R5 had significant predictive accuracy. The item 'psychopathy' was excluded from the assessment in these three studies due to the additional time and expertise required to assess psychopathy. Gunenc *et al.* (2015) reported that 'impulsivity', 'negative attitudes' and 'non-compliance with medication' in the C5 subscale were the best predictors for verbal aggression in psychiatric inpatients, while Teo *et al.* (2012) observed that the predictive accuracy of the HCR-20 largely depended on clinicians' level of knowledge and experience. In all examined

studies, the HCR-20 like the PCL-R/SV required comprehensive file reviews by a clinician team to assess violence risk, which may not be time-feasible for acute care nurses alone. The HCR-20 encompasses both static and dynamic factors and has some advantages over the PCL-R/SV, which exclusively assesses static factors, however, the R5 items involve an evaluator's subjective prediction of whether a patient is likely to become violent.

1.3 Violence Risk Appraisal Guide (VRAG)

The VRAG consists of 12 items including the PCL-R Score, history of violent and non-violent offences and mental disorder (Harris *et al*. 1993). The item with the highest weighting is the PCL-R score. The overall VRAG scores range from -27 to +35 and are used to assign a patient to one of nine risk categories associated with a probability of becoming violent. Patients in category 1 have the lowest score and are considered to be at lower risk of violence than those patients in category 9 (Cooke et al. 1999). Two studies by Doyle *et al*. (2002) and Snowden *et al.* (2009) found the VRAG with moderate predictive validity and significantly correlated with PCL-SV and HCR-20. As the PCL-R/SV needs to be administered to obtain an overall VRAG score, the VRAG will therefore have similar practical implementation issues to the PCL-R/SV in acute-care setting.

1.4 Short-Term Assessment of Risk and Treatability (START)

The START is a structured tool to assess seven interrelated domains: physical violence against others, suicide, self-harm, victimisation, substance use, unauthorised leave and self-neglect in mentally ill patients (Webster *et al*. 2006). The START is one of the few instruments that assess both risk to self and others. The seven domains consist of a total of 20 dynamic risk items which are scored as positive and negative, and are rated for strength and vulnerability on a 3-point scale from 0-2. Based on the item ratings, evaluators estimate risk in a similar manner to the HCR-20, as low, moderate or high for each of the seven domains. The evaluators then

identify any presence of additional risk factors, including mental and historical, before making an overall judgment concerning the patient's risk of committing a violent act. Higher strength total scores predict lower risk, whereas higher vulnerability total scores indicate higher risk.

The vulnerability and strength scores of the START showed moderate predictive validity in the study by Nonstad *et al*. (2010), but the AUC scores were not sufficient to yield a moderate effect size in the study by O'Shea *et al*. (2016). Wilson *et al*. (2013) compared the START with the HCR-20 and found that the START and the C5 of the HCR-20 both had good predictive validity, indicating that dynamic risk factors are critical for predicting imminent violence. As is the case with the HCR-20, the assessment process in these studies involved patient file review by a multidisciplinary team who decided which of the 20 items were to be defined as critical risk factors.

1.5 Brockville Risk Checklist (BRC), InterRAI Risk of Harm to Others Clinical Assessment Protocol (RHO-CAP), Imminent Risk Rating Scale (IRRS), Preliminary Scheme 33(PS33), Risk of Violence Assessment (ROVA), and Classification of Violence Risk (COVR) and the Fordham Risk Screening Tool (FRST)

Another seven tools assessed the risk of violence within two-to-six weeks following admission in acute psychiatric settings. The Brockville Risk Checklist (BRC), developed by Chagigiorgis *et al*.(2013) is a 41 item checklist overlapping across four dynamic risk subscales to assess harm to others, harm to self, risk of neglect and risk of exploitation by others. The researchers reported that the 'harm to others' subscale predicted non-aggressive incidents rather than aggressive incidents, while the remaining three risk subscales were not associated with any aggressive or non-aggressive outcomes. Further investigation to establish the predictive accuracy of the tool is required.

Neufeld *et al*. (2012) investigated the InterRAI Risk of Harm to Others Clinical Assessment Protocol (RHO-CAP) – a risk assessment algorithm incorporating a comprehensive mental health assessment including patients' past and present violence. In their study, the risk of violence was two times higher among patients with high RHO-CAP compared with patients with moderate or low scores. Starzomski and Wilson (2015) administered the seven-item Imminent Risk Rating Scale (IRRS) which combined historical, clinical and contextual factors. Although the inter-rater reliability demonstrated a high level of agreement, the AUC score did not show sufficient predictive accuracy.

Three studies investigated the Preliminary Scheme 33 (PS33) – a 33-item checklist across three subscales: historical, clinical and risk management. Bjørkly and Moger (2007) examined inter-rater reliability of the tool and found high level of agreement for the historical and clinical subscales only. The PS33 was reduced to 10 items and evaluated by Hartvig *et al*. (2011) and Eriksen *et al*. (2016) who found the tool as effective, with AUC=0.83 for predicting violence in psychiatric patients. They also changed the name of the tool as V-Risk-10 after reducing the 33 checklists to 10. Both researchers reported the tool as easy to complete within five minutes. The PS33 has some historical items requiring patients' background information to be collected before the assessment, and therefore may not be applicable for general acute-care settings.

The Risk of Violence Assessment (ROVA), developed by Lynch and Noel (2010), is a 13-item checklist across four domains: clinical disorders, personality disorders, psychosocial stressors, and risk assessment and intervention. While the researchers reported that the scale took less than ten minutes to complete, they found that not all risk items were associated with violent incidents nor did they possess satisfactory inter-rater reliability.

McDermott *et al*. (2011) administered the Classification of Violence Risk (COVR), a 44- item

computerised program with various algorithms customised for each patient. They reported that it took approximately 20 minutes to complete the program in which all questions were linked to each other, and depending on how one question was answered the subsequent question varied. The researchers compared the tool with the PCL-R, HCR-20 and VRAG and reported no statistical differences between them.

The Fordham Risk Screening Tool (FRST) was developed by Rosenfeld *et al.* (2017) to provide a structured screening approach for the assessment of psychiatric patients. Two studies, Rosenfeld *et al.* (2017) and Rotter and Rosenfeld (2018) examined this tool, which is used to determine whether a more comprehensive violence risk assessment using a validated, existing risk assessment instrument (e.g. the HCR-20), is required for a particular service user. The FRST examines recent (in the previous six months) and severe violent behaviour, threats, or suicidal ideation. The FRST demonstrates high sensitivity and moderate specificity in identifying individuals who subsequently scored high for risk for violence (based on the case prioritisation risk rating of the HCR-20v3). However, whilst the FRST is relatively easy to administer, it requires trained personnel, and furthermore, its focus on static factors and history of violence would preclude it from utilisation in general medical-surgical acute care.

2. Tools developed or administered in 24-hour psychiatric wards

Two risk assessment tools were developed to predict violence within 24 hour time frame in acute psychiatric wards. These tools were further examined for their predictive accuracy and inter-rater reliability.

2.1 Brøset Violence Checklist (BVC)

In addition to long-term violence assessment researchers have focused on developing risk

assessment tools for predicting day-to-day aggression in acute psychiatric wards. The BVC is the most frequently cited and evaluated tool identified for predicting violence in psychiatric units within 8 to 24 hours. Developed and examined by Almvik *et al*. (2000), the BVC comprises six items (confusion, irritability, boisterousness, physical threats, verbal threats and attacks on objects) each of which is scored as 0 (absent) or 1 (present) with a total score of six.

According to the researchers, a total score of 0 suggests that the risk of violence is small; scores of 1-2 indicate a moderate risk of violence and preventative measures are recommended. A score of 3 or more indicates a high risk of violence requiring immediate preventative measures and the activation of appropriate strategies to handle an attack. In their initial study, Almvik *et al*. (2000) reported that the tool had good psychometric properties with an AUC value of 0.82. Since then, the BVC has been evaluated in a number of studies in which the predictive validity of the tool has consistently been strong with an AUC of 0.85 (Yao *et al*., 2014), 0.92 (Hvidhjelm *et al*. 2014) and 0.94 (Almvik *et al*. 2007). The BVC has been reported to be quick and easy to administer by nurses (Almvik *et al*., 2007; Clarke *et al*. 2010; Woods *et al*. 2008; Yao *et al*. 2014). Clarke *et al*. (2010) and Hvidhjelm *et al*. (2014) reported that 'irritability' was the strongest predictor of the total BVC score, and most violent incidents were triggered by the denial of something requested by a patient.

Inter-rater reliability for the BVC has been reported in four studies. In the Yao *et al*. (2014) study, the inter-rater reliability for single items ranged from ICC = .41 – .76 with a total ICC=0.84. Similarly, Almvik *et al*. (2000) reported Kappa values ranging from 0.48-1.0 for single items with 100% agreement for the 'attacking objects' item, and r = 0.64-1.0 reported by Abderhalden *et al*. (2006). While statistical analysis was not performed, Clarke *et al*. (2010) stated that "scores were remarkably similar for all staff" between nursing staff and students (2010, p.617).

In a prospective cohort study Abderhalden *et al.* (2006) translated the BVC into German and extended it with a 10cm long Visual Analog Scale marked by "no risk" and "very high risk" at each endpoint of the scale. The BVC-VAS provides a total score of 12, with scores of 0-3 indicating very low risk, 4-6 low risk, 7-9 moderate risk and 10-12 high risk. The authors conducted their study in a development and a validation phase. While considerable differences were found within the BVC- VAS, the AUC values for the original BVC were consistent in both phases (AUC 0.87 development phase, and 0.86 validation phase) indicating that the inclusion of the VAS did not advance the accuracy of the original BVC. The BVC-VAS was further tested by Rechenmacher *et al.* (2014), who reported that by choosing a cut-off point of ≥6 for the BVC- VAS the sensitivity and the specificity was 64.7% and 95.1%, whereas, a cut-off point of ≥7 decreased the sensitivity to 58.8% and increased the specificity to 96.8%, recommending further research on the BVC-VAS.

2.2 Dynamic Appraisal of Situational Aggression (DASA)

The DASA was developed and examined by Ogloff and Daffern (2006) to assess the risk for imminent aggression on a daily basis in a psychiatric hospital in Australia. Of the seven risk factors of the tool, two are derived from the HCR-20: negative attitudes and impulsivity; two from the BVC: irritability and verbal threats; and another three items from the researchers' previous study: sensitive to perceived provocation, easily angered when requests are denied, and unwillingness to follow directions. The score ranging from 0-7 is calculated to obtain an overall score to assess a patient's likelihood for imminent aggression with a score of 0 indicating low risk, 1-3 as moderate risk and a score of 4 or above suggesting high risk for aggression. The researchers recommended implementing preventive measures when a patient scores at 6-7. In their study, the DASA, which was administered by nurses who scored each item for its presence or absence based on their observations during the past 12-24 hours, had a

good predictive accuracy with AUC=0.82.

The tool has been further validated in another four studies by Lantta *et al*. (2016), Chu *et al*. (2013), Griffith *et al*. (2013), and Vojt *et al*. (2010) with moderate to strong predictive validity. These studies further reported that the predictive validity of the DASA was not significantly different from that of the BVC (Chu *et al*. 2013; Ogloff & Daffern 2006) and that the tool took less than five minutes to complete (Chu *et al*. 2013; Griffith *et al*. 2013; Lantta *et al*. 2016; Ogloff & Daffern 2006). Vojt *et al*. (2010), however, reported that the predictive power of the DASA was consistent for incidents of verbal aggression only, and not for physical aggression or all other aggressive incidents. However, their study used a small sample size of 20 patients limiting the generalizability of the findings.

3. Tools developed or administered in general acute-care

Only two screening tools have been developed and examined in three studies (Kling et al. 2006, Ideker et al. 2011, and Kim et al. 2012) to identify patients at risk for violence within 24 hours of admission in general acute care settings.

3.1 Violence Risk Assessment Tool (M55)

The M55 was developed and evaluated by Kling *et al*. (2006) to flag potentially violent patients admitted to an acute care hospital. The tool includes 11 items, and has two screening levels to assess violence risk. The risk is rated as high if a patient has a history of violence or physical aggression, is physically aggressive or threatening, or is verbally hostile or threatening. The risk is also rated as high with the presence of three or more of the tool's items. The M55 showed initial reliability and validity with acceptable sensitivity and specificity at 71%-95% respectively (Kling *et al*. 2006). These results are very different to those reported by Ideker *et al*. (2011) who found that the tool predicted a small percentage of patients identified as at risk

of becoming violent compared with those who actually became violent in medical-surgical units with lower sensitivity at 41% and higher specificity at 99%.

3.2 Aggressive Behaviour Risk Assessment Tool (ABRAT)

Another tool developed by Kim *et al.* (2012) is the Aggressive Behaviour Risk Assessment Tool (ABRAT), a 10-item checklist combining items from the researcher's own investigation, the M55, and from the STAMP (Luck *et al.* 2007) with a total score rated on a 3-point scale from 0 (low risk) to 2 (high risk). In this study the ABRAT had good predictive validity with AUC of 0.82 with acceptable sensitivity (71.4%) and specificity (89.3%) for identifying violence within 24 hours of admission. The ABRAT was also found to be simple and easy to administer with an inter-rater reliability of Kappa= 0.658 between two nurses.

4. Tools developed or administered in emergency departments

Two studies (Luck *et al.* 2007, and Chapman *et al.* 2009) mentioned about developing a risk assessment tool in general emergency departments.

4.1 STAMP/EDAR (Staring, Tone/volume of voice, Anxiety, Mumbling and Pacing)/ (Emotions, Disease process, Assertive/non-assertive, Resources)

The STAMP is the only risk assessment tool to predict patient violence in emergency departments. Developed by Luck *et al.* (2007), it stems from a qualitative study involving 290 hours of participant observation, 16 semi-structured interviews and 13 informal interviews with nurses and clinicians, the acronym STAMP includes observed behavioural cues across five domains: staring, tone/volume of voice, anxiety, mumbling and pacing. The researchers reported that as the number of the behavioural cues exhibited by the patients increased, the risk of violence increased accordingly in their study. Chapman *et al.* (2009) extended the STAMP by adding another four domains: emotions, disease process, assertive/non-assertive and

resources as potential predictors for violent behaviour. The STAMP/EDAR is expected to be easy to administer by nurses working in general acute-care with no prior knowledge of the patient's history (Chapman *et al*., 2009), however the predictive validity of the tool is not known, and a scoring procedure is yet to be developed.

DISCUSSION AND RECOMMENDATIONS

The purpose of this paper was to examine the current evidence concerning risk assessment tools predicting violent inpatient behaviour in general acute care hospitals. Only three studies (Ideker *et al*., 2011; Kim *et al.,* 2012; Kling *et a*l., 2006) developed or tested tools in general acute care settings, and two (Chapman *et al*., 2009; Luck *et al*., 2007) described the primary and secondary development of tools in emergency departments. The remaining studies reported on risk assessment tools that were developed or tested in psychiatric inpatient settings. There were 16 violence risk assessment tools were found. Of them, two were developed for general acute care settings, and one was for emergency departments. The rest were developed and examined in psychiatric inpatients.

This review reveals that despite decades of research on psychiatric inpatient violence there is no single, user-friendly, standardised and evidence-based tool available for predicting violence in acute care hospitals. None of the tools developed for use in long-term psychiatric wards offer support to nursing staff in the assessment of day-to day inpatient violence. These tools consist of static risk items such as psychopathy and history of violence, which are relatively stable and not amenable to deliberate intervention in acute care facilities where violence is more likely to be unplanned. As these tools involve intensive clinical interviewing and patient file review, the administration of these tools is time consuming and the scoring procedure is lengthy, resulting in limited utility in the identification of violence in general acute care settings where nurses have limited time for risk assessments. These tools require multidisciplinary team input to

assess the risk of violence, and so cannot be administered by nurses alone. Nurses working in general care may have limited mental health expertise and appropriate training to assess violence risk using these tools, mainly due to a lack of clinical education hours in mental health (McCann *et al*. 2009). One exception is the clinical subscale of the HCR-20, which utilises dynamic risk items to reflect patients' current mental states, which could potentially be suitable for assessing risk by ward nurses alone in general acute-care settings. The predictive validity of the C5 was found comparable with that of the BVC and DASA (Chu *et al*. 2013; Ogloff & Daffern 2006). However, the HCR-20 including the C5 was later revised (Douglas 2014; Douglas *et al*. 2014) and thus requires further investigation to evaluate the new items for its predictive reliability.

The BVC and DASA are structured with strong predictive validity within 24 hours, and have been recommended for short-term psychiatric units (Bjorkdahl *et al*. 2006; Daffern 2007). While these tools were developed for and evaluated within psychiatric inpatients settings, they have potential to aid prediction of imminent violence in general acute care facilities. As reported in the reviewed studies, the BVC and DASA are easy to administer by ward nurses and take approximately five minutes to complete (Daffern *et al*. 2009). The BVC and DASA comprise risk items that are dynamic and therefore can capture fluctuations in the patient's mental state. These risk items are indicative of a patient's present state, not past behaviours, and so ward nurses are not required to know about the history of a patient. The risk information that the tools provide can be used for communication between health care staff for treatment planning and risk management. As such, both the BVC and DASA have potential to use in medical surgical care settings, however they need to be evaluated in acute care hospitals.

There are only two risk assessment tools, the M55 and ABRAT, which were specifically developed for medical-surgical acute care units to predict inpatient violence within a 24 hour

period. Despite the potential benefits of their simplicity, both tools are compromised by their inclusion of patients' history of violence, which may require patient file reviews to some extent by the ward nurses. The STAMP, which is the only tool developed to measure violence in emergency departments and has been recommended by researchers (Calow *et al*. 2016; Pich *et al*. 2010), is still a foundational work in the early identification of violent behaviour. These tools requires to be evaluated for predictive validity and reliability in general acute care facilities.

LIMITATIONS

Rigorous methods were undertaken for this review including an exhaustive and robust literature search. However, there are some limitations. The limitation of this integrative review is associated with inclusion of experimental and non-experimental research studies which might lead to the lack of objective data. The search might also have excluded relevant non-English research studies. The practical utility of the risk assessment tools was referred to as simplicity of the tool and was not determined by a valid instrument or a statistical test. Tools in acute health may need to consider other contributing factors such as different types of risk items (e.g. pain or acquired brain injury) which are not necessarily covered by the tools examined. The absence of a valid practical utility instrument might results in subjective observations and recommendation by the reviewers. While the included studies were evaluated in consultations between the reviewers to minimize bias, utilising approved assessment checklists for various research designs could further improve the quality of research evidence and strengthen the paper. Similarly, the use of a valid data extraction matrix could have enhanced the rigour of data extraction and data analysis. All of the reviewers examined the presentation of findings and conclusion thoroughly, yet the conclusions drawn from the research evidence can still be subjective.

CONCLUSION

This review examined current evidence for predicting violence in acute-care hospitals. The main focus of the review was on the predictive accuracy and practical utility of these tools in general acute care facilities. This results of this review shows that there is no single, user-friendly, standardised and evidence-based tool available for predicting violence in general acute care hospitals. The BVC and DASA which were found to be accurate in assessing violence in psychiatric inpatients and have potential for use in general acute care, require further testing to assess their validity and reliability in acute-care hospitals. The M55, ABRAT and STAMP/EDAR which were developed particularly for general acute and emergency departments also need to be thoroughly evaluated to establish their accuracy and reliability before administering for regular use.

RELEVANCE FOR CLINICAL PRACTICE

Assessing patient violence is essential for the safety of staff, patients and their families in acute medical-surgical hospitals. Nurses are the prime victim for patient violence in acute care. The use of an accurate and reliable risk assessment tool which can be administered by nurses with no specialized knowledge and expertise in their busy schedule can be an effective way of reducing patient violence and therefore improve nurse safety.

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