Utilization of the Broset Violence Checklist for Early Identification of Aggressive and Violent Behavior to Improve Unit Safety: A Quality Improvement Initiative

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Utilization of the Broset Violence Checklist for Early Identification of Aggressive and Violent Behavior to Improve Unit Safety: A Quality Improvement Initiative

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July 23, 2023
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Abstract

BACKGROUND:
There continues to be an increase in workplace violence nationally in the healthcare setting which jeopardizes patient and staff safety. Liu et al. (2019) found about 59% of health care workers experience workplace violence. Kafle et al. (2022) emphasizes the link between workplace violence and increased levels of nurse burnout and therefore decreased job satisfaction.

LOCAL PROBLEM:
The microsystem assessment revealed that there was no risk assessment tool to identifying early aggressive or violent patient behavior.

METHODS:
The Plan-Do-Study-Act (PDSA) framework was used for this quality improvement project to reduce workplace violence on this unit.

INTERVENTIONS:
After completion of an informal pre-intervention survey, it was found staff believed current processes were not effective at reducing aggressive or violent patient behavior. The effectiveness of the BVC was studied using percentage of nurse adherence rates to BVC completion and number of code greys on the unit.

RESULTS:
Prior to implementation of the BVC, the average number of code greys from months January through May were 10.2. Nurse adherence rate to completion of the BVC ranged from 5% to 10% through the four weeks of data collection. The number of code greys for the month of June on the Medical Oncology unit was five. A one sample t-test determined this decrease was insignificant (p=0.2098).

CONCLUSIONS:
Increased education, awareness, and buy-in from nursing staff and key stakeholders on completion of the BVC is needed to consistently decrease violent and aggressive patient behavior.

Key Words: Broset Violence Checklist, BVC, staff safety, patient safety, risk assessment tool, aggressive behavior, violent behavior, quality improvement
Introduction

Problem Description

Workplace violence continues to be prevalent within the health care setting. Today, there is a mindset that workplace violence, especially within the hospital setting, is just considered to be “a part of the job”. In North America specifically, Liu et al. (2019) conducted a systematic review and found on average about 59% of health care workers experience workplace violence. The most common type of workplace violence reported was verbal abuse (Liu et al., 2019). According to Kafle et al. (2022), workplace violence is linked to increased levels of nurse burnout and decreased job satisfaction among nurses and other health care professionals. Kafle et al. (2022) also assessed data from numerous articles that studied workplace violence as it related specifically to nurses and found that the percent of nurses affected was between 8% and 38%.

A decrease in workplace violence begins with early intervention of potential aggressive behaviors by patients. Early interventions can help decrease potentially violent or aggressive behaviors which puts both staff and patients’ safety at risk (Wong et al., 2022). The aim is to find an instrument that can identify aggressive and violent behavior early so proper interventions can be taken to de-escalate the behavior before it leads to violence. Numerous instruments are currently used in healthcare settings to identify potentially violent or aggressive behaviors early. Common risk assessment tools include Violence Risk Screening-10, Violence Assessment Tool, and Dynamic Appraisal of Situational Aggression. However, using a standardized scale that can be applicable to all healthcare settings is ideal. Specifically, according to Sarver et al. (2019), the Broset Violence Checklist (BVC) has been effective at both increasing the rate of early interventions and decreasing the prevalence of workplace violence. The proposed violence risk assessment is the Broset Violence Checklist.
Available Knowledge

Search Methods

A review of the literature was conducted to determine the effectiveness, reliability, and validity of the Broset Violence Checklist on a Medical Oncology Unit in the early identification of potentially violent or aggressive behavior. The databases CINAHL, PubMed, and ScienceDirect were utilized with Boolean Term "Broset Violence Checklist". Combined, the three databases identified a total of 28 articles. Only recent articles from 2018 through 2023 were included in this literature review. Nineteen articles were excluded due to language other than English, lack of relevance to this quality improvement project, duplicate articles, or full text unavailable. All geographic locations were included in this literature review. No sample populations were excluded in this literature review. The nine remaining articles were included in this literature review. Appendix B shows the complete PRISMA flow chart of the literature search conducted.

Critical Appraisal of Evidence

Sarver et al. (2019) conducted a retrospective cohort study to determine if there was a relationship between Broset Violence Checklist (BVC) scores and the incidence of violence in an acute psychiatric unit. According to Sarver et al. (2019), patients with higher BVC scores needed higher-level interventions such as initiating a violence nursing care plan (p = 0.023), forced medication administration (p = 0.001), and seclusion (p = 0.022). The violence occurred most often on Day 1 and Day 3 of patients' hospitalization. Verbal aggression was the most common type of violence displayed by patients. The BVC was shown to be effective at recognizing patients who were at risk for exhibiting violent behaviors (p < 0.0001) and therefore required higher-level interventions and had a longer length of stay (p = 0.0176). One limitation of this
study was that it only established the relationship between BVC scores and violent behavior but rather did not establish if the BVC reduced violent behavior after implementation.

A systematic review by Anderson & Jenson (2019) evaluated which violence risk-assessment screening tools could be applied to an acute mental health setting. Anderson & Jenson (2019) further compared four violence risk assessment tools, including the Broset Violence Checklist (BVC), Short-term Assessment of Risk and Treatability (START), Dynamic Appraisal of Situational Aggression-Inpatient Version (DASA-IV), and Violence Risk Screening-10 (V-RISK-10). When analyzing the BVC, Anderson & Jenson (2019) found it was effective at predicting violence within 72 hours of admission. In addition, when analyzing two studies Anderson & Jenson (2019) found high area under the curve (AUC) (0.93 and 0.85), high specificity (96.8% and 96.2%), and high negative predictive value (NPV) (99.5% and 98.0%). These two studies had low sensitivity (58.8% and 62.8%), however, limitations in both studies stated this was due to interventions implemented for patients identified as high risk for demonstrating violent behaviors. The V-RISK-10 also had similarly high AUC and high specificity; however, it uses historical information that is not always available upon admission.

A systematic review by Sammut et al. (2022) evaluated numerous violence risk assessment tools in the emergency care setting. The tools included the Violence Assessment Tool (VAT), Queensland Occupational Violence Patient Risk Assessment (QOVPRAO), Emergent Documentation Aggression Rating Tool (EDART), and Dynamic Appraisal of Situational Aggression (DASA). Sammut et al. (2022) found numerous screening tools effective at reducing violence but concluded that more research needs to be done to determine which is most effective.

When specifically analyzing the BVC, Senz et al. (2021), as cited in Sammut et al. (2022), was the first emergency department to implement the BVC for early recognition of
aggression and violence in patients. This correlational study evaluates the number of code greys before and after implementation of the BVC along with staff education related to early identification for risk of violence. Nursing and medical staff underwent education on using the Broset Checklist and its importance to reduce workplace violence. After educating the staff, documentation of the BVC went from 30% to 82%. Senz et al. (2021) separated code greys into planned and emergency responses. Planned code greys were aimed at early intervention in response to a potential incident while emergency code greys were in progress of an incident. Senz et al. (2021) showed a significant decrease in the number of emergency code greys (p=0.001) and a significant increase in planned code greys (p=<0.001). The purpose of planned code greys was to initiate a security presence as an early intervention before the patient becomes physically violent. Therefore, Senz et al. (2021) found the BVC improved staff perspective of using security resources and improved awareness of early aggressive behaviors that could escalate further allowing staff to be more proactive about initiating early interventions. After implementation of the BVC, the occupational health and risk rating of this hospital has been reduced to “moderate risk” from “extreme risk” (Senz et al., 2021). One possible limitation is that a different setting may have a different threshold for activating a code grey and calling security.

Lockersten et al. (2021) conducted a quasi-experimental study to examine the implementation of the BVC in an acute inpatient psychiatric setting and determined if the BVC can detect imminent violence; both threats and physical violence. Results showed after a BVC score of 3, there was a significantly higher percentage of patients who were imminently violent for both males (p=0.001; AUC = 0.75) and females (p=0.001; AUC = 0.79). According to Lockersten et al. (2021), patients scoring BVC of 3 or higher had high specificity (96%), low
positive predictive value (PPV) (10%), and high NPV (99.3%). Lockersten et al. (2021) found patients who were reported as irritability, boisterousness, or attacks on objects were strongly associated with imminent violence. Overall, high BVC scores were found to be effective at identifying imminent violence; both imminent threats and physical violence in both males and females. One limitation is that when early interventions are implemented and effective, they can result in decreased predictive validity of the study.

Hvidhjelm et al. (2022) conducted a meta-analysis of fifteen studies between 2000 and 2021 on the use of the BVC in numerous settings including emergency department and inpatient settings. The BVC has been slightly adapted in numerous studies depending on the specific country, however, each is implemented with the purpose to minimize violence. According to Hvidhjelm et al. (2022), all ten studies have a high AUC score (ranging from 0.69 to 0.98) which shows the high predictive validity of the BVC. This study emphasizes the importance of educating nurses prior to the implementation of the BVC. In addition, numerous studies in this meta-analysis show how the BVC can be easily implemented as it is inexpensive, user-friendly, and requires little time to complete.

Moursel et al. (2018) assessed the validity and reliability of the BVC in a psychiatric setting. This study found the BVC was effective at identifying violent behavior within the first 24 hours (p = 0.001) as the AUC was between 0.700 and 0.800. Moursel et al. (2018) found patients’ BVC scores were significantly highest on the day they were admitted (p = 0.001) and continued to decrease with each day. When a BVC score of 2 was used as the cut off for identifying aggressive behavior, patients had a specificity score of 1.00 during admission day through day three. In addition, Moursel et al. (2018) determined patients were more likely to exhibit aggressive or violent behavior on day shift in comparison to night shift. One limitation of
this study was that it only analyzed a patient through the first three days of their stay. More data needs to be collected to determine if a patient's BVC score continues to decrease after day three.

Ramesh et al. (2018) conducted a systematic review and meta-analysis using numerous risk assessment tools for both short-term and long-term use. Nineteen publications analyzed nine different risk assessment tools including Broset Violence Checklist (BVC), Classification of Violence Risk (COVR), Dynamic Appraisal of Situational Aggression (DASA), Level of Service Inventory-Revised (LSI-R), Psychopathy Checklist-Revised (PCL-R), Psychopathy Checklist Screening Version (PCL: SV), Violence Risk Appraisal Guide (VRAG), Violence Risk Screening-10 (V-RISK-10), and Violence Risk Scale (VRS). Ramesh et al. (2018) found the BVC and DASA were most effective at determining the likelihood of violence in a 24-hour period. The BVC and DASA had the highest average AUC of 0.83 meaning the research was highly accurate. One limitation Ramesh et al. (2018) found is the BVC is effective for short-term use as it is only accurate for the next 24 hours. Therefore, the BVC needs to be continually utilized at least every 24 hours for long-term accuracy.

In 2014, Best Practices in Evaluating and Treating Agitation (BETA) guidelines were adopted in hopes of standardizing the interventions used to reduce patient aggression. Brathovde (2021) determined if the addition of the BVC checklist improves BETA interventions implemented and improves nurses' attitudes towards the usage of violence risk tools. In this study, a BVC score of two was the cut-off and two BVC screenings were completed within the first 72 hours. Brathovde (2021) found that nurses with less than five years of experience have a significant positive change in attitude toward using risk assessment tools whereas nurses with more than five years’ experience did not have any significant difference.
Evidence Synthesis

Although the BVC has limited research on medical-surgical units, numerous studies support its effectiveness in emergency departments (Sammut et al., 2022; Senz et al., 2021) and acute psychiatric units (Lockersten et al., 2021; Moursel et al., 2019; Sarver et al., 2019). Sarver et al. (2021) state reasons for patient violence include "symptoms of mental illness, cognitive impairment, dementia, confusion, agitation, intoxication, and personality factors" (p. 477). Medical surgical units, and specifically this Medical Oncology unit, consist of a variety of patients including patients suffering from psychiatric, substance use, dementia, cognitive impairments, and delirium-related issues making the application of the BVC appropriate for this specific setting. Because of its high reliability and validity, the Broset Violence Checklist is the most appropriate violence risk assessment tool for a Medical Oncology unit in early identification of violent or aggressive behaviors in patients.

One possible limitation of BVC involves its sensitivity. Numerous studies show high specificity and high AUC when using this tool in multiple settings (Lockersten et al., 2021; Moursel et al., 2019) meaning this tool can correctly identify patients who are not at risk of violent behaviors and is effective at correctly identifying which patients are at risk for violent behaviors. However, both Lockertsen et al. (2021) & Moursel et al. (2019) had lower specificity scores of about 60% which determine the predictive validity, or ability of the tool to correctly identify patients at risk for violent behaviors. However, Hvidhjelm et al. (2023) completed a meta-analysis on the usability, implementation, and validity of the BVC and found the checklist has high predictive validity and clinical utility across numerous healthcare settings.

The Broset Violence Checklist is repeatedly classified as a short-term violence risk assessment tool. Brathovde (2021), Hvidhjelm et al. (2023), Lockersten et al. (2021), Moursel et
al. (2019), Ramesh et al. (2018), and Senz et al. (2021) found the BVC is an effective tool at predicting violent or aggressive behavior for the 24 hours following admission. Moursel et al. (2019) and Ramesh et al. (2018) emphasize the need for consistent completion of this checklist throughout the patients’ stay to maintain high reliability of the tool. Therefore, another limitation of this tool is that it is only effective for short-term use, unless continued completion occurs. Among differing studies, there are discrepancies as to which score is the cut-off for determining violent behavior. Lockersten et al. (2021) used a score of three as a cut-off to determine when early interventions would be needed. Moursel et al. (2018) used a score of two as the cut-off as to when early interventions were necessary. Both a cut-off of scoring a two and three on the checklist had high specificity scores. Appendix C, used by Senz et al. (2021), shows possible interventions that could be applied dependent on the score. A score of one to two can be considered a moderate risk for violence and preventative measures should be taken. A score of more than two can be considered a high risk of violence and more intense interventions may need to be taken (Senz et al., 2021).

Rationale

The Plan-Do-Study-Act (PDSA) cycle was used to rapidly implement, gather data, and analyze data for this quality improvement project. The PDSA cycle involved continuous cycles of implementing the BVC and readjusting these processes to fit this specific unit dependent on the results. Ideally, this intervention would have been implemented into the EMR, but due to time constraints, a physical paper copy was available to be filled out and placed in the patient’s chart. According to Connelly (2021), the PDSA cycle is effective in the health care setting because it allows for quick results using a small number of patients. Therefore, quick readjustments occurred to adapt the specific quality improvement project accordingly (Connelly,
2021). The Plan portion involved determining the specific population involved, gathering appropriate data, defining the specific aim, and identifying appropriate stakeholders. The Do portion of the PDSA cycle involved educating nurses on using the BVC, implementing the checklist, determining compliance of nurses in using checklist, and gathering the number of code greys occurring during a shift. The Study involved analyzing the gathered data to determine if this checklist is effective and identifying any possible patterns. Lastly, the Act portion included implementing any appropriate changes to improve usage of the BVC as well as disseminating key findings and determining next steps.

**Global Aim**

The global aim of this quality improvement project was to improve workplace violence on a Medical Oncology Unit in the Seacoast area by reducing the number of code greys on the unit.

**Specific Aim**

The specific aim of this quality improvement project was to have 85% completion of BVC upon admission of patients to the unit by June 30th, 2023. The process began with the completion of the BVC upon admission to the unit and ended with discharge of the patient. The goal was to have 75% completion of the BVC twice a day for all patients on the unit.

**Methods**

**Context**

Located in New Hampshire, this specific Medical Oncology unit is composed of 36 single occupancy rooms. This unit cares for patients with numerous medical diagnoses with the most prevalent being seizures, hip fractures, falls, pneumonia, metastatic cancer, alcohol or drug detoxification, altered mental status, stroke, cellulitis, and subdural hematoma. As noted
previously, reasons for patient violence include symptoms of mental illness, cognitive impairment, dementia, confusion, agitation, intoxication, and personality factors. Recently, night shift had had to activate the code grey response to deescalate an aggressive and potentially combative patient. With only two to three security guards staffed through the entire microsystem response times are not consistent or timely which puts staff at risk for workplace violence injury. When a code grey is called, multiple security officers and a staff member from BHU trained in restraint use respond which preoccupies both security and staff from other responsibilities throughout the hospital.

The vision statement at this hospital states, “we will be recognized as a healthcare leader in New England, providing advanced care in a safe, healing environment.” Currently on this Medical Oncology Unit, during one shift, five code greys were called on multiple patients. There are consistencies between this vision statement and the current processes. After gathering data from the security department, it was clear that a significant number of code greys in the hospital can be attributed to this specific unit. On the unit, data collected from security shows nine code greys called in January, twelve code greys called in February, six code greys in March, eleven code greys in April, and five code greys in May. Hospital wide, the Medical Oncology Unit was responsible for 17% of code greys in January, 32% in February, and 15% in March. Prior to this quality improvement project, there was no screening tool in place for early identification of potentially violent or aggressive patients on this unit.

A cost-benefit analysis was conducted to support the implementation of this quality improvement project. The number of specific workplace violence incidences occurring on this unit is unknown. According to the US Department of Labor (2019), about 55 million dollars in wages are lost a year because of workplace violence. To reduce the amount of code greys called
and increase early recognition of potentially violent or aggressive behaviors, the implementation of the BVC was proposed. The actual BVC is in the public domain and does not have additional cost to acquire. The cost of paper and ink for a paper version of the BVC was considered for when implementing this project.

**Interventions**

The BVC consists of six categories including *confusion, irritability, boisterousness, verbal threats, physical threats, and attacks on objects* (Appendix C). In each of these six categories, a patient was scored as zero, if the behavior is absent, or one, if the behavior was present. Ideal scoring was zero and a maximum score was six. A score of one to two indicated the patient was a moderate risk of violence and proposed certain early interventions should be implemented. A score of three or more indicated a very high risk of violence and immediate interventions should be implemented, specifically calling a code grey to deescalate the patient.

The checklist was supposed to predict the likelihood of violent or aggressive behavior for the next 24 hours. The primary nurse was responsible for completing this checklist during their shift for all patients. During the initial education, nurses were encouraged to complete the BVC more frequently in patients who had previously scored on the BVC.

Prior to implementation of the BVC, nurses were educated on the significance of completing the BVC to increase adherence among nursing staff (Moursel et al., 2018; Sarver et al., 2019; Senz et al., 2021). Senz et al. (2021) mandated nursing staff to participate in intensive education on the use of the BVC and education on its effectiveness at identifying early aggressive and violent patient behaviors. In this quality improvement project, nurses were educated on how to use the BVC to identify aggressive and violent behavior early. Nurses were educated both through email from the nurse manager and during an in-service at shift change. A
list of nursing interventions that can reduce aggressive and violent behavior were included and printed out (Appendix C), so nurses had options readily available if their patient scored on the BVC.

**Study of Interventions**

This quality improvement project focused on reduction of potential workplace violence incidence on this unit. The reduction in code greys on this Medical Oncology unit, once the intervention had been implemented, determined the effectiveness of the intervention. In addition, the completion of the BVC twice a day, once per nursing shift, was also be measured throughout the patient hospitalization. During education, nurses were encouraged to complete the BVC more than once for patients who were actively scoring on the BVC or had scored on the BVC in the past. Nurses used a printed-out paper copy of the BVC, which was continuously passed during shift hand off along with a paper copy of the patients’ report sheet. Percentage of completion of the BVC once a shift was measured through completion on BVC paper chart. An 85% completion of the BVC once per shift was the goal for June. Prior to this quality improvement project, the BVC was not utilized at all making it a 0% completion rate. Chart audits of patients’ paper charts were completed weekly through the month of June to determine if the BVC had been completed by the nursing staff.

An informal survey was conducted to determine the nurse’s knowledge of the violence checklist and their perception of violence prevalence on the unit. Most nurses had heard of the BVC but had never used it before when asked prior to education or implementation of this intervention. Many nurses felt that aggressive or violent patients were a problem on the unit when initially surveyed and that the current processes were not effective enough in reducing violent behavior.
Measures

The BVC was a quick and easy to use short term risk assessment tool that was educated to be completed by nurses once a shift to ensure potential aggressive or violent behaviors were identified. Operationalized definitions of each category on the BVC (Appendix C) included confused as “obviously confused and disoriented”, irritable as “easily annoyed or angered”, boisterous as “overly noisy, shouts, and slams doors”, physical threats as “threatening or intimidating stances and gestures”, verbal threats as “threatening or intimidating language”, and attacking as “kicking, hitting, throwing, or damaging objects”. Completion of the checklist should occur at least once during the day shift and once during night shift for continuous monitoring as the checklist only has validity and reliability for predicting violence within the 24 hours following admission ($p = 0.001$) (Moursel et al., 2018). Several researchers found the BVC was an effective tool at predicting violent or aggressive behavior for the next 24 hours and therefore frequently assessment is needed (Brathovde, 2021; Hvidhjelm et al., 2023; Lockersten et al., 2021; Moursel et al., 2019; Ramesh et al., 2018; Senz et al., 2021).

The most ideal violence risk assessment is not only quick and easy to use but can also be standardized to all healthcare settings (Moursel et al., 2018; Sarver et al., 2019). Nurses perceive that the BVC is useful because it is quick, effective, and easy to use (Brathovde, 2021; Hvidhjelm et al., 2022). Because of this, application of the BVC may be effective on a medical-surgical unit in the early identification of aggressive and violent behavior.

Hvidhjelm et al. (2023) completed a meta-analysis on the usability, implementation, and validity of the BVC and found the checklist has high predictive validity and clinical utility across numerous healthcare settings. Numerous studies show high specificity and high AUC when
using this tool in multiple settings (Lockersten et al., 2021; Moursel et al., 2019) meaning this tool can correctly identify patients who are not at risk of violent behaviors and is effective at correctly identifying which patients are at risk for violent behaviors.

This quality improvement project required buy-in from all nurses for its success. Nurses completed the BVC in order to be aware of potentially aggressive or violent behaviors to implement early interventions. The BVC was limited to identifying the behavior, and it was the nurse’s responsibility to implement the correct interventions for the specific situation. Dependent on the score a patient received, they required additional medication order places by physicians. Therefore, this required physicians to answer in a timely manner and order appropriate medications to reduce the likelihood of a code grey. Especially during day shift, nurses had conflicting priorities which took precedence over completion of this checklist which resulted in reduction of completion rates. Success of this project was defined as a reduction in the number of code greys on the unit compared to previous months.

**Analysis**

The number of code greys occurring on the Medical Oncology unit prior to implementation of the BVC had been collected for January, February, March, April, and May months. Number of code greys were collected for the month of June, once the tool had been implemented. A one sample t-test was used to determine if there was a statistical difference in comparison to the number of code greys prior to and after implementation of the BVC. The average number of code greys prior to implementation and after implementation will be compared through this test. The goal was to have a significant reduction in code greys once the BVC had been implemented. Throughout this quality improvement project, the number of code greys was continuously measured from pre-intervention through post-intervention making it
continuous data. Therefore, a one sample t-test was appropriate statistical test for this quality improvement project.

**Ethical Considerations**

There were no ethical considerations related to this quality improvement project. The project leader (PL), or Clinical Nurse Leader (CNL) student, conducting this quality improvement project had no formal position on this unit which reduces the risk of bias. The purpose of an informal survey being conducted both prior to and after the implementation of the BVC did not carry any risk of bias. This project was submitted through the University of New Hampshire Department of Nursing Quality Review Committee and was determined to be exempt from the Institutional Review Board (IRB).

**Results**

**Initial Steps of Intervention**

One week prior to the implementation phase, all staff were informed of the start date and timeline of this quality improvement project through an email. In addition, this email educated staff on proper usage of the BVC. Start date of this quality improvement project was June 1st, 2023. All staff present on the unit for the June 1st start date were also educated on proper usage of the BVC. Paper copies of the BVC were handed out and made accessible to staff. Throughout the month of June, the project leader (PL) ensured adequate paper copies of the BVC were available to the nursing staff. This quality improvement project required a month of data to properly assess if the BVC reduced code greys, so the end date was June 31st. Four PDSA cycles were completed during this timeline, once PDSA cycle was completed each week. The PL completed weekly auditing of patients charts to gain data on nursing adherence to the BVC. At
the end of the month, the number of code greys was collected from the security office. Figure 1 further explains the intervention timeline.

![Quality improvement project timeline for BVC implementation.](image)

**Figure 1.** Quality improvement project timeline for BVC implementation.

**Process Measures & Outcomes**

**Quantitative Data on Nurse Adherence Rates**

This quality improvement project used the Plan-Do-Study-Act (PDSA) framework to gain quick and continuous data regarding nurse adherence rates to completion of the BVC checklist. This first PDSA cycle, which started on June 1st, had very low engagement from nursing staff leading to low adherence rates of five percent nurse adherence rate. The project leader asked charge nurses to reiterate the importance of nurse adherence to the BVC prior to the start of the second PDSA cycle. During the second PDSA cycle, which started June 8th, there was an increase in potentially aggressive or violent patients in this microsystem resulting in an increase in nursing adherence to completion of the BVC. As a result, nurse adherence rate to the BVC rose to 10%. During the third PDSA cycle, which started June 14th, adherence rate remained around 10% with a high number of aggressive or violent patients still present in this microsystem. Lastly, during the fourth and last PDSA cycle, starting June 21st, nurse adherence
rate dropped back down to 5%. Figure 2 represents percentage of BVC checklist completion by nursing staff.

*Quantitative Data on Number of Code Greys*

**Figure 2.** Percentage of nurse adherence to completion of BVC checklist by nursing staff on Medical Oncology unit.

Prior to implementation of the BVC, the average number of code greys per month was 10.2 on the Medical Oncology unit between the months of January and May 2023. An average of these five months was used to analyze the data to reduce the likelihood for outliers and determine any pre-intervention trends. Figure 3 shows the average number of code greys in each specific month from January through May 2023, prior to implementation of this intervention.
Only code greys on the Medical Oncology unit were included as the quality improvement project was not implemented throughout the entire macrosystem, but rather just in this particular microsystem. Table 1 illustrates the descriptive statistics for number of code greys for the pre-intervention period.

<table>
<thead>
<tr>
<th>Mean</th>
<th>Standard Error</th>
<th>Standard Deviation</th>
<th>Sample Variance</th>
<th>Confidence Level (95%)</th>
<th>Pearson Correlation Coefficient (r)</th>
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<td>7.7</td>
<td>3.45</td>
<td>0.3989</td>
</tr>
</tbody>
</table>

*Table 1. Descriptive Statistics for Pre-Intervention average number of code greys.*

The Pearson Correlation Coefficient demonstrated a moderately strong increase in code greys prior to implementation of the BVC \((r = 0.3989)\). Therefore, there was a slight increase in the number of code greys prior to implementation of the BVC checklist. This data helps highlight supportive literature from Kafle et al. (2022) stating that aggressive and violent patient behavior is increasing across numerous hospital settings. This supports informal pre-intervention survey
from nurses that the current processes are not enough to reduce aggressive and violent patient behavior.

After implementation of the BVC, the average number of code greys on this Medical Oncology unit during the month of June was five. After conducting a one sample t test to compare pre-intervention to post-intervention, it was found the decrease in code greys was not statistically significant (p=0.2098). Therefore, the BVC did not significantly decrease the number of code greys on the unit.

**Contextual Elements & Observed Associations**

Pre-intervention data was collected over the span of five months and post-intervention data was collected for one month. Due to the nature of the rapid cycle PDSA framework, only one month of post-intervention data could be collected. Additional months may be necessary to improve external validity and reduce bias associated with this quality improvement project.

Completion of the BVC by the nursing staff was much lower than anticipated. The nurse adherence rate was about 10% at most when the specific aim was to have a nurse adherence rate of 75% by June 30th. Further research into why the adherence rate was so low and how to increase the adherence rate is important for future studies. One possible reason was the misconception among nursing staff that the BVC was only used for patients who had a history of exhibiting violent or aggressive behavior. During the second and third PDSA cycles, according to observations made by the charge nurses, there was an increase in violent or aggressive patients on the floor which may have contributed to an increase nurse adherence percentage. During the fourth and final PDSA cycle, the number of patients exhibiting aggressive and violent behavior decreased leading to a decrease in nurse adherence of the BVC.
Unintended Consequences

One potential consequence associated with this quality improvement project was the decreased emphasis on patient-centered care. This quality improvement project centered around the nursing staff and improving their ability to identify and therefore reduce patient aggressive or violent behavior. It is assumed nurses are already educated on early detection and early interventions needed to deescalate this behavior. The BVC only identifies patients at risk for exhibiting aggressive or violent behavior rather acting as an intervention to directly reduce the behavior. However, for the effectiveness of the BVC, nurses are responsible for implementing interventions to reduce this behavior. The success of this quality improvement project is contingent on the assumption that when nurses identify these behaviors they will intervene. Therefore, the number of code greys will only decrease if nurses successfully implement interventions, such as de-escalation techniques or medication administration.

The BVC is only effective as a short-term risk assessment tool. When done consistently once a shift, it has shown efficacy in numerous settings (Lockersten et al., 2021; Moursel et al., 2019; Sarver et al., 2019; Sammut et al., 2022; Senz et al., 2021). However, with a low nurse adherence rate to BVC completion, missed opportunities for early identification are noted. This can account for insignificant reduction in the number of code greys after implementation of the BVC.

Missing Data

Due to time constraints, a post intervention survey could not be sent out to gain data on nurse perspective regarding the BVC. The goal is for nursing staff to use a risk assessment tool they believe will help them identify early aggressive or violent behavior effectively. Future
research via survey can help better understand how the nurses feel about the usability, validity, and efficacy of the BVC in this specific clinical setting.

**Discussion**

**Summary**

**Key Findings**

The specific aim of this project included an 85% BVC completion rate upon admission, a 75% completion rate twice daily while in the microsystem, and a significant decrease in the number of code greys. Both data on nurse adherence to the BVC and the number of code greys in the month of June were gathered to assess BVC efficacy. Over the four-week period, the nurse adherence rate was lower than anticipated. At its highest, the nurse adherence rate to the BVC was 10%. Prior to implementation of the BVC, the average number of code greys from months January through May was 10.2 per month. After implementation of the BVC, there was five code greys in the month of June on the unit. After conducting a one sample t test, it was found the decrease in code greys between pre intervention and post intervention was not statistically significant (p = 0.2098).

**Relevance to Rationale**

Four PDSA cycles were conducted throughout this project. After the first PDSA cycle, there was low engagement from staff resulting in a 5% adherence rate to the BVC. As a result, the PL asked the charge nurses to reiterate usage of the BVC to nurses during shift change meetings. After the second PDSA cycle, there was a five percent increase in nurse adherence for a total of 10% completion rate. This is most likely due to the increase in aggressive or violent behaviors on the unit. The third PDSA cycle also had a 10% percent adherence rate. Lastly, the fourth PDSA cycle had a decreased nurse adherence rate of five percent. The use of the PDSA
cycle allowed for rapid data collection and therefore the ability to adjust the processes in hopes to increase nursing adherence rate and decrease the number of code greys.

**Relevance to Specific Aim**

The goal was to have an adherence rate of 75% by June 30\textsuperscript{th}, however the adherence rate was 10% at the highest. Therefore, the specific aim was not met for this quality improvement project. The original goal was to have the BVC used for all patients on the floor, however staff focused on completion of the BVC for patients with history of aggressive or violent behavior leading to lower adherence rates. Future education on using the BVC in all patients, rather than just those with a history of violent or aggressive behaviors, may lead to higher rates of checklist completion. Emphasis on the importance of using the BVC for all patients both upon admission and consistently should be included in this education.

Another specific aim of the project was to reduce the number of code greys on the unit. After conducting a one sample t test, it was clear the decrease in number of code greys was not significant (p=0.2098). Therefore, this specific aim was also not accomplished for this quality improvement project.

**Project Strengths**

Through informal survey prior to implementation of the BVC, nurses on this unit believed aggressive or violent patients were a concern. Nursing staff also believed current processes on the unit were not effective at reducing aggressive or violent behavior. Therefore, when the idea was originally presented to the nurses, they believed a risk assessment tool, like the BVC, could reduce these behaviors. Once education or re-education was done, nurses were eager to use the BVC. Therefore, there was clearly a need for implementation of some kind of short-term risk assessment tool in this microsystem.
Interpretation

Association Between Interventions & Outcomes

The global aim of this quality improvement project was to increase awareness of aggressive and violent patient behavior in order to de-escalate the patient prior to a code grey occurring. This was measured through nurse adherence to completion of BVC and number of code greys on the unit. It was believed that an increase in nurse adherence to the completion of the BVC would result in reduction of code greys on the unit. As shown in the pre-intervention data, prior to implementation of the BVC there was a slight increase in the number of code greys occurring on the unit.

The patient population on the Medical Oncology unit was appropriate for implementation of the BVC. As stated in Sarver et al. (2021), reasons for patient violence may include “symptoms of mental illness, cognitive impairment, dementia, confusion, agitation, intoxication, and personality factors” (p. 477). Through assessment of the microsystem and observation in the microsystem, it was found this specific Medical Oncology unit commonly had numerous patients exhibiting one or multiple of the factors listed by Sarver et al. (2021). During the second PDSA cycle, the increase in patients with aggressive or violent behavior incentivizes staff to use the tool more frequently.

Comparison of Results with Other Publications

The results of this quality improvement project differed from the outcomes of other publications included in the literature review. Brathovde (2021), Hvidhjelm et al. (2023), Lockersten et al. (2021), Moursel et al. (2019), Ramesh et al. (2018), and Senz et al. (2021) found the BVC is an effective tool at predicting violent or aggressive behavior for the following 24 hours. With such a low nurse adherence rate, it was difficult to properly assess the impact of
reducing the number of code greys on the unit as the BVC is a short-term risk assessment tool. Moursel et al. (2019) and Ramesh et al. (2018) emphasize the need for consistent completion of this checklist throughout the patients’ stay to maintain high reliability of the tool. At the highest, the nurse adherence rate to the BVC was 10%. Having a higher nurse adherence rate has the potential to reduce the number of code greys on the unit.

The BVC has shown effectiveness in both an emergency department setting (Sammut et al., 2022; Senz et al., 2021) and acute psychiatric setting (Lockersten et al., 2021; Moursel et al., 2019; Sarver et al., 2019). However, prior to this quality improvement project, limited research has been done on implementation of the BVC on a Medical unit. However, future QI projects need to be conducted to improve the low nurse adherence scores before a conclusive statement can be made about the effectiveness of the BVC on a Medical unit. The low nurse adherence rate led to insignificant reduction in the number of code greys when compared to the pre-intervention number.

**Impact on People & Systems**

This quality improvement project had an impact on both nurses and patients in this microsystem. With a global increase in workplace violence, both staff and patient safety could be compromised. Implementation of the BVC allowed for early identification and intervention of aggressive or violent patient behaviors. In turn, this helped reduce the number of code greys and improve both patient and staff safety. The BVC checklist included possible interventions that could be implemented depending on the BVC score, which helped guide nurses in implementing the appropriate interventions.
Differences Between Observed & Anticipated Outcomes

Future research can be done on staff perceptions on use of the BVC. Due to time constraints, a post-intervention survey could not be performed to assess staff’s perception on the effectiveness of the BVC at reducing aggressive and violent behavior. However, some studies, such as Senz et al. (2021), explored nursing perceptions of the BVC once it was implemented. Senz et al. (2021) did find nursing staff believed the BVC was effective in reducing violent and aggressive behavior. Similar could be done to determine if the nurses’ perceived the BVC as useful to identifying aggressive and violent behavior.

The main goal for future PDSA cycles is to better understand the decreased nurse adherence to the BVC. The addition of the BVC into the EMR would be most effective. During each shift, there is a checklist in the EMR of all assessment tools that need to be completed for the patient. Therefore, embedding the BVC into EMR to be completed upon admission and once per shift will increase adherence as it will send reminders each shift for its completion. It is believed that future PDSA cycles with BVC embedded into EMR may drastically increase nurse adherence rates.

One major reason for below anticipated nurse adherence to the BVC is because nursing staff focused on using it for patients only with a history of violent and aggressive behavior. Although patients who have exhibited aggressive or violent behavior in the past are most likely to have reoccurring violent or aggressive behavior, sometimes this history is not accessible to staff prior to admission to unit. One reason the BVC was used over other violence risk assessment tools was because it is quick and easy for all patients to be screened, not just those who have a history of violent or aggressive behavior.
Limitations

This quality improvement project had a few limitations to note. One major limitation of the project was the lack of key stakeholders throughout the project. One of the key stakeholders resigned during the first week of project implementation unexpectedly and the PL was only visiting once per week for chart auditing. This led to decreased awareness of BVC implementation as there was no stakeholders on the unit encouraging usage of this tool during the days that the PL was not present. The PL tried to use charge nurses as the stakeholder, however due to many other competing responsibilities of the charge nurse this was unsuccessful.

Another major limitation was buy-in from staff. This could be partly due to lack of stakeholders present in the quality improvement project. Both an email was sent out and an in-service was done during the first day of implementation, however more awareness needed to occur in order to increase staff participation. Further research needs to be done to increase staff buy-in as this is essential for higher numbers of nursing adherence to the BVC.

Another limitation was the time constraints associated with gathering data and finishing the entirety of this quality improvement project by the end of July. Only a month of data was collected through the month of June, to assess the effect of this intervention more accurately in the microsystem, further data collection should occur.

Limits to Generalizability of Work

This quality improvement project could successfully be replicated on another unit or at another hospital. A paper copy of the BVC was used, as opposed to it being built into the EMR making it easier to replicate. Data collection included nurse adherence to the BVC and collecting number of code greys from security. The PL collected data themselves for nurse adherence rates through chart audits weekly, however, more frequent auditing could be done for future quality
improvement projects. At this hospital, security continuously recorded the number of code greys hospital wide as well as on each specific unit. The PL may have to be the primary recorder for the number of code greys if security at the hospital does not keep track.

**Factors Limiting Internal Validity**

Although the PL took steps to reduce internal validity of this quality improvement project, it was not possible to completely eliminate these factors. Lack of buy-in from stakeholders on the unit contributed to decrease in internal validity of the project. The primary stakeholder resigned during the Do phase of the PDSA cycle and due to staffing issues, there was no primary stakeholder for most of the data collection phase. This led to lack of awareness of the BVC among staff.

**Efforts Made to Minimize & Adjust for Limitations**

The PL made multiple efforts to reduce the effect of lack of stakeholder buy-in on the intervention. First, the PL tried to use charge nurses to help disseminate education and importance of the BVC. The PL also tried to identify alternative stakeholders to help support this quality improvement project. To spread awareness about the QI project, The PL sent out an email prior to implementation of this project and conducted an in-service during shift change on the first day of implementation. Each week during chart auditing, the PL communicated with the charge nurse regarding the completion of the BVC among staff and if any changes needed to be made to better fit the specific unit.

**Conclusion**

**Usefulness of Work**

This quality improvement project provided insight into the microsystem and the patients this microsystem serves. The aim was to decrease workplace violence by reducing the number of
code greys on the unit. This would help improve both patient and staff safety on the unit. In addition, the BVC helped provide awareness for staff to identify and implement interventions early in an effort to reduce aggressive or violent patient behavior.

**Sustainability**

This quality improvement project is highly sustainable as it has very minimal risks with significant potential benefits. As it is already implemented in this microsystem, it could be continued on this unit as well as implemented on other units at this hospital. Inclusion of the BVC into the EMR would help increase sustainability of this quality improvement project across the entire hospital. Staff may need future re-education on the effectiveness and importance of the BVC to reduce aggressive and violent patient behavior as it reduces workplace violence and improves patient and staff safety. The education of the importance of the BVC will increase buy-in among staff.

**Potential for Spread to Other Contexts**

Although this quality improvement project was done at the microsystem level, it affects other areas of the hospital as well. When a code grey occurs, security and staff from other units often respond, taking this time and these resources away from other units in the hospital. This quality improvement project improved patient and staff safety on this unit, however, indirectly it also improved safety on other floors as well. With reduction of code greys on the Medical Oncology unit, these resources remain readily available to be used on other units when situations arise. In addition, staff were surveyed prior to creation and implementation of this quality improvement project to determine possible needs. Many staff believed workplace violence was an issue in this unit. As a result, staff may be more inclined to report future ideas for quality improvement as their ideas were heard and changes in processes were made.
Implications for Practice & Further Study

In this quality improvement project, low nurse adherence rates to completion of the BVC lead to an insignificant decrease in the number of code greys. Research on increasing nurse adherence rates is key on significantly decreasing the number of code greys on the unit. Future PDSA cycles for future months will determine if implementation of the BVC continues to trend a decrease in number of code greys. Additional months will also improve external validity and reduce bias associated with this quality improvement project.

Senz et al. (2021) conducted a survey to determine nurse perspective on the BVC. For further study, the PL could survey the nurses to determine if they believed the BVC was both easy to use and effective at reducing number of code greys. Nurse could also give important insight that could improve nurse adherence rate in future PDSA cycles. Using a risk assessment tool that nurses feel is effective at reducing violent or aggressive patient behavior will help improve buy-in and therefore increase nurse adherence to BVC completion.

Suggested Next Steps

Next steps for this quality improvement project are to increase stakeholder engagement and awareness of staff. Increased engagement from new stakeholders helps to increase nurse awareness and nurse adherence to completion of the BVC. As previously stated, the BVC needs to be completed at least every 24 hours for each patient. Continuous completion of the BVC is needed to effectively identify violent and aggressive patient behavior. Education on how to properly use the BVC and the validity, reliability, and efficacy of this risk assessment tool will help increase nurse engagement and therefore may help increase nurse adherence to completion of the BVC.
References


Appendix A

PICO Question

P: Potentially violent or aggressive patients

I: Completion of Broset Violence Checklist

C: No intervention

O: Early identification of potentially aggressive behaviors

T: Completion by July 28th, 2023
Appendix B

PRISMA Flow Sheet

Records identified from databases:
- CINAHL: n = 3
- PubMed: n = 19
- Science Direct: n = 6

Records removed before screening:
- Duplicate records (n = 2)

Records screened (n = 26)

Reports assessed for eligibility (n = 26)

Reports excluded:
- No full text: n = 1
- Not focus of study: n = 15
- Not using nurses: n = 1

Studies included in review: (n = 9)
Appendix C

Broseit Violence Checklist

<table>
<thead>
<tr>
<th>BEHAVIORS OF CONCERN OBSERVATIONS</th>
<th>SCORE = 0</th>
<th>SCORE = 1</th>
<th>SCORE = 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFUSED</td>
<td>Risk of Violence = SMALL</td>
<td>Risk of Violence = MODERATE</td>
<td>Risk of Violence = VERY HIGH</td>
</tr>
<tr>
<td>Obviously confused or disoriented</td>
<td>o No required interventions</td>
<td>o Consider preventative measures</td>
<td>o Ensure safety</td>
</tr>
<tr>
<td>IRRITABLE</td>
<td>o Plan for potential deterioration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easily annoyed or irritable, intolerant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOISTEROUS</td>
<td>o Continue regular observations</td>
<td>o Ensure personal safety</td>
<td>o CALL CODE GREY</td>
</tr>
<tr>
<td>Overtly noisy, shouts, slams doors</td>
<td>o Call for help if needed</td>
<td>o Document incident including triggers &amp; management</td>
<td></td>
</tr>
<tr>
<td>PHYSICAL THREATS</td>
<td>o Consider more appropriate location &amp; additional staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threatening or intimidating gestures/stance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERBAL THREATS</td>
<td>o Request PRN medications</td>
<td>o Attempt verbal de-escalation if safe</td>
<td></td>
</tr>
<tr>
<td>Threatening or intimidating language</td>
<td>o Offer oral meds (if applicable)</td>
<td>o Offer oral medications if appropriate</td>
<td></td>
</tr>
<tr>
<td>ATTACKING OBJECTS</td>
<td>o Consider de-escalation techniques</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kicking, hitting, throwing, or damaging objects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL SCORE (Maximum of 6)