

## Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Code Strong Screening Instrument Validity/Reliability

### Specific Care Question

Are there instruments that are valid and reliable in identifying patients who may escalate into a violent act against themselves or others?

### Recommendations Based on Current Literature (Best Evidence) Only

A strong recommendation is made for the use of the Brøset Violence Checklist, based on review of current literature by the Department of EBP. The overall certainty in the evidence is very low. The Brøset Violence Checklist (BVC) was tested within the criminal justice system for reliability and validity. The Public Services Health and Safety Association of Toronto, Canada adapted and adopted the BVC for use in Emergency Departments (Public Services Health & Safety Association, 2010). After adapting the BVC screening instrument the Public Services Health and Safety Association (2010) retitled the instrument to *Violence/Aggression Assessment Checklist (VAAC)*.

When there is a lack of scientific evidence, standard work should be developed, implemented, and monitored.

### Literature Summary

**Background.** The National Institute for Occupational Safety and Health (NIOSH) defines workplace violence as any “violent acts (including physical assaults and threats of assaults) directed toward persons at work or on duty” (NIOSH, 2014, What is workplace violence?). Healthcare workers are at an increased risk for workplace violence. Between 2002 through 2013, the incidence of serious workplace violence, on average, has been 4 times higher within the healthcare and social assistance sector than the other four reported sectors: construction, private industry, retail trade, and manufacturing (United States Department of Labor, n. d.). Nonfatal cases involving days away from work, for healthcare practitioners and technical occupations, due to intentional injury by another person between 2011 and 2018 has steadily increased from 24.2 per 10,000 full-time workers to 30.5, respectively (United States Department of Labor, 2019).

Based on the Occupational Safety and Health Administration (OSHA) law, all employees have the right to feel safe at work (United States Department of Labor, n. d.). A majority of the literature findings focused on increasing the safety of employees within the criminal justice arena. This review will summarize identified literature to answer the specific care question regarding the identification of valid and reliable instruments to identify patients, in an acute care setting, at risk to escalate into a violent act against themselves or others.

**Study characteristics.** The search for suitable studies was completed on October 31, 2019. C. Spain, MSW, MBA, LCSW, LSCSW and A. Moog, LSCSW, LCSW, ACM-SW reviewed the 29 titles and/or abstracts found in the search and identified 14 single studies believed to answer the question. After an in-depth review of these identified articles, along with 21 articles identified from the ancestry search, one study answered the question. Almvik, Woods, and Rasmussen (2000) is a psychometric study reporting sensitivity/specificity and interrater reliability for the BVC (see Figure 1).

### Summary by Outcome

**Instrument Validity/Reliability.** One study (Almvik et al., 2000) reported psychometric properties for the BVC. Almvik et al. (2000) reported the sensitivity, sensitivity, and interrater reliability of the BVC. The BVC was developed for use in the criminal justice system. In 2010, the BVC was adapted for use in Emergency Departments (ED) by the Public Services Health and Safety Association of Toronto, Canada (Public Services Health & Safety Association, 2010); however, the validity and reliability of the checklist within the ED environment has not been reported. The Public Services Health & Safety Association (2010) adapted screening instrument was retitled to *Violence/Aggression Assessment Checklist (VAAC)*. In testing the BVC, if two or more patient behaviors were assessed to be present the BVC was 63% accurate in predicting that the patient will exhibit violence within the next 24 hours and 92% accurate in predicting that violence will not be exhibited by the patient in the next 24 hours. Interrater reliability was reported with a  $\kappa$  score of 0.44. Based on Cohen’s work on reliability statistics, this instrument when used with more than one assessor, is found to have moderate agreement between assessors (McHugh, 2012).

**Certainty of the evidence for instrument validity/reliability.** The certainty of the body of evidence was very low based on four factors: within-study risk of bias, directness of evidence, precision of effect estimates and consistency among studies. The body of evidence was assessed to have very serious imprecision and very serious indirectness. The study was assessed to have very serious imprecision as the study had only 109 study participants. In addition, the study had very serious indirectness as only 2% of the study population was less than 20 years of age and all of the

## Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Code Strong Screening Instrument Validity/Reliability

participants were admitted to an inpatient psychiatric hospital and not a medical-surgical unit. As only one study (Almvik et al., 2000) was identified to answer this question, consistency could not be assessed.

### Identification of Studies

#### Search Strategy and Results (see Figure 1)

PubMed:

((("Surveys and Questionnaires"[Mesh]) OR ( "Surveys and Questionnaires/instrumentation"[Mesh] OR "Surveys and Questionnaires/methods"[Mesh] OR "Surveys and Questionnaires/nursing"[Mesh] OR "Surveys and Questionnaires/psychology"[Mesh] ))) AND (violence[ti] AND aggression[ti]); Yield  $n = 8$

Additional records identified through other sources  $n = 28$

#### Studies Included in this Review

Citation	Study Type
Almvik et al. (2000)	Psychometric instrument validation reporting sensitivity/specificity and interrater reliability

#### Studies Not Included in this Review with Exclusion Rationale

Citation	Reason for exclusion
Abderhalden et al. (2006)	Addition of Visual Analog Scale did not improve the BVC
American Organization of Nurse Executives and Emergency Nurses Association (2015)	A validated instrument to identify patients at risk for escalation in violent behavioral changes was not identified within this document
Barzman et al. (2011)	Cronbach's $\alpha$ and receiver operating curve statistics measured internal consistency of the instrument however the reliability and validity of the instrument were not reported
Chapman, Perry, Styles, and Combs (2009)	Exploratory research to describe factors that identify patients at risk for escalation in violent behavioral changes
Chu, Thomas, Daffern, and Ogloff (2013)	Study population differed from CM ED population with the study population having at least 7 days of inpatient stay following a week of observation
Claudius, Desai, Davis, and Henderson (2017)	Descriptive study to identify patient-level risk factors, an instrument was not validated
Cook et al. (2018)	HARM-FV was developed to guide the discussion of risk within an inpatient minimum or medium secure forensic unit with an average length of stay of 50.734 months
Dolan, Fullam, Logan, and Davies (2008)	Study population differed from CM ED population with the study setting being a medium secure forensic unit with participants having a length of stay greater than 6 months
Fisher (2016)	Narrative review
Ghosh et al. (2019)	Iterative review
Hoff and Rosenbaum (1994)	Measured victimization rather than identify patients at risk for escalation in violent behavioral changes
Kling et al. (2006)	Sensitivity/specificity reported; however, a positive M55 was not used to calculate the values rather a positive incident report of aggression was used
Luck, Jackson, and Usher (2007)	Framework only, instrument development with scoring procedure is yet to be developed
McNiell and Binder (1995)	Instrument (Brief Psychiatric Rating Scale) implementation involved a joint 18-minute interview between the patient and two clinicians
Menger, Spruit, van Est, Nap, and Scheepers (2019)	Use of EHR data modeled only, actualization of this model has not occurred

## Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Code Strong Screening Instrument Validity/Reliability

Nordstrom et al. (2012)	The article is one of a set of articles to address Best practices in the Evaluation and Treatment of Agitation in the emergency setting (Project BETA); however, it refers to the Behavioral Activity Rating Scale (BARS) scale but does not provide psychometric analysis of the scale.
Roaldset, Hartvig, and Bjorkly (2011)	V-Risk-10 is a prognostic tool developed to screen pts for violence after discharge from acute psychiatric wards
Swift, Harrigan, Cappelleri, Kramer, and Chandler (2002)	The study measures the therapeutic effects of IM ziprasidone and related drugs in clinical trials
Vogel (2016)	The study did not provide validation/reliability statistics
Wong, Gordon, and Law (2006)	The instrument, Violence Risk Scale, assesses 6 static and 20 dynamic variables to predict the reoccurrence of violent behavior in criminal offenders
Woods and Almvik (2002)	Reiterated the same findings reported in Almvik et al. (2000)

### Methods Used for Appraisal and Synthesis

<sup>a</sup>Rayyan is a web-based software used for the initial screening of titles and / or abstracts for this analysis (Ouzzani, Hammady, Fedorowicz & Elmagarmid, 2017).

<sup>b</sup>Review Manager (Higgins & Green, 2011) is a Cochrane Collaborative computer program used to assess the study characteristics as well as the risk of bias and create the forest plots found in this analysis.

<sup>c</sup>The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram depicts the process in which literature is searched, screened, and eligibility criteria is applied (Moher, Liberati, Tetzlaff, & Altman, 2009).

<sup>a</sup>Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic Reviews*, 5(1), 210. doi:10.1186/s13643-016-0384-4

<sup>b</sup>Higgins, J. P. T., & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions [updated March 2011]* (Version 5.1.0 ed.): The Cochrane Collaboration, 2011.

<sup>c</sup>Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097 **For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).**

### Question Originator

A. Moog, LCSW, LCSW, ACM-SW

### Medical Librarian Responsible for the Search Strategy

K. Dayani, MLS, AHIP

### EBP Team Member Responsible for Analyzing, Reviewing, Synthesizing, and Developing this Document

J. A. Bartlett, PhD, RN

### Acronyms Used in this Document

Acronym	Explanation
BVC	Brøset Violence Checklist
EBP	Evidence Based Practice
ED	Emergency Department
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration

### Date Developed/Updated

12/2019

Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability

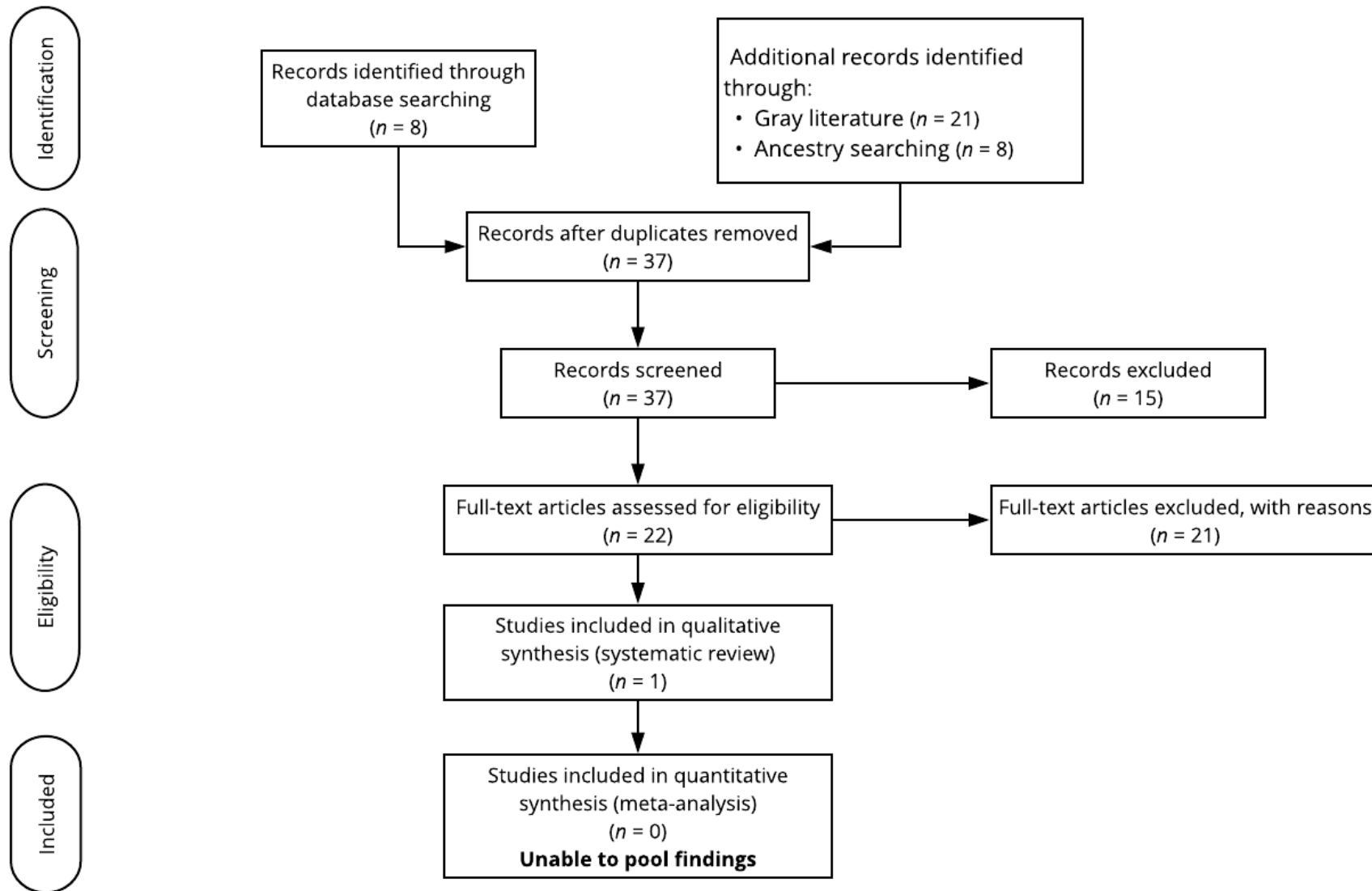


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>c</sup>

*Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability*

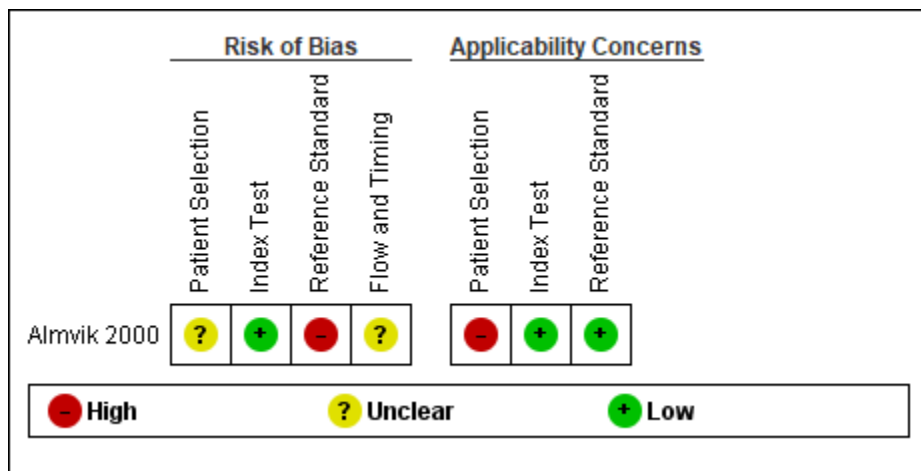


Figure 2. Risk of Bias Summary

**Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability**

**Meta-analysis**

Characteristics of Predictive Study

**Almvik et al. (2000)**

<i>Characteristics of Study</i>	
<b>Patient Selection</b>	
<b>A. Risk of Bias</b>	
<b>Patient Sampling</b>	All patients admitted to psychiatric hospitals within a 2-month period in the Spring, 1997.
<b>Was a consecutive or random sample of patients enrolled?</b>	Yes
<b>Was a case-control design avoided?</b>	Yes
<b>Did the study avoid inappropriate exclusions?</b>	Yes
<b>Could the selection of patients have introduced bias?</b>	Unclear risk
<b>B. Concerns regarding applicability</b>	
<b>Patient characteristics and setting</b>	<p>Patients (<math>N = 109</math>) admitted to four acute wards at the psychiatric hospitals.</p> <p>Gender</p> <ul style="list-style-type: none"> <li>• Male: <math>n = 52</math></li> <li>• Female: <math>n = 57</math></li> </ul> <p>Age in years</p> <ul style="list-style-type: none"> <li>• <math>&lt; 20</math>: <math>n = 2</math></li> <li>• 20 to 30: <math>n = 23</math></li> <li>• 31 to 40: <math>n = 36</math></li> <li>• 41 to 50: <math>n = 22</math></li> <li>• <math>&gt; 50</math>: <math>n = 26</math></li> </ul>
<b>Are there concerns that the included patients and setting do not match the review question?</b>	High concern
<b>Index test</b>	
<b>Index test</b>	Brøset Violence Checklist
<b>A. Risk of Bias</b>	
<b>Were the index test results interpreted without knowledge of the results of the reference standard?</b>	Yes
<b>If a threshold was used, was it pre-specified?</b>	Yes
<b>Could the conduct or interpretation of the index test have introduced bias?</b>	Low risk
<b>B. Concerns regarding applicability</b>	
<b>Are there concerns that the index test, its conduct, or interpretation differ from the review question?</b>	Low concern

*Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability*

<b>Reference Standard</b>	
<b>A. Risk of Bias</b>	
Target condition and reference standard(s)	Incident-report form
Is the reference standards likely to correctly classify the target condition?	Yes
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes
Could the reference standard, its conduct, or its interpretation have introduced bias?	High risk
<b>B. Concerns regarding applicability</b>	
Are there concerns that the target condition as defined by the reference standard does not match the question?	Low concern
<b>Flow and Timing</b>	
<b>A. Risk of Bias</b>	
Flow and timing	Brøset Violence Checklist completed within 2.5 hours after the beginning of each nursing shift by each of the patient's assigned nurses Incident-report form reported to typically record between 87 and 98% of incidents that actually occurred
Was there an appropriate interval between index test and reference standard?	Yes
Did all patients receive the same reference standard?	Unclear
Were all patients included in the analysis?	No
Could the patient flow have introduced bias?	Unclear risk

*Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability*

<b>Study notes</b>	<p>Receiver Operating Characteristics (ROC) Area Under the Curve (for a cutoff of 2) was 0.82 (<math>SE = 0.04</math>), with a 95% CI of 0.75 to 0.89. See additional tables. The BVC is 63% accurate in predicting that the patient will exhibit violence within the next 24 hours and 92% accurate in predicting that violence will not be exhibited by the patient in the next 24 hours. Interrater reliability was tested using two methods: Kappa and Percent of exact rater agreement</p> <ul style="list-style-type: none"><li>• Kappa value for the entire BVC score was 0.44 (moderate agreement cite McHugh 2012)</li><li>• Kappa values for the six distinct items:<ul style="list-style-type: none"><li>○ Confusion = 0.91 (almost perfect agreement)</li><li>○ Irritability = 0.68 (substantial agreement)</li><li>○ Boisterousness = 0.61 (substantial agreement)</li><li>○ Verbal threats = 0.48 (moderate agreement)</li><li>○ Physical threats = 0.66 (substantial agreement)</li><li>○ Attacks on objects = 1.00 (perfect agreement)</li></ul></li><li>• Percent of exact rater agreement<ul style="list-style-type: none"><li>○ Confusion = 97%</li><li>○ Irritability = 90%</li><li>○ Boisterousness = 90%</li><li>○ Verbal threats = 95%</li><li>○ Physical threats = 97%</li><li>○ Attacks on objects = 100%</li></ul></li></ul>
--------------------	--



## Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Code Strong Screening Instrument Validity/Reliability

### References

- Abderhalden, C., Needham, I., Dassen, T., Halfens, R., Haug, H. J., & Fischer, J. (2006). Predicting inpatient violence using an extended version of the Broset-Violence-Checklist: instrument development and clinical application. *BMC Psychiatry*, 6, 17. doi:10.1186/1471-244X-6-17
- Almvik, R., Woods, P., & Rasmussen, K. J. J. o. i. v. (2000). The Brøset Violence Checklist: Sensitivity, specificity, and interrater reliability. *15(12)*, 1284-1296.
- American Organization of Nurse Executives, & Emergency Nurses Association. (2015). Toolkit for Mitigating Violence in the Workplace. Retrieved from [https://www.calhospital.org/sites/main/files/file-attachments/aone\\_ena\\_toolkit.pdf](https://www.calhospital.org/sites/main/files/file-attachments/aone_ena_toolkit.pdf)
- Barzman, D. H., Brackenbury, L., Sonnier, L., Schnell, B., Cassidy, A., Salisbury, S., . . . Mossman, D. (2011). Brief Rating of Aggression by Children and Adolescents (BRACHA): development of a tool for assessing risk of inpatients' aggressive behavior. *J Am Acad Psychiatry Law*, 39(2), 170-179.
- Chapman, R., Perry, L., Styles, I., & Combs, S. (2009). Predicting patient aggression against nurses in all hospital areas. *Br J Nurs*, 18(8), 476, 478-483. doi:10.12968/bjon.2009.18.8.41810
- Chu, C. M., Thomas, S. D., Daffern, M., & Ogloff, J. R. (2013). Should clinicians use average or peak scores on a dynamic risk-assessment measure to most accurately predict inpatient aggression? *Int J Ment Health Nurs*, 22(6), 493-499. doi:10.1111/j.1447-0349.2012.00846.x
- Claudius, I. A., Desai, S., Davis, E., & Henderson, S. (2017). Case-controlled Analysis of Patient-based Risk Factors for Assault in the Healthcare Workplace. *West J Emerg Med*, 18(6), 1153-1158. doi:10.5811/westjem.2017.7.34845
- Cook, A. N., Moulden, H. M., Mamak, M., Lalani, S., Messina, K., & Chaimowitz, G. (2018). Validating the Hamilton Anatomy of Risk Management-Forensic Version and the Aggressive Incidents Scale. *Assessment*, 25(4), 432-445. doi:10.1177/1073191116653828
- Dolan, M., Fullam, R., Logan, C., & Davies, G. (2008). The Violence Risk Scale Second Edition (VRS-2) as a predictor of institutional violence in a British forensic inpatient sample. *Psychiatry Res*, 158(1), 55-65. doi:10.1016/j.psychres.2006.08.014
- Fisher, K. (2016). Inpatient Violence. *Psychiatr Clin North Am*, 39(4), 567-577. doi:10.1016/j.psc.2016.07.005
- Ghosh, M., Twigg, D., Kutzer, Y., Towell-Barnard, A., De Jong, G., & Dodds, M. (2019). The validity and utility of violence risk assessment tools to predict patient violence in acute care settings: An integrative literature review. *Int J Ment Health Nurs*, 28(6), 1248-1267. doi:10.1111/inm.12645
- Hoff, L. A., & Rosenbaum, L. (1994). A victimization assessment tool: instrument development and clinical implications. *J Adv Nurs*, 20(4), 627-634. doi:10.1046/j.1365-2648.1994.20040627.x
- Kling, R., Corbiere, M., Milord, R., Morrison, J. G., Craib, K., Yassi, A., . . . Saunders, S. (2006). Use of a violence risk assessment tool in an acute care hospital: effectiveness in identifying violent patients. *AAOHN J*, 54(11), 481-487. doi:10.1177/216507990605401102
- Luck, L., Jackson, D., & Usher, K. (2007). STAMP: components of observable behaviour that indicate potential for patient violence in emergency departments. *J Adv Nurs*, 59(1), 11-19. doi:10.1111/j.1365-2648.2007.04308.x
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia medica*, 22(3), 276–282.
- McNiel, D. E., & Binder, R. L. (1995). Correlates of accuracy in the assessment of psychiatric inpatients' risk of violence. *Am J Psychiatry*, 152(6), 901-906. doi:10.1176/ajp.152.6.901
- Menger, V., Spruit, M., van Est, R., Nap, E., & Scheepers, F. (2019). Machine Learning Approach to Inpatient Violence Risk Assessment Using Routinely Collected Clinical Notes in Electronic Health Records. *JAMA Netw Open*, 2(7), e196709. doi:10.1001/jamanetworkopen.2019.6709
- Nordstrom, K., Zun, L. S., Wilson, M. P., Stiebel, V., Ng, A. T., Bregman, B., & Anderson, E. L. (2012). Medical evaluation and triage of the agitated patient: consensus statement of the american association for emergency psychiatry project Beta medical evaluation workgroup. *West J Emerg Med*, 13(1), 3-10. doi:10.5811/westjem.2011.9.6863
- Public Services Health & Safety Association. (2010). Completing the Violence/Aggression Assessment Checklist (VAAC) for Emergency Departmentnets (ED) or Emergency Medical Services (EMS). Retrieved from <https://terraform-20180423174453746800000001.s3.amazonaws.com/attachments/cjiisgqgl00dwxj77htr2wej-vaacetool-instruction.pdf>
- Roadset, J. O., Hartvig, P., & Bjorkly, S. (2011). V-RISK-10: validation of a screen for risk of violence after discharge from acute psychiatry. *Eur Psychiatry*, 26(2), 85-91. doi:10.1016/j.eurpsy.2010.04.002

***Office of Evidence Based Practice (EBP) – Critically Appraised Topic:  
Code Strong Screening Instrument Validity/Reliability***

- Swift, R. H., Harrigan, E. P., Cappelleri, J. C., Kramer, D., & Chandler, L. P. (2002). Validation of the behavioural activity rating scale (BARS): a novel measure of activity in agitated patients. *J Psychiatr Res*, *36*(2), 87-95. doi:10.1016/s0022-3956(01)00052-8
- United States Department of Labor. (2019). Databases, Tables & Calculators by Subject. Retrieved from <https://data.bls.gov/pdq/SurveyOutputServlet>
- United States Department of Labor. (n. d.). *Workplace violence in healthcare: Understanding the challenge*. (3826). Retrieved from <https://www.osha.gov/Publications/OSHA3826.pdf>
- Vogel, L. (2016). New tool evaluates risk of patient aggression. *CMAJ*, *188*(10), E200. doi:10.1503/cmaj.109-5276
- Wong, S. C., Gordon, A. J. P., Public Policy, & Law. (2006). The validity and reliability of the Violence Risk Scale: A treatment-friendly violence risk assessment tool. *12*(3), 279.
- Woods, P., & Almvik, R. J. A. P. S. (2002). The Brøset violence checklist (BVC). *106*, 103-105.