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Infection Control: Reducing Hospital Acquired Central Line Bloodstream Infections

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Clinical Leadership Theme

For this microsystem we aim to improve bloodstream infection rates in the NICU. The goal is to reduce the infection rate from 15% to 0%, and prevent further bloodstream associated infections. The clinical leadership role this project encompasses is systems analyst/risk anticipator. As a CNL I will conduct a microsystem analysis by: identifying a clinical issue with a focus on a population, analyzing barriers related to the issue, incorporating analysis of outcome data, and disseminating an action plan to the appropriate audience (AACN, 2013). I will use the latest evidence based practices to improve quality of healthcare delivery.

Statement of the Problem

Hospital-acquired infection complicates the care of 30% to 50% of infants born less than 28 weeks' gestation in neonatal intensive care units (Garber & Puopolo, 2015). Central line-associated bloodstream infections (CLABSIs) are the most common type of hospital-acquired infection among infants in the NICU (Garber & Puopolo, 2015). Majority of infants born less than 34 weeks will require a central line or peripherally inserted venous access in order to receive medications and nutrition. Poor neonatal immune defenses, invasive technical care, multiple exposures to antibiotics, prolonged periods without enteral feeding, and pathogenic, hospital-derived microbial species combine to place infants in the NICU at higher risk of infection(Garber & Puopolo, 2015).

From 2016 to February 2017 there was a rise in infection rates from 0% to 15%. Since PICC line maintenance is mainly performed by staff nurses within this microsystem, staff education is key in implementing infection control. Due to recent changes in the shift of

responsibility for PICC lines as well the surge in premature admissions, I find the urgency for this project is now.

Project Overview

The overall goal of this project is to reduce the infection rate of 15% to 0% by mid-May. By reducing the infection rate and preventing further bloodstream infections, I hope to decrease length of stay, eliminate risks and secondary complications, decrease unnecessary stress, and practice cost containment. My objectives include informing staff of the problem at hand, pinpointing a cause, and educating staff on the solution. The process begins with infection control at the time of PICC line insertion. The process ends with the discontinued use of the PICC line. By working on the process, we expect to reduce infection rates and increase knowledge among staff regarding PICC Line care.

Rationale

Within the past year the placement of PICC line have nearly doubled due to the change in acuity and increase in premature admissions. A rise in premature admissions can further be explained by mothers that face many socioeconomic factors such as low income, delayed education, inadequate occupation, and lack of prenatal care. Although these factors cannot be reconciled in the NICU once the infant is born, eliminating further stress factors for these mothers can. Most infants less than 34 weeks will require long term intravenous access. In the situation of an infant requiring long term intravenous access, a PICC line is placed. This specific type of central line requires continuous assessment and maintenance from all staff including physicians and nurses. A recent transfer in responsibility took place in 2016, consisting of the maintenance of PICC lines which was originally performed by physicians and clinicians to now

be performed by staff nurses and PICC resource nurses. This shift was granted at the request of the Director of Medicine for cost containment, consistency, and immediate action. Staff nurses are more confident in PICC line maintenance due to long term practice and can react immediately if there is a problem. Since the transfer of responsibility the infection rate has increased. After conducting a root-cause analysis and analyzing surveys, it was determined that source of increase infection rates was caused by a combination of shift in responsibility, and decrease in prophylactic antibiotic use in preemies. From this information the needs assessment was developed emphasizing the need for reduction of 15% incidence rate back to 0%. It was observed that although there was a change of responsibility, there was not a change in procedure. The same practice utilized by physicians to care for PICC lines was taught to staff nurses as well. While technique was the same, the preference was different.

Methodology

As mentioned earlier, based on the survey results and root-cause analysis, shift in responsibility and decrease prophylactic antibiotic use in preterm infants were determined as the source of infection increase. Since I discovered that the technique had not changed but preference did, my implementation will be focused on correcting the preference. Due to each infant's individual condition and physician's plan of care, prophylactic antibiotic use in preterm infants cannot be addressed at this time. Staff preference however can be resolved with staff education. I will be utilizing Kurt Lewin's Three-Step Change Model to guide each action of implementation. Doing the first stage known as unfreezing, I identified the problem and communicated it with staff. The next stage known as change, I discovered a solution, and executed it. The last stage known as refreezing will consist of everyone practicing the same preference with technique and evaluating data. Based on the unit protocol and the latest-evidence

based practice one procedure has been established for PICC line maintenance including dressing change and blood draw. The next step will be to include this procedure in unit handbook and educate staff. An in-service with demonstration will be offered to teach staff the procedure and technique. During the in-service, education will also include proper hand hygiene and correct application of PPE. After this step I will collaborate with my charge nurse, nurse manager, and CNS to ensure that everyone is practicing this procedure. Ultimately I will work with the epidemiology nurse and physicians to measure any new cases of infection. Project effectiveness will be expected when there is no new case of central line bloodstream infection in the month of April or May. Further observations will also continue after May.

Data Source/Literature Review

Majority of information used for this project is based on central line bundles and guidelines taken from the CDC and Joint Commission website, as well as a few articles. Based on PICO, I am obtaining information on neonates with central line bloodstream infections, where a bundle was used to decrease the infection rate. The Joint Commission states that bundles incorporate evidence-based science into practice, and bundle use is recommended in central line-associated bloodstream infection (CLABSI) guidelines (The Joint Commission, 2013). One CDC website offers a PowerPoint that reviews findings and conclusions related to measures for infection control and a narrative summary of an expert review panel. The Agency for Healthcare Research & Quality (2013) website is a quality improvement page lead by the Federal agency charged with improving the safety and quality of the country's healthcare. It offers a progress report on the latest national CLABSI infection rate, discusses the country-wide prevention project, and offers a detailed bundle. The Garber & Puopolo (2015) article addresses the nature of CLABSI in the NICU and the complications as well as best practices and real time

surveillance for distinguishing infection control. The Ting, Goh, & Osiovich (2013) study is a retrospective observational study based in Canada that praises the importance of staff education and introduction of bundles. The site of this project will be on surveillance of patient charts and labs. Careful observation will be on any positive blood cultures or increase in markers indicating an infection.

Timeline

The project began in late February and will conclude in Mid-May with continued observation until December. Refer to Appendix C for timeline. The first phase of the project took place from February 28-March 13, consisted of identifying the issue and locating the cause. This phase included composing a questionnaire/survey and comparing it to the latest policy. The second phase will take place from March 14-April 15, and will consist of developing a procedure and implementing it. Staff education will be indicated during this phase. The last phase will take place from April 16-May 17, will consist of reinforcing the new procedure and strict monitoring and evaluation to make sure all staff is complying. Patients particularly with PICC lines will be assessed with specific attention to their labs.

Expected Results

The success of this project should result in 0% infections within this microsystem. Further central line infections should be easily avoided with proper compliance. I hope to possibly start a No CLABSI campaign which is already implemented on other units that consist of strict guidelines for preventing CLABSI. This campaign will bring continued awareness to CLABSI by education. The unit would benefit the most with signs up affirming the No CLABSI campaign and stressing the new PICC line maintenance procedure and technique.

Nursing Relevance

The reduction of bloodstream infections in the neonate population will drastically increase quality of care and decrease hospitalization. By preventing this infection, the neonate will have one less complication in care and potential drawback. Parents and caregivers will also have one less stressor to worry about. Hopefully staff will perceive this project as a caution to practice by the book with all procedures despite their preference or expertise. All staff should be reminded that their preference doesn't always have a positive outcome. The appliance of evidence-based practice within this unit is a concept that should always be remembered. With proper research and preparation, change is possible. Evidence based practice is the only way to improve patient outcomes and maximize safety.

Summary

Hospital-acquired infections are a leading cause of morbidity and mortality in neonatal intensive care units (Ceballos, Waterman, Hulett, & Makic, 2013). It's estimated that each neonatal bloodstream infection costs about \$35,000 and adds about two weeks to a baby's hospital stay (Akron's Children Hospital, 2015). When a newborn contracts a bloodstream infection, not only does it compromise their immune system, but it affects that quality of life. Reducing the CLABSI rate to 0% in the NICU has been a challenging yet beneficial experience. This 40 bed microsystem encompasses a vulnerable population of patients who cannot advocate for themselves. I found this project very rewarding at the mere fact that I could have an impact on all of these patient's lives. The goal of the project was not only to reduce infection, but improve quality of care. By eliminating infections, I was able to enhance quality care by preventing any further complications aggravated by CLABSI.

Although I encountered barriers along the way which included: starting late, staff opinions, and delayed response of the Epidemiology department, I was still able to be successful. With the use of the root-cause analysis, Kurt Lewin's Three-Step Change Model, and the unit survey, I was able to introduce the central bundle for care maintenance. The central line bundle which has been updated in the unit structure standards now serves as the blueprint for central infection control. Staff education included emphasizing the use of this bundle along with proper hand hygiene, strict documentation, and use of alcohol caps. Since applying this infection control method, I was able to meet my goal. The CLABSI rate currently, for the end of April is 0% (see Appendix D). From the beginning of 2017, the rate decreased back down to 0%. Through dedication and continued observance I hope to keep this rate down. My sustainability plan will consist of the Stop CLABSI campaign. This campaign will continue heighten awareness of central line infections, stress maintenance compliance, and spotlight staff training. Overall I learned that change is only possible the cooperation of every staff member. When everyone is on the same accord, outcomes can be achieved.

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Appendix A

PICC Line Dressing Change Questionnaire

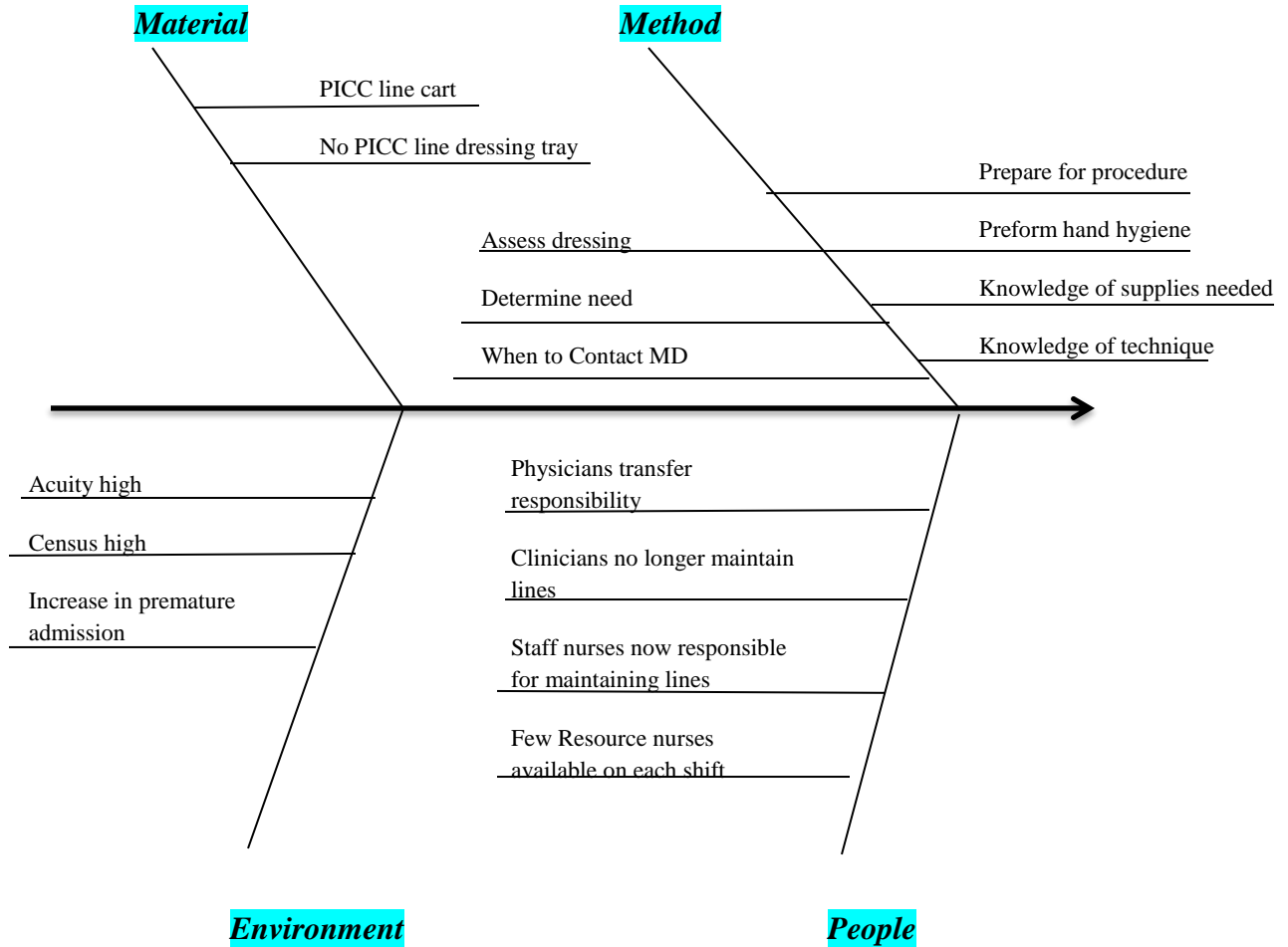
Are you a PICC Line Resource Nurse Y N Dayshift or Nightshift

What are the reasons that indicate the need for a dressing change?

How do you practice sterile techniques when changing the dressing? _____

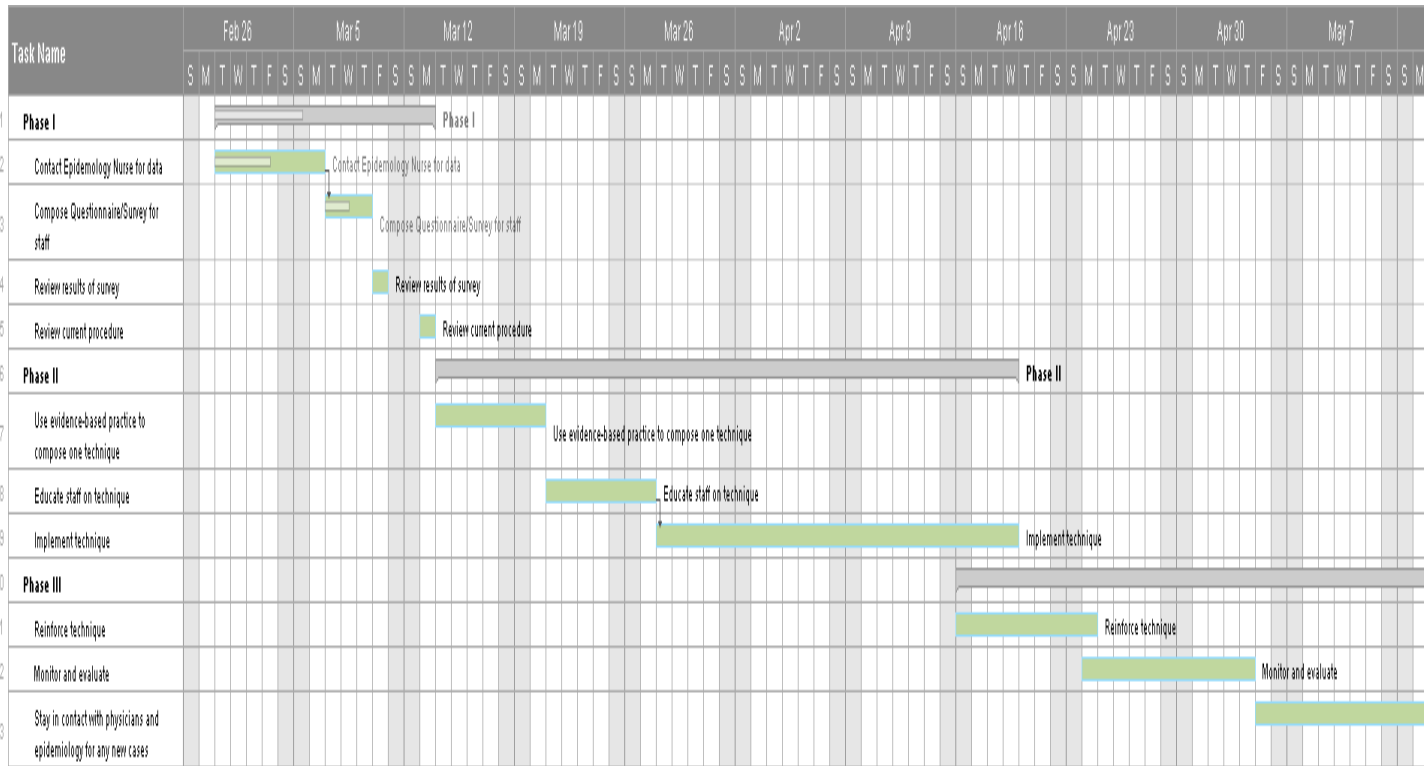
Appendix B

Root-Cause Analysis



Appendix C

Gantt Chart & Timeline Table



Task	Start Date	End Date	Assigned to
Phase I	02/28/17	03/13/17	
Contact Epidemiology Nurse for data	02/28	03/06	CNL(me)
Compose Questionnaire/Survey for staff	03/07	03/09	CNL(me)
Review results of survey	03/10	03/10	CNL(me)
Review current procedure	03/13	03/13	CNL(me)
Phase II	03/14/17	04/19/17	
Use evidence-based practice to compose one technique	03/14	03/20	CNL(me) & CNS
Educate staff on technique	03/21	03/27	CNL(me)
Implement technique	3/28	04/19	Staff RNs
Phase III	04/16/17	05/17/17	
Reinforce technique	04/16	04/24	CNL(me), CNS, Charge RN, Nurse Manager
Monitor and evaluate	04/24	05/04	CNL(me)
Stay in contact with physicians and epidemiology for any new cases	05/05	05/17	CNL(me)

Appendix D

Results

CLABSI Events

