Fall 11-13-2022

Reducing Central Venous Infections

Desiree Banton
University of St. Augustine for Health Sciences

DOI: https://doi.org/10.46409/sr.JCER3689

Reducing Central Venous Infections

Desiree Banton MPH, MSN, BS, RN CHES®

School of Nursing, University of St. Augustine for Health Sciences

This Manuscript Partially Fulfills the Requirements for the

Doctor of Nursing Practice Program and is Approved by:

Hilary Morgan, PhD, CNM, CNE

Lynne Wallom, DSN, RN, NEA-BC, NPD-BC

Date of Final Approval November 13, 2022

University of St. Augustine for Health Sciences
DNP Scholarly Project
Signature Form

Student Last Name: Banton	**First Name:** Desiree	**Middle Initial:** E

E-mail: d.banton@usa.edu
Title of DNP Project: Reducing Central Venous Infections

My signature confirms I have reviewed and approved this final written DNP Scholarly Project.
DocuSign electronic signature or wet signature required.

Type Name in Blue Box Below	Signature	Date
DNP Project Primary Faculty: Dr. Hilary Morgan	DocuSigned by: Hilary Morgan 810C89B155E24D7...	11/30/22
DNP Project Preceptor: Lynne Wallom	DocuSigned by: Lynne Wallom CB980E5A8892446...	12/2/22
DNP Project Preceptor:		

Abstract

Practice Problem: Patients in the hospital are 36.6% more likely to die after a diagnosis of a Central Line-Associated Bloodstream Infection (CLABSI) (Chovanec et al., 2021). The purpose of this evidence-based practice implementation is to reduce CLABSI rates in the Neurological ICU (Neuro ICU) at a private medical center through use of a CLABSI prevention bundle checklist each shift.

PICOT: In the adult neuro-ICU (P), how does implementing a CLABSI prevention bundle checklist each shift (I), compared to current practice (C), affect CLABSI rates (O) within eight weeks (T)?

Evidence: Evidence-based research supports that if clinical staff completed each part of the CLABSI bundle, remained informed, and used an interdisciplinary team approach there would be a lower risk of CLABSI.

Intervention: The intervention for the project was to have the Neuro ICU staff nurses complete a CLABSI bundle checklist a the change of each shift for patients with a central line. The staff completed an educational lesson on CLABSI and completing each competent of the CLABSI bundle checklist.

Outcome: 100% of nurses received education on CLABSI and CLABSI bundles. 100% of patients with central lines receive a documented CLABSI bundle checklist and there was a decreased CLABSI infections from 1.28% to 0%.

Conclusion: This evidence-based practice implementation aimed to reduce the Neuro ICU's CLABSI rate through the CLABSI preventive bundle checklist at each shift. Going forward the best practice recommendations for reducing CLABSI rates include using CLABSI packages, informed staff, and an interdisciplinary team approach.

Reducing Central Venous Infections

Patients in the hospital are 36.6% more likely to die after a diagnosis of a Central Line-Associated Bloodstream Infection (CLABSI) (Chovanec et al., 2021). Central venous catheters (CVC) are beneficial for clinical staff to provide various treatments and interventions for patient care. For critically ill patients in the intensive care unit (ICU), CVC insertion is a customary practice (Kolikof et al., 2020). Unfortunately, if CVCs are not cared for effectively, the results can be deadly. CLABSI is caused when a CVC line becomes infected. Since having CVCs are common in the hospital and the risk associated with CLABSI could be deathly, it is necessary to ensure that all infection prevention methods are followed.

The negative impacts of CLABSI have made healthcare facilities prioritize infection control practices to reduce CLABSI rates (Haddadin et al., 2020). CVCs are flexible, thin catheters that advanced clinicians place through a large vein that leads to an area above the heart (Kolikof et al., 2020). Although there are national guidelines to prevent CLABSI infections, healthcare facilities and patients struggle with CLABSI diagnoses. Previous research on CLABSI prevention in the ICU shows that facilities utilize CVC bundle care to reduce CLABSI rates (Jusino-Leon et al., 2019). Research studies have shown that CVC bundles using chlorhexidine skin preparations, avoiding the femoral area, completing line changes, performing hand hygiene, and checking the CVC line are ways to reduce CLABSI (Johnson, 2018; Kolikof et al., 2020; Lee et al., 2018; Mattox, 2017). The purpose of this evidence-based practice implementation is to reduce CLABSI rates in the Neurological ICU (Neuro ICU) at a private medical center through use of a CLABSI prevention bundle checklist each shift.

Significance of the Practice Problem

Causes of CLABSI

One cause of CLABSI is by bacteria on a patient's skin that migrates from the surface of the catheter to the outer skin layer and into the intravascular space (Haddadin et al., 2020. CLABSI can also be caused by pathogens on a patient's CVC hub usually from a clinician's hands or equipment that enters a patient's bloodstream. In addition, CLABSI can form from a contaminated skin site, such as dirty skin before CVC insertion or a dirty CVC dressing. Gram-positive pathogens are the most common causes for CLABSI, followed by gram negatives and Candida species. There are tunneled and non-tunnels catheters associated with CLABSI. Most CLABSI diagnoses occur with non-tunneled catheters.

Diagnosis of CLABSI

Lowering the rate of CLABSI in healthcare is significant because of the mortality rates with critically ill patients and the cost associated with each infection. Regulating bodies such as the Joint Commission can utilize CLABSI rates to determine infection concerns at a facility (The Joint Commission, 2012). CLABSI diagnosis occurs within 48 hours after insertion and is confirmed with positive blood cultures (Haddadin et al., 2020). Those CLABSI results for a positive blood culture after 48 hours can be the cause of poor central line maintenance or an infection from another source in the body. The health care provider first assesses for signs and symptoms of CLABSI. For example, a patient requires further evaluation if they are experiencing symptoms such as fever, tachycardia, signs of sepsis, discharge from the CVC insertion site, and a CVC dressing site that is warm or swollen. If the patient has any of these symptoms, then a blood culture is completed. When the blood cultures are positive for a pathogen, a CLABSI diagnosis is validated.

Impacts of CLABSI

In the Neuro ICU, patients have CVC lines for hemodynamic monitoring, nutrition, medication administration, attaining labs, and other various reasons (Mattox, 2017). Once a CVC line is infected, it can lead to adverse patient outcomes such as additional hospital days, additional antibiotic uses to clear the infection, increase health care costs and mortality. Patients endure emotional distress because of the additional hospital days (Haddadin et al., 2020) Patients in the hospital are 36.6% more likely to die after being diagnosed with a Central Line-Associated Bloodstream Infections (CLABSI) infection (Chovanec et al., 2021). For clinical practices, a CLABSI infection requires clinical staff to do an additional assessment if the CVC needs to be replaced or if the patient could still have effective medical interventions without a CVC because providers rely on the CVC presence (Thornton et al., 2017). CLABSI infections cost healthcare facilities over $2 billion. CLABSI diagnoses are costly and contribute to approximately $46,000 for each positive case (Haddadin et al., 2020). That fee comes from the additional cost of blood tests, imaging, antibiotics, and additional patients' hospital days. The Hospital-Acquired Condition (HAC) Reduction Program is from the Centers for Medicare and Medicaid Services fines 1% for Medicare reimbursement (CMS, 2021).

CLABSI Rates

In the United States, CLABSI rates in the ICU are approximately 0.8 cases per 100 CVC line days (Haddadin et al., 2020). The Antibiotic Resistance and Patient Safety Portal (n.d.) shows that Georgia's CLABSI rate is 7% lower than the national baseline. However, in the project site, CLABSI rates for fiscal year 2020 in the Neuro ICU are 1.28%. States that have laws for reporting CLABSI have lower CLABSI rates than states that do not (Liu et al., 2017).

PICOT Question

In the adult neuro-ICU (P), how does implementing a CLABSI prevention bundle checklist each shift (I), compared to current practice (C), affect CLABSI rates (O) within eight weeks (T)?

Population

The population of the adult ICU has a wide variety of patients and diagnoses. Patients in the ICU are more likely to have central lines than other areas in the hospital (Jock et al., 2016). The diagnosis usually in the neuro ICU includes patients with traumatic brain injury, cerebrovascular diseases, epilepsy, and other neurological diseases and deficits (Hilz et al., 2019). Due to the greater chance of having patients with central lines, it is more efficient to monitor CLABSI rates in the ICU.

Intervention

Evidence-based practices show that utilizing bundles as an intervention is beneficial for reducing CLABSI rates (Jusino-Leon et al., 2019). Before implementing the project, the outcomes manager completed a CLABSI checklist for each central line. The vascular access team rounded on each central line and completed needed dressing changes and the bedside nurses would document and monitor the central lines. The intervention included the CLABSI bundle checklist at each shift and how it affects patient care with a central line. The intervention puts the responsibility of central line rounding onto the bedside nurse at shift change through the CLABSI bundle checklist. Each facility has variations to its CLABSI prevention bundle such as dressing change dates or terminal cleaning of rooms. Evidence-based research supports that if clinical staff completed each part of the CLABSI bundle, there is a lower risk of CLABSI (Reynolds et al., 2021).

Comparison

Comparing patients who have a CLABSI bundle checklist for each shift versus patients who do not have a CLABSI bundle checklist determines if the checklist decreased CLABSI infections. When completing chart audits, if a step is not noted, it is assumed that the patient did not receive the standard CVC line care.

Outcome

The desired outcome is that all patients with central lines receive a documented CLABSI bundle checklist and that there are decreased CLABSI cases. The outcome was measured through chart audits and lab results. The lab is a key component because CLABSI results come from positive blood cultures. Chart audits entail verifying how many patients have a central line and a documented checklist for each shift.

Time

The timing was within an eight-week period. CLABSI occurs within 48 hours of central line insertion (Haddadin et al., 2020). The nursing staff assessed the CVC line using the CVC bundle daily. Each time the nurses evaluate the CVC line, they checked if the line met the criteria for removal. The daily process took place on multiple patients and monitored the success or failure of the intervention.

Evidence-Based Practice Framework & Change Theory

The Johns Hopkins Evidence-Based Practice (JHEBP) framework was used for the project. The JHEBP framework uses a problem-solving approach in three phases: practice question, evidence, translation (PET) and 20 steps (Dang et al., 2022). The first two phases were completed prior to implementing the project. The first phase of JHEBP for the project was identifying the clinical question using a PICOT format. An interdisciplinary team was

assembled, along with meetings scheduled to address the question. The second phase involved gathering evidence. The researcher gathered evidence from internal sources of the project site for current data and external sources by completing a literature review. Using the JHEBP framework, the researcher appraised as either Level I, II, III, IV, or V (by strength) and rated either A (high quality) or B (good quality). In the third phase, the researcher shared information with the stakeholders and created an action plan. After creating the action plan, the plan was implemented, and the outcomes evaluated. In the end, the stakeholders received a report with the project's findings.

The foundation of the implementation plan for CLABSI prevention used Lewin's change theory. Lewin's change theory uses three steps: unfreezing, moving, and freezing as the concepts to change a person's behavior in the desired direction (Lewin, 1951). Lewin's change theory of unfreezing-moving-freezing can be used to make changes in a unit by implementing a CLABSI prevention bundle checklist each shift. Lewin's change theory incorporates an interdisciplinary team. The goal is to unfreeze the everyday occurrences in the Neuro ICU related to CVC care and education. That step includes education for all the staff members involved with CVC care. Education includes reviewing each action item on the CLABSI prevention bedside checklist and its importance. Next is the moving step; the employees worked with an interdisciplinary team to achieve the desired outcome of CVC care and follow-up. This step includes the staff starting to use the bundle. Last was refreezing the new behavior in the Neuro ICU. Freezing was when each nurse used the CLABSI prevention checklist at shift change consistently.

Evidence Search Strategy

The evidence search strategy utilized for reduction of CLABSI in the Neuro ICU included the use of several databases. These included the use of the University of Saint

Augustine's library for the CINAL Complete database, OVID Emcare database, and the Joanna Briggs Institute (JBI) database. The research included Boolean operators such as "AND" and "OR." The keywords included: CLABSI, ICU, central line, and bundle. Next, inclusion criteria included (CLABSI) AND (ICU) AND (central line) and (bundle). Interchangeable words included "CLABSI" and "central line bloodstream infection," "ICU" and "intensive care unit" and "critical care unit," "central line" and "CVC," and "bundle" and "checklist." Last, exclusion criteria included searching for information within the last five years (2018-2022), full text only documents, removing duplicates, academic journals, English language, and geography for the USA. Further limiters were placed on articles that were only abstracts and articles that were specific to a population under 18 years old.

Evidence Search Results

A literature review was completed for the project. Many articles discuss CLABSI infections. The literature review with eligible publications used for the project is reflected in the PRISMA diagram (Appendix G).

The evidence search resulted in 308 articles. The initial search included (CLABSI) AND (ICU) AND (central line) AND (bundle). When applying the limiting factors such as full text, within the last five years (2018-2022), academic journals, English language, and geography for the USA, there were a remaining 17 articles available. Duplicate results were eliminated, and after further assessments of the articles, six remaining articles were left that were used in the project for core research (Appendix A and Appendix B). The preliminary review removed results that did not include the intensive care unit for adults, 18 and older and released results that did not have intensive care unit CVC placement. Other articles that were not in the primary search offered excellent information regarding CLABSI infections were included in the reviews.

Using the Johns Hopkins Nursing Evidence-Based practice quality grading system, it was essential to identify the level of quality of the articles used for the research based on the final six articles. There were one Level I article, three Level II articles, and two Level V articles. All the articles were of high quality.

Themes with Practice Recommendations

Through a literature review, themes were recognized from practice recommendations to reduce CLABSI rates in the ICU. The practice recommendation to reduce CLABSI rates included using CLABSI bundles, having informed clinical staff, and implementing an interdisciplinary team approach. The studies in Appendix A and Appendix B support that using CLABSI bundles reduces CLABSI rates in the ICU setting.

Population

The articles in Appendix A and Appendix B were conducted in an ICU setting. In the intensive care unit (ICU), CVC insertion is common (Kolikof et al., 2020). In the Neuro ICU, patients usually have neurological diseases that can have focal neurological such as traumatic brain injury, cerebrovascular diseases, and epilepsy (Bharadwaj et al., 2022; Hilz et al., 2019). Patients in the ICU are more likely to have a CVC than other areas in the hospital (Jock et al., 2016). Invasive hemodynamic monitoring usually occurs in the ICU setting using a CVC line (Haddadin et al., 2020; Mattox, 2017).

Use of CLABSI Bundle

Related literature states that the best method to decrease CLABSI is utilizing a CLABSI bundle (Johnson, 2018; Kolikof et al., 2020; Lee et al., 2018; Mattox, 2017). The research studies explained that using the Chlorhexidine skin preparation, avoiding the femoral area, completing line changes, hand hygiene, and review of CVC line are methods to decrease

CLABSI. The Joint Commission has a CLABSI toolkit that offers a CVC maintenance bundle that the facility could use as a resource (Jusino-Leon et al., 2019).

Forty-three participating hospitals from 22 countries had central line bundles that included chlorhexidine, sterile barriers during insertion, subclavian or internal jugular vein over the femoral vein, hand hygiene, and daily review of the central line's needs (Devrim et al., 2022). Prior to insertion, cleansing the skin with chlorhexidine prevents bacteria from the skin from entering the patient's intravascular space (Haddadin et al., 2020). Providers should avoid using the femoral area for CVC insertion because femoral catheters are associated with a higher risk of CLABSI infection. During the insertion of the CVC and at the time of the CVC dressing change, the provider completes their task in a sterile space wearing sterile gloves. After insertion, chlorhexidine baths help decrease bacteria on the patient's skin that may lead to infection (Haddadin et al., 2020). Cleaning the CVC hub is essential to decrease bacteria from migrating from the hub site to the patient's bloodstream, leading to CLABSI.

Informed Clinical Staff

Clinical staff needs to be knowledgeable about infection control if they desire for CLABSI rates to decrease in their facility (Beaudry & ScottoDiMaso, 2020; Gabbard et al., 2021; Haddadin et al., 2020; Lee et al., 2018; Jusino-Leon et al., 2019; Reynolds et al., 2021). Knowledgeable staff is more inclined to follow the policies in place for interventions. Staff education includes understanding the patient consequences from a CLABSI infection, such as increased length of stay, healthcare cost, morbidity, and mortality (Reynolds et al., 2021). Jusino-Leon et al. (2019) stated that providers who follow evidence-based practice protocols effectively decrease CLABSI rate (Appendix D). However, there is no way to ensure

that having a written hospital policy will result in employee compliance. Informed staff will be accountable for following the practices to reduce CLABSI.

Interdisciplinary Team Approach

Four studies supported that the interdisciplinary team's compliance determines decreasing CLABSI results (Gabbard et al., 2021; Haddadin et al., 2020; Jusino-Leon et al., 2019; Kolikof et al., 2021). The interdisciplinary team includes the medical doctor, registered nurse, laboratory specialist, and clinical nursing specialist. The registered nurse ensures that the medical doctor has everything they need prior to inserting the CVC line, and during the procedure, everything remains sterile and follows up with the CVC line (Kolikof et al., 2021). Nurses are also responsible for making sure the CVC dressing remains clean and that the medical doctors confirm the placement of the CVC before administering any medication. If there are signs of infection, the nursing staff should immediately notify the medical doctors. The laboratory specialist provided timely notification to the medical team if there is a positive blood culture (Haddadin et al., 2020). The clinical nurse specialist collaborates with the medical team to assist in writing protocols such as a protocol to decrease hospital-acquired infections such as CLABSI (Gabbard et al., 2021). A central line should be addressed with the interdisciplinary team (Kolikof et al., 2021). For example, the length of time the line has been in place and if it can be removed.

Overall, the studies support the practice recommendation to complete a CVC bundle checklist at the change of each shift. The studies state that CVC bundles that include chlorhexidine skin preparations, avoiding the femoral area, completing line changes, performing hand hygiene, and checking the CVC line are ways to reduce CLABSI (Johnson, 2018; Kolikof et al., 2020; Lee et al., 2018; Mattox, 2017).

Setting, Stakeholders, and Systems Changes

The project occurs at a 520-bed adult hospital in Georgia with a 20-bed Neuro ICU. It is the region's only level I trauma center, and the only one with a level IV neonatal intensive care unit. At most, the Neuro ICU could have 20 patients, each with the possibility of multiple CVCs. There are uncertainties with the patient census in the Neuro ICU that would delay the project. For example, there is the potential for the Neuro ICU to have no CVCs lines in place. The organization is associated with a research university. The organization's mission is to provide leadership and excellence in clinical care through student-centered comprehensive research. The mission aligns with infection control practices for reducing CLABSI rates.

The stakeholders include the Chief Nursing Officer, the Director of Adult Patient Care Services and Centralized Nursing Services, the Clinical Outcomes Manager, and the Neuro ICU staff nurses. These stakeholders were interested in improving patient outcomes and reducing costs by decreasing CLABSI in the Neuro ICU. The Neuro ICU is the hospital area that has CLABSI rates higher than the Georgia state average. The population for the project is patients in the Neuro ICU who have a CVC. A meeting with the stakeholders reviewed the current CLABSI rates, the current unit's practice, and the practice change of implementing evidence-based practice to reduce CLABSI rates. The stakeholders view the project to be beneficial because of the improved patient outcomes, reduced cost, and improved quality care.

The project was constrained to the Neuro ICU, making it a micro-level change. Evidence-based practice to address CLABSI in the Neuro ICU is at the micro-level through the support of the stakeholders and the interdisciplinary team. The project to implement a CLABSI checklist at shift change relies on the nursing staff's understanding of the negative impact of CLABSI on the

patient and the healthcare facility. The checklist made the nurses more accountable for monitoring the CVC and advocating for their patients if there is a sign of infection.

A SWOT analysis reviewed the strengths, weaknesses, opportunities, and threats (Nelson & Staggers, 2018). The information gathered from the SWOT analysis (Appendix H) assists with implementing the project. The project's strength was that the facility is recognized as the top comprehensive stroke center in the area. Holding such a high distinction leads to a continuously growing population of patients that utilize the Neuro ICU. Another strength is the project team; the stakeholders and leaders in the organization are invested in supporting a project that focuses on infection control. The weakness of the project includes the high turnover of staff. Having different staff members that are not always core staff is an added variable of an education gap. Another weakness is that the project was only implemented in one hospital area. An opportunity from the project is the potential to streamline the CLABSI checklist in the Cerner electric medical records system. The threat related to the project is the census of the population in the Neuro ICU that have a CVC. There is a potential that although the Neuro ICU has 20-beds, there may be no patient with a CVC on the unit. Another potential threat could be the resistance from the nursing staff for completing the checklist at the change of shift.

Implementation Plan with Timeline and Budget

The project identified how using a CLABSI checklist at the change of shift affected the CLABSI rate in the Neuro ICU within eight weeks of implementation. The Neuro ICU staff nurses utilized the CLABSI checklist (Appendix I) at each shift to ensure that each section was complete, and issues were be addressed during the shift. The checklist guides nurses to bring concerns to medical or management staff. There were three main goals for the project. Neuro ICU staff nurses had education training opportunities in huddles resulting in 100% of staff

reviewing the CLABSI bundle checklist by week 1 (Appendix M). Neuro ICU staff nurses at each shift completed the CLABSI bundle checklist for each patient with a CVC at 100% by week 8 (Appendix L). By week eight, Neuro-ICU reduced the percentage of CLABSI diagnosis to below the 1.28% baseline in the Neuro ICU. The projects goals focus was to decrease the CLABSI rate in the Neuro ICU, whose rates are higher than the state of Georgia's average.

The CLABSI rate can be decreased with an interdisciplinary team approach (Gabbard et al., 2021; Haddadin et al., 2020; Jusino-Leon et al., 2019; Kolikof et al., 2021). For this project, the interdisciplinary team included the medical doctor, registered nurse, laboratory specialist, and clinical nurse specialist. The stakeholders included the chief nursing officer, the director of adult patient care services and centralized nursing services, the clinical outcomes manager, and the Neuro ICU staff nurses. The project timeline (Appendix J) started first with the researcher identifying a practice problem for the clinical site. After identifying the practice problem, the researcher completed a literature search related to the practice problem. Next, the researcher did an assessment of the practice site. Then the researcher spoke with the stakeholders. The stakeholders agreed to the CLABSI checklist tool at the bedside. From there, the clinical outcomes manager explained to the Neuro ICU staff nurses and clinical nurse specialists how the CLABSI checklist would positively impact the Neuro ICU's CLABSI rate. The clinical outcomes manager along with the unit nurse manager and charge nurses were identified as the unit’s leadership team. The leadership team and project leader during huddle explained to the staff nurses each area of the CLABSI checklist (Appendix I). In the huddle, the Clinical Outcomes manager had a CLABSI review document for the nurses to review and sign off on, indicating their understanding (Appendix M).

Unfreezing Step

The CLABSI education occurred the week of the project's start date during the huddle. This period is considered the unfreezing step from Lewin's change theory. Huddle is a beginning of the shift meeting between the nurses and the unit manager or charge nurse. In huddle information regarding the unit is reviewed and usually quick educational moments can take place. Huddles vary in time between five and twenty minutes. After all the nurses in the unit have received an education, there was regular reminders at each shift huddle, encouraging the use of the checklist tool at the bedside. In the huddle, the Clinical Outcomes manager and project leader had a CLABSI review document for the nurses to review (Appendix M). Due to the demanding schedule of the Clinical Outcomes manager and the clinical nurse specialist, the charge nurses for the unit ensured that the checklist tool was used during the change of shift.

Moving Step

The staff nurses for eight weeks initiated the project. This period is considered the moving step of Lewin's change theory. Data was collected from the checklist that was collected and the results received from the laboratory if there are positive blood cultures. Four weeks after the implementation there was a midway checkpoint to briefly assess the gathered data. All positive blood cultures were going to be tracked and identifying information from the checklist was going to be used. Every Friday there was a CLABSI checklist audit to ensure that staff nurses were completing the checklist. The SOS report generated by the project site was reviewed every Friday by the researcher if there is a positive blood culture for a patient with a CVC.

Freezing Step

At the end of eight weeks, this time was considered the freezing step of Lewin's change theory. By this time, all nurses were using the CLABSI checklist at the change of shift for all

patients with a CVC and submitting the checklist to the Clinical Outcomes manager. The data was analyzed against the baseline data of the Neuro ICU, the CLABSI rate from the state, and the final CLABSI rate after eight weeks. After a comparison report on the project, the analysis was sent to the stakeholders. For the project, there was a minimal budget (Appendix K) of ten dollars used for printing the CLABSI checklist for nurses to use. There was no cost associated with creating the CLABSI checklist.

Results

The project aimed to evaluate CLABSI rates before and after implementing the CLABSI checklist. For the project, there were three main goals. The first goal was to have the neuro ICU staff nurses' complete education training in huddles with participation at 100% within the first week. In the huddle, the project leader and the Clinical Outcomes manager completed a CLABSI review document for the nurses to review (Appendix M). This goal was met with the staff reviewing the CLABSI bundle checklist by week one at 100%.

Nurses who completed the huddle signed their names, initialed, and dated, indicating that they reviewed the CLABSI checklist and implemented it each shift (Appendix L). The clinical outcomes manager confirmed this goal by examining the sign-in sheet from the huddles to ensure that all staff members participated. The signed list was compared to the nursing staff roster to ensure that each nurse participated in the huddle and CLABSI checklist tool.

The second goal was to have the neuro ICU staff nurses at each shift complete the CLABSI bundle checklist for each patient with a CVC at 100% by week eight. This goal was met at 100%. The oncoming nurses completed the CLABSI checklist each shift, and the form was given to the Clinical Outcomes manager to review daily. The clinical outcomes manager measured this goal through chart audits.

The final goal was to reduce the neuro-ICU CLABSI rate to below 1.28% in eight weeks. The neuro-ICU accomplished this goal with a CLABSI rate of 0% during the eight-week implementation period. CLABSI rates are reported through the National Healthcare Safety Network (NHSN) (Bagchi et al., 2018). The validity of the CLABSI checklist tool is based on calculating the CLABSI rates (Appendix D), which is the number of CLABSI divided by the total catheter days and multiplied by 1000 (Pathak et al., 2018).

The 0% CLABSI rate did not have statistical significance but clinical importance to the project. The Clinical Outcomes manager identified 18 central lines between July 27, 2022, to August 24, 2022, with zero positive blood cultures. Each shift for each patient had a completed CLABSI bundle checklist successfully. The clinical outcomes manager measured this goal through lab results and reported weekly to the project leader if there were any positive cases. Data collection to monitor CLABSI rates was through the hospital's SOS system that tracks patient information such as positive blood cultures. The CLABSI rates were calculated by reviewing the SOS system, which resulted in no CLABSI cases. The project did not put the patients at risk of harm, and the CLABSI checklist stayed securely with the clinical outcomes manager.

Impact

The project's purpose was to implement a CLABSI checklist to utilize at change of shift to decrease the CLABSI rate in the Neuro ICU. The project's outcome had a clinical impact on the care provided by nurses that went through each area of the checklist to ensure that patients' central lines were up to the standards of the hospital. The project reduced CLABSI infections from 1.28% to 0%.

The project impacted how nurses reported to one another when a patient had a central line. The current practice within the unit requires nurses to do bedside shift reports. The project made nurses highlight and utilize a checklist so that patients with a central line required a digital assessment between two nurses.

A few project limitations early on included a lack of enthusiasm from the nursing staff to utilize a checklist. The nursing staff felt the checklist was repetitive information already collected from the vascular access team within the hospital and the clinical outcomes manager. Other limitations were associated with receiving data from the hospital that led to their FY 21 1.28 CLABSI percentage for the Neuro ICU. Another limitation of the project is related to the coronavirus pandemic. The hospital staff experienced staff shortages along with problems with their throughput. Essentially patients were placed in critical care areas that would not have genuinely qualified for critical care before the coronavirus.

It is speculated that due to the inappropriate bedding of medical intensive care unit patients within the Neuro ICU setting, the baseline results were much higher than what they would've been if it was not for the coronavirus pandemic. Medical intensive care unit patients within this facility have a history of higher CLABSI rates than patients that in the Neuro ICU.

Before starting the project, the hospital recognized that certain areas had higher infection rates than others. The vascular access team was created to support departments more to help the hospital achieve lower infection rates. Fortunately, upon the project completion, the implemented population had a zero rate for CLABSI.

In the future, the facility will not make it the nurse's responsibility to complete a CLABSI checklist. Instead, the project helped nurses understand the key components necessary to maintain a patient central line to the hospital standards. From now on, the hospital will continue

utilizing its vascular access team to help keep central lines within its standards. Outside of the vascular access team, additional training will occur within the units so that nurses can know how to complete dressing changes for patients with a central line correctly in case the dressings are soiled.

Dissemination Plan

The project results were reviewed with the project preceptor. Next, the project was shared with the project site's nursing administration, nursing staff, unit managers, and the vascular access team. The results were presented through a printed report and a presentation.

The project is available for review to the nursing community through membership of Sigma Theta Tau International Honor Society of Nursing. The project lead presented the project results to Sigma Theta Tau International Honor Society of Nursing members by participation in a presentation webinar. The project results are also available through the University of Saint Augustine for Health Sciences Scholarship and Open Access Repository. Having the results available online makes the results accessible to everyone.

Conclusion

This evidence-based practice implementation aimed to reduce the Neuro ICU's CLABSI rate through the CLABSI preventive bundle checklist at each shift. CLABSI is caused by bacteria migrating from the surface of the catheter to the outer layers of the skin and the intravascular space. Due to the mortality rate of critically ill patients and the costs associated with each infection, it is important to reduce the CLABSI rate. When CLABSI occurs, it can lead to adverse patient consequences such as additional length of hospital stay, additional use of antibiotics to eliminate infection, increased medical costs, and mortality. Best practice

recommendations for reducing CLABSI rates include using CLABSI packages, informed staff, and an interdisciplinary team approach.

References

Bagchi, S., Watkins, J., Pollock, D. A., Edwards, J. R., & Allen-Bridson, K. (2018). State health department validations of central line–associated bloodstream infection events reported via the National Healthcare Safety Network. *American Journal of Infection Control*, *46*(11), 1290-1295.

Beaudry, J., & ScottoDiMaso, K. (2020). Central Line Care: Reducing central line--associated bloodstream infections on a hematologic malignancy and stem cell transplant unit. *Clinical Journal of Oncology Nursing*, *24*(2), 148–153. https://doi.org/10.1188/20.CJON.148-152

Bharadwaj, S., Rao, G. U., Hegde, A., & Chakrabarti, D. (2022). Survey of family satisfaction with patient care and decision making in neuro-intensive care unit- a prospective single center cross sectional study from an Indian Institute of Neurosciences. *Neurology India*, *70*(1), 135. https://link.gale.com/apps/doc/A695478945/AONE?u=lirn55718&sid=ebsco&xid=e2dbb7b1

Centers for Disease Control and Prevention. (n.d.). *Antibiotic Resistance & Patient Safety Portal*. Centers for Disease Control and Prevention. Retrieved February 3, 2022, from https://arpsp.cdc.gov/profile/geography/georgia?redirect=true

Centers for Medicare and Medicaid Services. (2021). Hospital-Acquired Condition Reduction Program. Retrieved from https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HAC/Hospital-Acquired-Conditions

Chovanec, K., Arsene, C., Gomez, C., Brixey, M., Tolles, D., Galliers, J. W., Kopaniasz, R., Bobash, T., & Goodwin, L. (2021). Association of CLABSI With hospital length of stay,

readmission rates, and mortality: A retrospective review. *Worldviews on Evidence-Based Nursing*, *18*(6), 332–338. https://doi.org/10.1111/wvn.12548

Devrim, I., Erdem, H., El-Kholy, A., Almohaizeie, A., Logar, M., Rahimi, B. A., Amer, F., Alkan-Ceviker, S., Sonmezer, M. C., Belitova, M., Al-Ramahi, J. W., Pshenichnaya, N., Gad, M. A., Santos, L., Khedr, R., Hassan, A. N., Boncuoglu, E., Cortegiani, A., Marino, A., … Kanj, S. (2022). Analyzing central-line associated bloodstream infection prevention bundles in 22 countries: The results of ID-IRI survey. *AJIC: American Journal of Infection Control*. https://doi.org/10.1016/j.ajic.2022.02.031

Gabbard, E. R., Klein, D., Vollman, K., Chamblee, T. B., Soltis, L. M., & Zellinger, M. (2021). Clinical Nurse Specialist: A critical member of the ICU Team. AACN Advanced Critical Care, 32(4), 413–420. https://doi.org/10.4037/aacnacc2021511

Haddadin, Y., Annamaraju, P., & Regunath, H. (2020). Central line-associated bloodstream infections (CLABSI). *StatPearls* [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK430891/

Hilz, M. J., Liu, M., Roy, S., & Wang, R. (2019). Autonomic dysfunction in the neurological intensive care unit. *Clinical autonomic research: official journal of the Clinical Autonomic Research Society*, *29*(3), 301–311. https://doi.org/10.1007/s10286-018-0545-8

Hospital-Acquired Condition Reduction Program. CMS. (n.d.). Retrieved February 4, 2022, from https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HAC/Hospital-Acquired-Conditions

Jock, L., Emery, L., Jameson, L., & Woods, P. A. (2016). Journey to zero central line-associated bloodstream infections: An intensive care unit's story of sustained success and quality

improvement. *Journal of the Association for Vascular Access*, *21*(2), 76–80. https://doi.org/10.1016/j.java.2016.03.002

The Joint Commission. Preventing Central Line-Associated Bloodstream Infections: A Global Challenge, a Global Perspective. Oak Brook, IL: Joint Commission Resources, May 2012. https://www.jointcommission.org/-/media/tjc/documents/resources/hai/clabsi_monographpdf.pdf

Johnson, S. (2018). A case study of Organizational Risk on Hospital-Acquired Infections. *Nursing Economic$*, *36*(3), 128–135.

Jusino-Leon, G. N., Matheson, L., & Forsythe, L. (2019). Chlorhexidine Gluconate Baths: Supporting daily use to reduce central line-associated bloodstream infections affecting immunocompromised patients. *Clinical Journal of Oncology Nursing*, 23(2), E32–E38. https://doi.org/10.1188/19.CJON.E32-E38

Kim, M., & Mallory, C. (2017). *Statistics for evidence-based practice in nursing* (2nd ed.). Jones & Barlett Learning

Kolikof, J., Peterson, K., & Baker, A. M. (2020). Central venous catheter. *StatPearls [Internet]*. https://www.ncbi.nlm.nih.gov/books/NBK557798/

Lee, Y. S. H., Stone, P. W., Pogorzelska-Maziarz, M., & Nembhard, I. M. (2018). Differences in work environment for staff as an explanation for variation in central line bundle compliance in intensive care units. *Health Care Management Review*, 43(2), 138–147. DOI:10.1097/HMR.0000000000000134

Liu, H., Herzig, C., Dick, A. W., Furuya, E. Y., Larson, E., Reagan, J., Pogorzelska-Maziarz, M., & Stone, P. W. (2017). Impact of State Reporting Laws on Central Line-Associated

Bloodstream Infection Rates in U.S. Adult Intensive Care Units. *Health services research*, *52*(3), 1079–1098. https://doi.org/10.1111/1475-6773.12530

Mattox, E. A. (2017). Complications of peripheral venous access devices: prevention, detection, and recovery strategies. *Critical care nurse*, *37*(2), e1-e14.https://doi.org/10.4037/ccn2017657

Nelson, R. & Staggers, N. (2018). *Health informatics: An interprofessional approach* (2nd ed.). Elsevier.

Nickel, B. (2019). Peripheral intravenous administration of high-risk infusions in critical care: A risk-benefit analysis. *Critical Care Nurse*, *39*(6), 16–28. https://doi.org/10.4037/ccn2019443.

Nickel, B. (2021). Does the Midline Peripheral Intravenous Catheter Have a Place in Critical Care? *Critical Care Nurse*, *41*(6), e1–e21. https://doi.org/10.4037/ccn2021818

Pathak, R., Gangina, S., Jairam, F., & Hinton, K. (2018). A vascular access and midlines program can decrease hospital-acquired central line-associated bloodstream infections and cost to a community-based hospital. *Therapeutics and Clinical Risk Management*, *14*, 1453+. https://link.gale.com/apps/doc/A583490019/AONE?u=lirn55718&sid=ebsco&xid=6a96f3c2

Reynolds, S. S., Woltz, P., Keating, E., Neff, J., Elliott, J., Hatch, D., ... & Granger, B. B. (2021). Results of the Chlorhexidine Gluconate bathing implementation intervention to improve evidence-based nursing practices for prevention of central line-associated bloodstream infections Study (Changing Baths): A stepped wedge cluster randomized trial. *Implementation Science*, 16(1), 1-16. https://doi.org/10.1186/s13012-021-01112-4

Thornton, K. C., Schwarz, J. J., Gross, A. K., Anderson, W. G., Liu, K. D., Romig, M. C., ... & Lipshutz, A. K. (2017). Preventing harm in the ICU—building a culture of safety and engaging patients and families. *Critical Care Medicine*, 45(9), 1531-1537. https://doi.org/10.1097/CCM.0000000000002556

Appendix A

Summary of Primary Research Evidence

Citation	Design, Level Quality Grade	Sample Sample size	Intervention Comparison	Theoretical Foundation	Outcome Definition	Usefulness Results Key Findings
Reynolds, S. S., Woltz, P., Keating, E., Neff, J., Elliott, J., Hatch, D., ... & Granger, B. B. (2021). Results of the Chlorhexidine Gluconate bathing implementation intervention to improve evidence-based nursing practices for prevention of central line-associated bloodstream infections Study (Changing Baths): A stepped wedge cluster randomized trial. *Implementation Science*, 16(1), 1-16. https://doi.org/10.1186/s13012-021-01112-4	Level I Randomized Control Trial A	The study was conducted in two large hospitals in the southeastern U.S.: one academic (957 total beds) and one community-based (683 total beds).	Education provided on both day and night shift by the CNS during shift change. With education was the explanation of the CHG bathing per the AHRQ protocol.	None	Rates of CLABSI decreased 27.4% after the intervention	Booster education sessions along with audits from nursing leadership assisted with the decrease in CLABSI rate although it was a smaller sample size.
Jusino-Leon, G. N., Matheson, L., & Forsythe, L. (2019). Chlorhexidine Gluconate Baths: Supporting daily use to reduce central line-associated bloodstream infections affecting immunocompromised patients. *Clinical Journal of Oncology Nursing*, 23(2), E32–E38. https://doi.org/10.1188/19.CJON.E32-E38	Level II An observational pre-/post design B	Increasing adherence to CHG baths bring the CLABSI rate from 5.28 per 1,000 central lines	Education and visuals were provided to hospital staff and patients education about the purpose of CHG baths. Reviewing	None	Adherence to documentation of the CHG baths with wipes by improved from 94% in April to a consistent 100% in June.	Healthcare provider compliance is a determinant of infection prevention associated with CVCs.

		days to 1 per 1,000 central line days within a 10-week period	documentation on where to chart a success full or patients' refusal of CHG bath was mentioned.			
Haddadin, Y., Annamaraju, P., & Regunath, H. (2020). Central line-associated blood stream infections (CLABSI). StatPearls [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK430891/	Level V Integrative Review, B	Patients that have CVC's	Defining CLABSI and the determinants to classify an infection along with education on prevention.	None	Established best practices, protocols, and checklist provide the best patient safety to reducing CLABSI rates.	Definitions of CLABSI and CVC lines

Legend:

Appendix B

Summary of Systematic Reviews (SR)

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
Beaudry, J., & ScottoDiMaso, K. (2020). Central Line Care: Reducing central line--associated bloodstream infections on a hematologic malignancy and stem cell transplant unit. *Clinical Journal of Oncology Nursing*, 24(2), 148–153. https://doi.org/10.1188/20.CJON.148-152	Level II A	What measure need to occur to reducing central line associated bloodstream infections?	Multiple databases through USA Library (OVID Medline, EMBASE, CINAHL, PubMed) "(CLABSI) AND (ICU) AND (central line) and (bundle)	Inclusion criteria: CLABSI, ICU, Central Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text Geography USA	The cost from one hospital acquired CLABSI event is $48,108 All healthcare workers that encounter a CVC play a role in CLABSI prevention Encourage reporting any barriers that stop a healthcare worker from properly maintaining a CVC line CVC line care should be included in all new hire orientation	Focused standardized education surrounding maintenance and care of CVC lines is an effective way to reduce CLABSI	The article is useful to show that explaining and implementing a standard system to assist with knowledge gaps results in reducing CLABSI rates Utilizing standardization in CLABSI education reduced CLASBI rates Dedicated time to review hospital's policy for CLABSI prevention maintenance includes multiple variables that lead to success. Staff need to understand each variable's role in decreasing CLABSI
Lee, Y. S. H., Stone, P. W., Pogorzelska-	Level I A	Why is there a variation between ICU	Multiple databases through USA Library	Inclusion criteria: central line bloodstream infection, ICU, Central	Having a written Hospital policy does not always	The staff's workload was the biggest	When implementing EBP changes finding a bundle tool that it not

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
Maziarz, M., & Nembhard, I. M. (2018). Differences in work environment for staff as an explanation for variation in central line bundle compliance in intensive care units. *Health Care Management Review*, 43(2), 138–147. DOI:10.1097/HMR.0000000000000134		staff in central line compliance?	(OVID Medline, EMBASE, CINAHL, PubMed) "(central line bloodstream infection) AND (ICU) AND (central line) and (bundle)	Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text, Geography USA	equal high compliance. Leadership should take an active role in infection prevention by completing chart audits to ensure CVC compliance. It is calculated that the use of CVC bundles is associated with a 43% decrease in CLABSI rates, 1,500 saved lives, and $175 million in reduced health care costs Maximal bundle compliance estimates range from 28% to 38% of U.S. hospitals	factor determining the use of CLABSI bundles and compliance	time consuming would be best to ensure compliance of CLABSI bundled care Having a document used at shift change or that is simple to use would be the most effective to busy staff changing the behavior of nurses to prioritize infection control through small changes
Nickel, B. (2019). Peripheral Intravenous Administration of High-Risk Infusions in	Level II A	Are peripheral intravenous access locations better to use	Multiple databases through USA Library (OVID Medline, EMBASE, CINAHL, PubMed)	Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text Geography, USA	Catheter–related phlebitis signs and symptoms. Having a peripheral IV and CVC may	Peripheral IV's can still cause infection in the hospital setting even though they	The use of peripheral IV's is more common to cause phlebitis and extravasation.

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
Critical Care: A Risk-Benefit Analysis. *Critical Care Nurse*, *39*(6), 16–28. https://doi.org/10.4037/ccn2019443.		in critical care areas?	"(CLABSI) AND (ICU) AND (central line) and (bundle)		increase bloodstream infections.	are most used prior to have a CVC.	
Johnson, S. (2018). A Case Study of Organizational Risk on Hospital-Acquired Infections. *Nursing Economic$*, *36* (3), 128–135.	Level II A	How costly can CLABSI infections be?	Multiple databases through USA Library (OVID Medline, EMBASE, CINAHL, PubMed) "(CLABSI) AND (ICU) AND (central line) and (bundle)	Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text Geography, USA	Approximately 50% of patients in intensive care have a CVC. CLABSIs cost between $3,700 and $29,000 per diagnosis depending on the treatment and additional hospital days.	Patients can have an increased length of stay of seven days in the hospital due to CLABSI.	CLABSI bundle includes hand hygiene, barrier precautions on insertion, chlorhexidine skin preparation, avoiding the femoral area, and daily review of line.
Gabbard, E. R., Klein, D., Vollman, K., Chamblee, T. B., Soltis, L. M., & Zellinger, M. (2021).	Level V A	What member of the health care team can assist with CLABSI reduction rates>	Multiple databases through USA Library (OVID Medline, EMBASE, CINAHL, PubMed) "(CLABSI) AND	Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text Geography, USA	Using a clinical nurse specialist in the critical care ICU area is valuable to implement evidence into practice.	Clinical nurse specialist can write protocols for ICU settings.	Clinical nurse specialist work to impact inpatient facilities to decrease hospital inquired infections including CLABSI.

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
Clinical Nurse Specialist: A Critical Member of the ICU Team. AACN Advanced Critical Care, 32(4), 413–420. https://doi.org/10.4037/aacnacc2021511			(ICU) AND (central line) and (bundle)				
Nickel, B. (2021). Does the Midline Peripheral Intravenous Catheter Have a Place in Critical Care? *Critical Care Nurse*, *41*(6), e1–e21. https://doi.org/10.4037/ccn2021818	Level V A	Can a midline be used instead of a CVC in ICU?	Multiple databases through USA Library (OVID Medline, EMBASE, CINAHL, PubMed) "(CLABSI) AND (ICU) AND (central line) and (bundle)	Line, Bundle, English language Exclusion criteria: 2018-2022 Academic Journals Full text Geography, USA	The catheter dwell time was associated with CLABSI infections more than the type of catheter used.	Midlines are used for compatible solutions and should be considered for short-term continuous vesicant therapy.	A midline should not be used as a CLABSI prevention strategy.

Legend:

Appendix C

Project Schedule

	NUR7801								NUR7802								NUR7803							
Activity	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15
Meet with preceptor	X			X			X																	
Meet with stakeholders				X			X																	
Identify a practice problem for project topic	X	X																						
Literature search for practice problem	X	X	X	X																				
Create CLABSI checklist				X	X																			
Create huddle						X	X																	

	NUR7801								NUR7802								NUR7803							
Activity	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15
education document																								
Prepare project proposal	X	X	X	X	X	X	X	X																
EPRC Review									X	X	X													
EPRC Edits									X	X	X													
Project Approval									X	X	X													
Implementation											X	X	X	X	X	X								
Continued staff audits											X	X	X	X	X	X								
Ongoing staff education											X	X	X	X	X	X								
Internal checklist audit											X	X	X	X	X	X								
Computing																	X	X	X	X	X			

	NUR7801								NUR7802								NUR7803							
Activity	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15
CLABSI rate																								
Data synthesis																	X	X	X	X	X			
Data analysis																	X	X	X	X	X			
Project presentation																						X	X	
Project Results																						X	X	

Appendix D

Of CLABSI / # of CVC days= CLABSI rate X 1000

Appendix E

Summary of Primary Research Evidence

Level	Quality Grade	Citation
I	A	Reynolds, S. S., Woltz, P., Keating, E., Neff, J., Elliott, J., Hatch, D., ... & Granger, B. B. (2021). Results of the Chlorhexidine Gluconate bathing implementation intervention to improve evidence-based nursing practices for prevention of central line-associated bloodstream infections Study (Changing Baths): A stepped wedge cluster randomized trial. *Implementation Science*, 16(1), 1-16. https://doi.org/10.1186/s13012-021-01112-4
II	B	Jusino-Leon, G. N., Matheson, L., & Forsythe, L. (2019). Chlorhexidine Gluconate Baths: Supporting daily use to reduce central line-associated bloodstream infections affecting immunocompromised patients. *Clinical Journal of Oncology Nursing*, 23(2), E32–E38. https://doi.org/10.1188/19.CJON.E32-E38
III	None	None
IV	None	None
V	B	Haddadin, Y., Annamaraju, P., & Regunath, H. (2020). Central line-associated blood stream infections (CLABSI). StatPearls [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK430891/

Appendix F

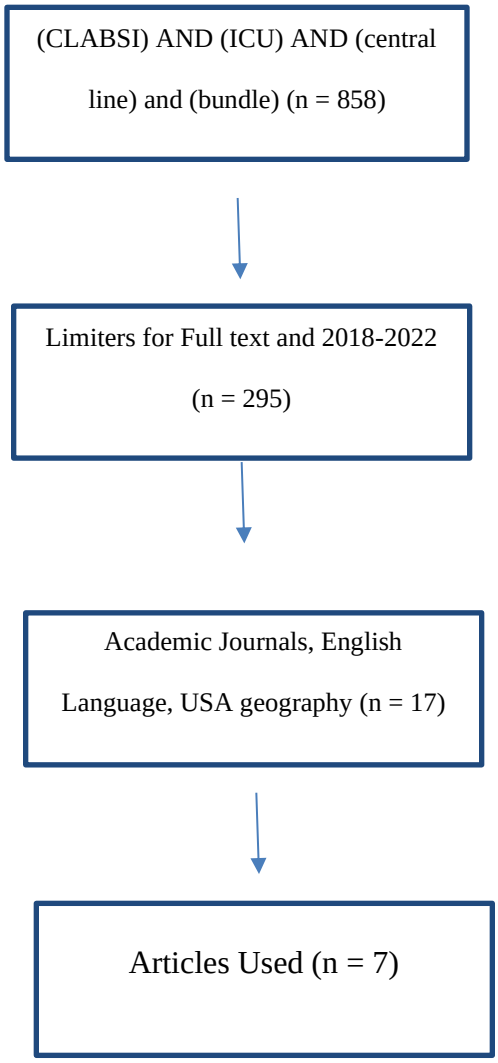
Summary of Systematic Reviews

Level	Quality Grade	Citation
I	A	Lee, Y. S. H., Stone, P. W., Pogorzelska-Maziarz, M., & Nembhard, I. M. (2018). Differences in work environment for staff as an explanation for variation in central line bundle compliance in intensive care units. *Health Care Management Review*, 43(2), 138–147. DOI:10.1097/HMR.0000000000000134
II	B	Beaudry, J., & ScottoDiMaso, K. (2020). Central Line Care: Reducing central line--associated bloodstream infections on a hematologic malignancy and stem cell transplant unit. *Clinical Journal of Oncology Nursing*, 24(2), 148–153. https://doi.org/10.1188/20.CJON.148-152
	A	Nickel, B. (2019). Peripheral Intravenous Administration of High-Risk Infusions in Critical Care: A Risk-Benefi t Analysis. *Critical Care Nurse*, *39*(6), 16–28. https://doi.org/10.4037/ccn2019443.
	A	Johnson, S. (2018). A Case Study of Organizational Risk on Hospital-Acquired Infections. *Nursing Economic$*, *36*(3), 128–135.
III	None	None
IV	None	None
V	A	Gabbard, E. R., Klein, D., Vollman, K., Chamblee, T. B., Soltis, L. M., & Zellinger, M. (2021). Clinical Nurse Specialist: A Critical Member of the ICU Team. AACN

	A	Advanced Critical Care, 32(4), 413–420. https://doi.org/10.4037/aacnacc2021511 Nickel, B. (2021). Does the Midline Peripheral Intravenous Catheter Have a Place in Critical Care? *Critical Care Nurse*, *41*(6), e1–e21. https://doi.org/10.4037/ccn2021818

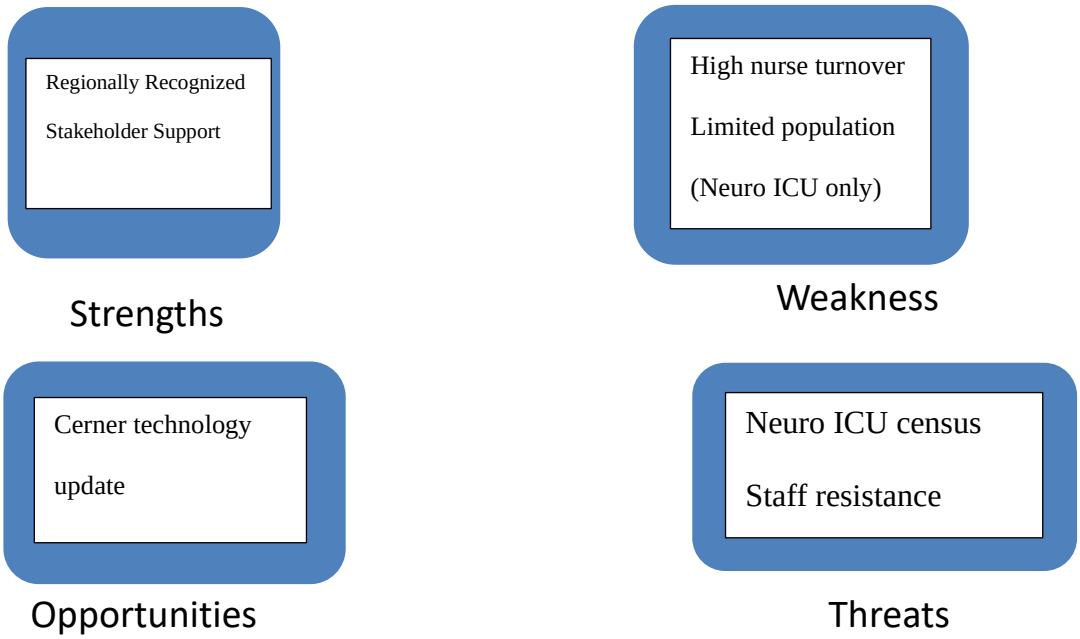
Appendix G

PRISMA diagram



Appendix H

SWOT Analysis



Appendix I

CLABSI Checklist

Room#	Type of Catheter	Location of Catheter	Insertion date	Dressing clean, dry, and intact	Room clean	CHG bath documented	Capped hubs	IV-line dated	Criteria to remove

Appendix J

Task	Responsible Party	Start	Midpoint Check-in	End
Identify a practice problem for project topic	Project Researcher	January 10, 2022		January 23, 2022
Literature search for practice problem	Project Researcher	January 10, 2022		February 20, 2022
Visit practice site	Project researcher	February 16, 2022		November 21, 2022
Speak with stakeholders	Project Researcher	February 16, 2022		November 21, 2022
Staff nurse education	Leadership Team	Week 1 (Reminders to complete checklist at each shift)		Week 8
Implementation CLABSI check list	Staff Nurses	Week 1	Week 4	Week 8
CLABSI checklist audit	Project Researcher	Every Friday starting Week 1	Week 4	Week 8

CLABSI report review	Project Researcher	Every Friday from the SOS system starting Week 1	Week 4	Week 8
Share results with stakeholders	Project Researcher	November 21, 2022		

Appendix K

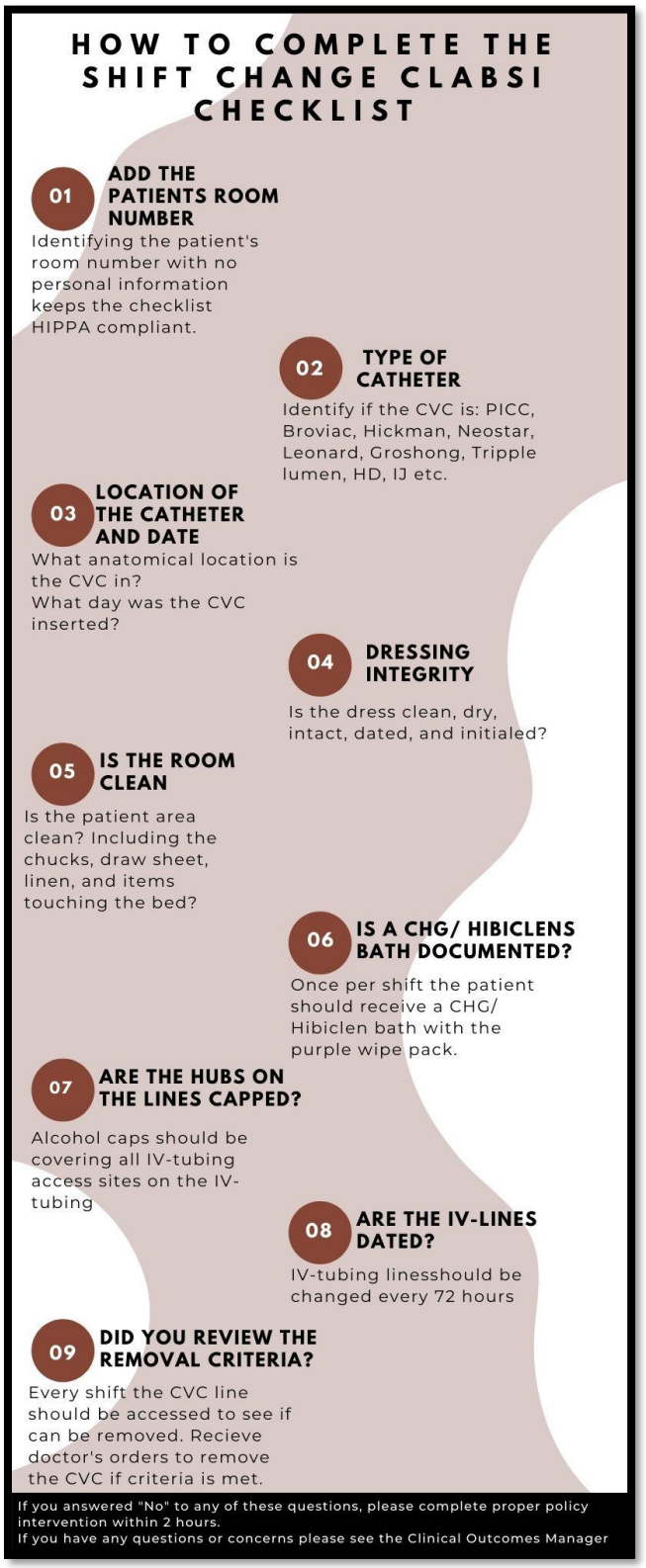
Budget

Expenses	
Printing- *CLABSI checklist change sheets*	$10
Total	$10

Appendix L

CLABSI Huddle Education Sign-in Sheet		
Name	**Date**	**Initial**
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		

Appendix M


HOW TO COMPLETE THE SHIFT CHANGE CLABSI CHECKLIST
01
ADD THE PATIENTS ROOM NUMBER
Identifying the patient's room number with no personal information keeps the checklist HIPPA compliant.
02
TYPE OF CATHETER
Identify if the CVC is: PICC, Broviac, Hickman, Neostar, Leonard, Groshong, Tripple lumen, HD, IJ etc.
03
LOCATION OF THE CATHETER AND DATE
What anatomical location is the CVC in?
What day was the CVC inserted?
04
DRESSING INTEGRITY
Is the dress clean, dry, intact, dated, and initialed?
05
IS THE ROOM CLEAN
Is the patient area clean? Including the chucks, draw sheet, linen, and items touching the bed?
06
IS A CHG/ HIBICLENS BATH DOCUMENTED?
Once per shift the patient should receive a CHG/ Hibiclen bath with the purple wipe pack.
07
ARE THE HUBS ON THE LINES CAPPED?
Alcohol caps should be covering all IV-tubing access sites on the IV-tubing
08
ARE THE IV-LINES DATED?
IV-tubing linesshould be changed every 72 hours
09
DID YOU REVIEW THE REMOVAL CRITERIA?
Every shift the CVC line should be accessed to see if can be removed. Recieve doctor's orders to remove the CVC if criteria is met.
If you answered "No" to any of these questions, please complete proper policy intervention within 2 hours.
If you have any questions or concerns please see the Clinical Outcomes Manager