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Central line associated blood stream infection (CLABSI) Prevention through Designated-Nurse peripherally inserted central catheter (PICC) line Dressing Change

This paper is submitted in partial fulfillment

For Nurs 5382: Capstone

In the School of Nursing

The University of Texas at Tyler

By

Belinder Atabongafac

April 19, 2022

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Executive Summary

The goal of this review is to show ways in which a nurse can have influence in the patient's life by caring for their PICC line. The rate of hospital-acquired infections is related to the care that patients get while admitted in the hospital. All hospital acquired infections can and should be prevented. This is also true for central line associated blood stream infections (CLABSI). The care provided to a patient with a PICC line, including how their line is taken care of, decides if the line gets infected, and if the patients get an infection. When patients get a PICC line infection kwon as CLABSI, some patients end up getting extremely sick and this could even result to death. According to Perin et al (2016), about 250-500,000 CLABSI's are estimated to occur each year, resulting in about 10-30% mortality rate. In research from Ziegler et al, CLABSI is associated with a high mortality rate. This, therefore, calls for the need for intervention efforts to aid in preventing CLABSI. Prior research has been conducted on ways in which to prevent this infection, but more research needs to occur so that more nurses can be involved in the prevention effort of CLABSI. Prior intervention efforts have been hand washing, use of Chlorhexidine, use of nurse designated PICC teams. More research could involve studies in which nursing, as a department, works in collaboration with the infection control team to prevent central catheter associated bloodstream infections. My project would fill this gap in research. I propose that by forming teams of nurses, where designated nurses change PICC line dressings weekly and maintain them would help reduce CLABSI.

Keywords: CLABSI, CLABSI prevention, PICC lines, Infection Prevention, Designated-Nurse, Dressing Change.

Rationale for the Project

Nurses are at the bedside each day involved with patient care and performing hands-on skills. They, therefore, can play a significant role in the reduction of CLABSI in hospital-settings. Preventing CLABSI is important because it not only improves patient outcomes, it decreases mortality rate in patients, and it also decreases patient hospital length of stay and decrease cost. CLABSI was determined to be significantly associated with readmission to an acute care hospital (Khong et al., 2015). The CDC estimates CLABSI cost $48,000 per episode and approximately 23,500 CLABSIs were reported to NHSN from U.S. hospitals in 2016. (CDC,2020). CLABSI's are known to prolong hospital stay, increase morbidity, and raise mortality rate by 12-25% (*Control and Prevent the Spread of Germs*, 2020). It is important to prevent the occurrence of CLABSI, it begins with a basic skill such as hand hygiene, educating nurses on proper hand hygiene and care for the PICC line. The use of peer tutoring educational methods had been an effective in CLABSI prevention bundles (Park et al., 2017). A recent study showed 70% compliance among nurses with CLABSI guidelines about hand hygiene education, part of which involves dressing interruption when dressing change days are not due yet (Timsit et al., 2012). The more dressings are interrupted due to soilage or bleeding amongst other things, the higher the risk of infection. Preventing dressing interruptions helps prevent CLABSI.

In research from Singh et al. (2017), the main aim of central line care is to reduce the catheter-related blood stream infection. Health-care workers' hands are the most common vehicle for the transmission of health care associated pathogens. Hand hygiene is already widely discussed in healthcare. Teaching healthcare workers, especially nurses, how to properly care for PICC lines, providing them with a protocol in place that, if effective, can reduce the occurrence of CLABSI and, thus, help improve patient outcomes.

Literature Synthesis

Due to certain patient conditions, receiving PICC lines in acute care settings is sometimes unavoidable. Examples include septic patients and patients who need long term IV antibiotics. According to research, CLABSI was determined to be significantly associated with acute care hospital readmission (Khong et al., 2015). It is important to note that, a big contributor to CLABSI is line care/maintenance. According to research from McCraw et al. (2018c), each CLABSI occurred approximately 10–12 days after the insertion date of the device demonstrating that the infection was not caused during the insertion process but rather during the daily maintenance. Using care bundles to prevent CLABSI has proven to be effective in many hospital ICUs (Blot et al., 2014) and (Gupta et al., 2021). However, research has also revealed that involving direct care staff in infection control training and interventions, as well as involving patients and their family members can help improve reduction of infection rates (McAlearney et al., 2014) and (Perin et al., 2016). Also, using Nurse-led PICC teams coupled with EBP interventions can lead to a reduction in the mortality rate of patients with PICC lines (Krein et al., 2015) and (Grigonis at al., 2016). In research from Ziegler et al. (2014) high mortality rate from CLABSI is a major reason for intervention such as peer tutoring resources (park et al.,2017) need to be implemented. Another noteworthy point to take into consideration with CLABSI prevention is teaching nurses how to properly care for PICC lines and creating standards of protocol that nurses can effectively use under observation and thereafter to maintain good practice (Singh et al., 2017). Prevention of CLABSI measures can also entail a peer tutoring approach, where nurses will be motivated to learn from each other and actively participate in creating solutions to their own workplace problems. Through this effort, they can

develop a safety culture on the units they work on, through the sharing of a mutual understanding (Park et al., 2017).

Project Stakeholders

When thinking of stakeholders, it is not only thinking about those involved in the project, but those who would benefit or care about the results of that project. To that end, I would also include patients, their families, hospital administrators, and care providers.

Getting all stakeholders on board will contribute to the success of this project when it comes to developing, planning, implementing, and evaluating this project. The main stakeholders will include upper management, in this case the Chief Nursing Officer (CNO) and medical director for infection control (one infectious disease doctor), Nurse managers (three at this time to cover the Med-surg and ICU units), the units for first implementation. Infection Control Nurse team leader (one infection control Nurse), Nurse Educators (three at this time, they will set up education and training classes, charge nurses on each unit (one from day shift and one from night shift total of six, they will be originally trained by the educators), patient care representative (to assess patient satisfaction with care of their PICC lines) and Patients with PICC lines (10 on each unit, total of 30 for a start).

Implementation Plan

In research from Kapil et al. (2020), Central line-associated bloodstream infection (CLABSI) is one of the most important Device associated infections (DAI), causing significant morbidity and mortality in critically ill patient. Continuous educational intervention and hand hygiene are two of the most important steps that can be taken to prevent such infections.

The plan in this project involves, training charge nurses on each unit in a special class on how to properly change PICC line dressings without getting the patient infected. The class would likely last between an hour and an hour and a half long and cover, hand hygiene prior to dressing change, maintaining sterile technique, and practicing sterile dressing change.

The charge nurses will be from both day and night shifts since they work 12-hour shifts. The infection control team, educators and nurse managers will be part of this training, and the nurse managers on each unit will be the ones to recruit their charge nurses and register them for a class. The nurse managers can also include some competent/qualified nurses they think can be a part of the project. When the in-class training is completed, a trial will be conducted on three units for one week with supervision, when these specially trained nurses are ready assessed and verified as ready to perform the skill independently. At that point, they will become the only individuals responsible for PICC line dressing changes when they are due. This gives room for accountability and ensures that these dressing changes will be done properly.

All the above will serve to help prevent CLABSI's, decrease patients' hospital length of stay and decrease mortality rates from CLABSI. Hence my PICOT question: In acute care settings, in patients with PICC lines, (P), How does having specially trained nurses change PICC line dressings (I), compared to having non specially trained nurses change PICC line dressings (C) decrease the number of Central Line Associated Blood Stream Infections (CLABSI's) (O) over a 3month period. (T)?

Step one – Gather data on CLABSI rate and mortality rate from CLABSI in hospital and cost to the hospital.

- Decide the average number of PICC line patients in the hospital.

- Find the current policy is on dressing changes
- Discuss the implementation of the new project with managers, infection control team and educators as well.
- Decide the current rate of CLABSI infections in the hospital.
- Decide the mortality rate for CLABSI.
- Decide the average length of stay for a CLABSI patient
- Estimate the added cost caused by a CLABSI infection.

Step Two: Reach out to Educators to set up classes this includes identifying training locations and schedule.

- Reach out to managers to select charge nurses and any other nurses they think can be part of this project.
- Setting up different dates and times for this classroom training/demo. Ensure all project members attend the course.
- Everyone will need to be signed-off on this training in class.

Step Three: After everyone has been signed off in class, then go ahead to skills check of on-unit with supervision.

- These specially trained nurses will be observed for skill check off on unit prior to independently performing skill.
- Implementing this project on all units with patient that have PICC lines.

Stage Four: Gather data about CLABSI rate and mortality rate from CLABSI in hospital after about a month of implementing this project for a period of 3months.

- Rate of CLABSI in patients after this intervention began, compared to the rate before this intervention.
- Mortality rate of CLABSI in patients after this intervention began, compared to the rate before this intervention.
- Average hospital stays of patients after this intervention began, compared to the rate before this intervention.
- Estimated Hospital cost savings.

Timetable/Flowchart

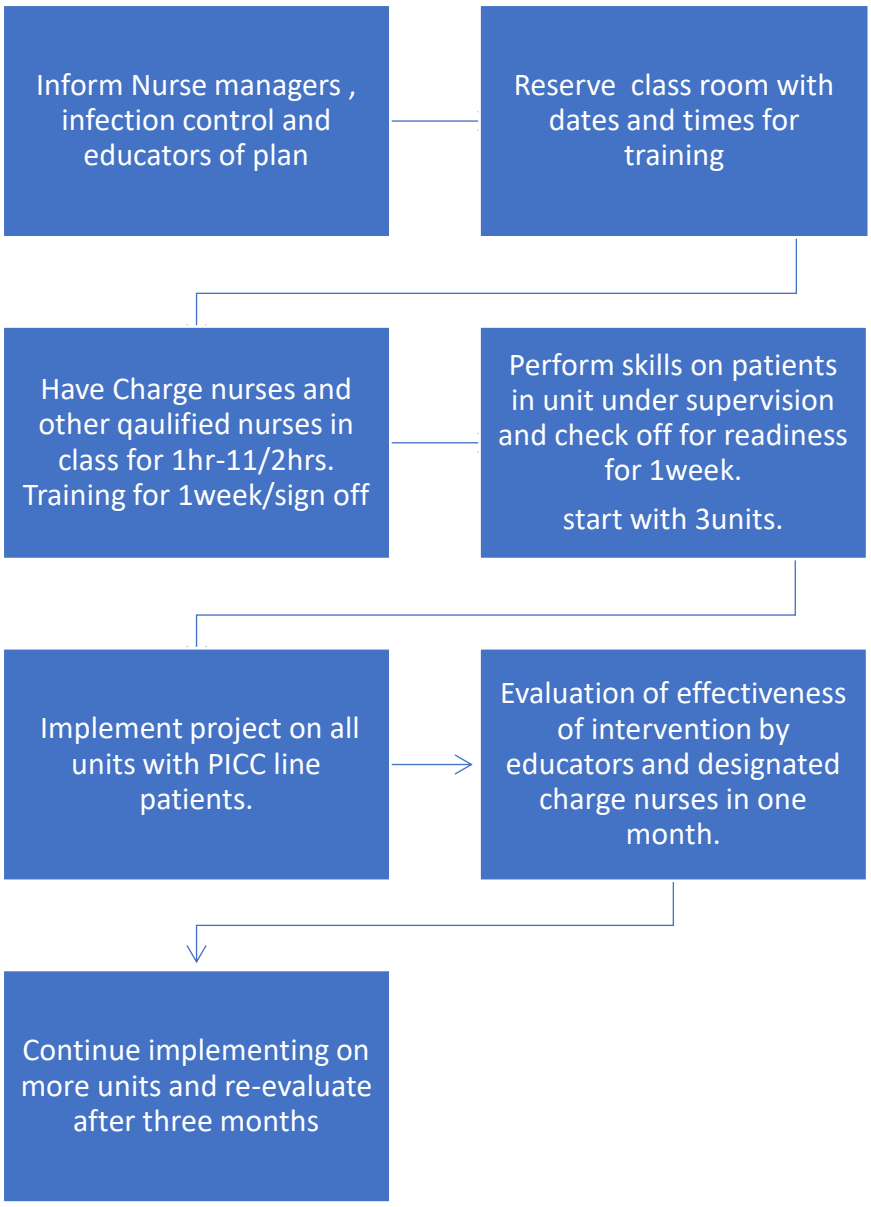
This is a bench-mark project, and the time frame is slated for 3months in the entire process.

- Week 1- Talk to manager about the plan and get upper management on board. Gathering data to support project rationale
- Week 2- Have an open conference room (education room) approved.
- Week 2- Set up supplies for PICC line dressing change (PICC line dressing kits, sterile gloves, autoclave, mannequin arm with PICC line, Saline flushes, alcohol prep.
- Weeks 3-5 (3 weeks) -Need Charge nurses most likely two at a time. Demonstrate how to appropriately do a sterile dressing change (DON and DOFF). Have them demo teach back. - 3 days (Monday, Wednesday, Friday).
- Week 6- Check them off at every step (Check off in class and on to unit check-off)

- Weeks 7- 10- disseminate and teach on different units. PICC line dressings done by specially trained/charge nurses.
- Week 11 to 12 Evaluation- Meet with team to discuss the progress of project implementation. Assess what is working and what needs to be revised and or added. Gather data and analyze the effects of CLABSI on patients on these unit.

Flowchart

The flow chart below, shows an idea of the steps that will be taken to see this project implemented successfully.



Data Collection Methods

To assess the project, was collected in two areas. First, a pre-post assessment was conducted to assess nurses' knowledge and comfort level with PICC Line dressing changed (attached in Appendix A). Nurses were assessed prior to their first training course, after the completion of the training, and after the intervention to assess their knowledge throughout the intervention. It is expected that the average scores on the post test will improve after completion of training and remain stable upon the completion of the three-month project.

To assess the effectiveness of the intervention, data was collected through a chart review ofall hospitalized patients on the unit with central lines in the past six months dating back to August 31st, 2021. The chart review consisted of figuring out the number of patients with PICC lines, number of patients with CLABSI infection, number of patients who died due to CLABSI and the length of stay for patients with PICC lines who had CLABSI and the length of stay for patients with PICC lines without CLABSI. The chart review was completed prior to the February 1st, 2022, intervention by specialized dressing change nurses. Post intervention chart reviews were also conducted, and the following data was gathered: the number of patients with PICC lines, number of patients with CLABSI infection, number of patients who died due to CLABSI and the length of stay for patients with PICC lines who had CLABSI and the length of stay for patients with PICC lines without CLABSI. This data is gathered to calculate the percent change in CLABSIs on this unit post intervention to figure out if there was a change or reduction in the number of CLABSI's, mortality rates from and hospital length of stay.

Cost/Benefit Discussion

This would be a low-cost project for the hospital since the hospital has most of the supplies. There will be no need to buy any of the dressing change supplies or kits. Each PICC line dressing kit is pre-packaged to involve all dressing supplies and these cost about $637.99 USD online. Since the hospitals buy in bulk it is cheaper. Also, some dressing items can be can re-used during training. The cost of CLABSI per CDC is estimated at $48,000 per episode. If we can use supplies already owned by the hospital during the training classes, the cost to the hospital will be minimal and if successful then it saves the hospital thousands of dollars which can then be added to improve other aspects of the hospital. Or to buy more supplies. Other benefits would include non-financial costs like mortality, increased patient satisfaction and increased competence in nurses.

Discussion of Results

The expectation is that, with 60 patients on three units from chart reviews, with no intervention, 20 patients had PICC lines, 8 of them were infected with CLABSI and 2 died from CLABSI. After intervention on the 60 patients with 20 PICC line patients, the number of CLABSI's went down to 6 patients and no deaths were recorded. Therefore, there would be a 25% reduction in CLABSI rates post-intervention and a 100% reduction in mortality rate due to CLABSI. This will be a sign that the intervention was successful. There would be a 30-percentage point increase in the pre/post test scores. The average pre-test scores would be 50% while the average post-test score would be 80%. Therefore, this intervention project would boost the comfort level of nurses who do PICC line dressing changes and intend improves

patients' outcomes. Many studies have been done to decrease the rate of CLABSI including continuous educations, care bundles and alcohol impregnated caps. Adding designated PICC line dressing change nurses will also contribute significantly to decreasing CLABSI rates based on the above results.

Conclusion/Recommendation

Hospital acquired infections present a large cost to hospitals and decrease patient outcomes. Most of these infections, including CLABSI, are preventable. Prior studies have been done to show that the use of care bundles, continuous nurse education, proper hand hygiene, nurse -led PICC teams, and adding designated PICC line dressing nurses will only improve patient outcomes and significantly decrease the rate of hospital acquired infections. An intervention such as designated nurse change central line dressings will be a positive recommendation for hospitals to apply since it can save them money, decrease patient hospital length of stay, prevent infections, and decrease mortality rate from central line associated blood stream infections.

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Appendix A

Pre-Intervention

Have you changed a PICC line dressing before?

Answer:

1. **Routinely 0-100**
2. **Occasionally 0-50**
3. **Very few times 0- 30**

Do you feel you know how to change a PICC line dressing or need more training?

1. **Yes 0-100**
2. **Somewhat 0-50**
3. **Need more training 0-30**

How comfortable are you changing one independently?

1. **Comfortable 0-100**
2. **Somewhat 0-50**
3. **Unsure 0-30**

Post Intervention

Have you changed a PICC line dressing before?

4. **Routinely 0-100**
5. **Occasionally 0-50**
6. **Unsure 0- 30**

Do you feel you know how to change a PICC line dressing or need more training?

4. **Yes 0-100**
5. **Somewhat 0-50**
6. **Need more training 0-30**

How comfortable are you changing PICC line dressing independently?

4. **Comfortable 0-100**
5. **Somewhat comfortable 0-50**
6. **Unsure 0-30**

- **6 Charge Nurses filled out the questionnaire**

Pre intervention Scores were 42, 56, 68, 36, 48, 50 on all questions =50%

Post test Scores were 65,80, 95, 85, 80,75 = 80%