The Art and Science of Infusion Nursing

Reducing Central Line-Associated Bloodstream Infection Rates in the Context of a Caring-Healing Environment

A Patient Safety Program Evaluation

Daphne Hanson, DNP, MSN, RN, NE-BC, LHRM

ABSTRACT

Central line-associated bloodstream infections (CLABSIs) prove to be detrimental to both the patient and the hospital. The present study was a quality improvement training project to affect CLABSI rates in the cardiac intensive care unit in the context of a caring-healing environment, and contributed to a culture of patient safety to empower staff to speak up if they see a breach in protocol at any time. A caring-healing environment encouraged staff to take the extra time and precautions to prevent infections for their patients and created a better quality of care for the patients.

Key words: central line-associated bloodstream infection (CLABSI), infection control training, patient safety, quality improvement

PROBLEM STATEMENT

Central line-associated bloodstream infections (CLABSIs) are some of the most lethal hospital-acquired infections, costing health care institutions up to $45 000 per infection and yielding a mortality rate of 18%.[1] The Institute for Healthcare Improvement noted that when patients develop CLABSIs, not only must antibiotics be initiated, but hospitalizations must be extended an average of 7 days.[2] The Centers for Disease Control and Prevention (CDC) estimated that approximately 41 000 preventable CLABSIs occur in U.S. hospitals every year.[3] Because the CLABSI rate is a reportable measure enforced by the Centers for Medicare and Medicaid Services (CMS), it is important to note that not only can a high infection rate affect reimbursement, but it can also negatively impact the public's perception of the hospital. The requirements stipulated in the CMS Hospital Value-Based Purchasing program regarding infection control have stiffened, most notably with respect to hospital-acquired CLABSI rates.

The most important and compelling nursing motivations for decreasing hospital CLABSI rates are to optimize quality of care and to promote patient wellness. With an unacceptable rate of 3.4 infections per 1000 central line days in the cardiac unit, efforts were needed to reduce this rate. This study was conducted to investigate an intervention designed to reach this necessary goal.

PURPOSE

The purpose of this study was to determine whether a comprehensive training program that promoted a caring-healing environment and culture of patient safety could effectively reduce the cardiac intensive care unit (ICU) 2014 rate of 3.4 infections per 1000 central line days to 0 infections per 1000 central line days. This study was completed in a large nonprofit south Florida community hospital in 2015.

CLABSI may threaten patients' lives, yet it is largely preventable. The threat may be costly for an institution; it can affect financial reimbursement as well as compromise the reputation of a hospital. Action to effectively reduce incidence of CLABSI was considered to be of critical importance.

Author Affiliation: *Christine E. Lynn College of Nursing, Florida Atlantic University, Boca Raton, Florida.*

Daphne Hanson, DNP, MSN, RN, NE-BC, LHRM, *holds a doctor of nursing practice degree from Florida Atlantic University. She graduated with a master's degree in nursing administration and finance, is board certified as a nurse executive, and holds a certification in cardiovascular excellence and nursing care. Daphne is currently the director of quality and risk management at a hospital in South Florida.*

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Corresponding Author: *Daphne Hanson, DNP, MSN, RN, NE-BC, LHRM, Christine E. Lynn College of Nursing, Florida Atlantic University, 10394 Prato Street, Wellington, FL 33414 (dacajo007@yahoo.com).*

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OPERATIONAL DEFINITIONS

- *CLABSI:* A laboratory-confirmed bloodstream infection (LCBI) where a peripherally inserted central catheter (PICC) or umbilical catheter (UC) was in place for >2 calendar days on the date of event, with day of device placement being day 1; AND
  - A PICC or UC was in place on the date of event or the day before;
  - If a PICC or UC was in place for >2 calendar days and then removed, the date of event of the LCBI must be the date of discontinuation or the next day;
  - If the patient is admitted or transferred into a facility with an implanted PICC in place, and that is the patient's only PICC, day of first access in an inpatient location is considered Day 1.[4]
- *CLABSI per 1000 central line days:* This score is the number of CLABSIs among patients per 1000 central line days. PICCs are counted each day. Each patient with 1 or more PICCs at the time the count is performed is counted as 1 central line day.[4]
- *Pre- and postassessment tool:* To identify reasons for the high infection rate, nurses and physicians working on the unit with the highest incidence of CLABSIs were given a pre- and postassessment that had previously been tested for reliability and validity.
- *Adult patient:* Male or female individual, 18 years or older, admitted to the inpatient intensive care.
- *Central catheter:* An intravascular catheter that terminates at or close to the heart or in 1 of the great vessels, which is used for infusion, withdrawal of blood, or hemodynamic monitoring (ie, peripherally inserted central catheter, central vascular access device, dialysis catheter, or arterial catheter).
- *Great vessels for the purpose of reporting central line bloodstream infections and counting central line days in the National Healthcare Safety Network system:*
  - Aorta
  - Pulmonary artery
  - Superior vena cava
  - Inferior vena cava
  - Brachiocephalic veins
  - Internal jugular veins
  - Subclavian veins
  - External iliac veins
  - Common iliac veins
  - Femoral veins
- *Bloodstream infections (BSIs):* Laboratory-confirmed bloodstream infections
- *Access:* Defined as catheter placement, infusion, or withdrawal through the catheter. Such catheters continue to be eligible for CLABSI once they are accessed until they are either discontinued or the day after patient discharge. Note that the "de-access" of a port does not result in the patient's removal from CLABSI surveillance.
- *CLABSI rate:* (number of CLABSIs identified/number of central line days) × 1000[4]

PROJECT OBJECTIVES

The most important and compelling nursing motivations for decreasing hospital CLABSI rates are to optimize quality of care and to promote patient wellness. Therefore, it was the purpose of this quality improvement project to decrease the CLABSI rate by improving compliance with protocol in the cardiac ICU within the context of a caring-healing environment, and to champion a culture of patient safety. The goal was to increase health care worker knowledge of the cause, progression, and physical and financial toll of CLABSIs, all in a concerted effort to effectively decrease CLABSI rates. The adoption of a caring-healing environment was designed to encourage the staff to take the necessary precautions and extra time to prevent CLABSIs, and will serve to empower them in the future to guide others who have breached protocol. "Caring begins with being present, open to compassion, mercy, gentleness, loving-kindness and equanimity toward and with self before one can offer compassionate care to others."[5(pxviii)] The purpose was to decrease the 2014 CLABSI rate of 3.4 infections per 1000 central line days via a comprehensive and effective training program. To accomplish this, a pretest assessment questionnaire by which physicians and nurses in the ICU of interest were assessed with regard to their training, readiness, and ability to prevent CLABSIs was administered. An evidence-based training course using Watson's caring framework[5] prepared the nurses and physicians for a higher quality of patient care. A posttest questionnaire was administered after the training was implemented. The CLABSI rate was collected by adherence to CDC guidelines of (number of CLABSIs identified/number of central line days) × 1000.

LITERATURE REVIEW AND SYNTHESIS

Similar research studies have undergone similar programs at their hospitals in an effort to decrease CLABSI rates. Effective training and teaching are essential when it comes to proper infection control and nursing protocols and procedures. Parra et al[6] prove that evidence-based training is effective in reducing the incidence of CLABSIs in the ICU. The study also used a pre- and posttest as an outcome measurement for nursing knowledge and the validity of the training provided. The pre- and posttest measurement of health care worker knowledge was a goal to replicate in this project.

Adriana et al[7] also analyzed how a training program would impact CLABSI rates in a surgical ICU with the inclusion of the infection control department. The interactive training program and infection control personnel rounding

sustained long-term decreases in the unit's CLABSI rate. The presence and support of a physician epidemiologist has also proven to reduce CLABSI hospital rates.[8] The success shows the importance of working together between the infection prevention team and ICU health care workers for achieving the goal of reducing infections in the ICU.

The Leapfrog Group, which benchmarked hospitals with the lowest rates for CLABSI prevention, used a qualitative observational study to show how hospitals reduced their CLABSI rates. The study found that these points—hand hygiene, maximal sterile barrier precautions, chlorhexidine skin antisepsis, appropriate insertion site selections, and prompt removal of unnecessary catheters—all proved to reduce CLABSI rates in the target hospitals they reviewed.[1]

Render et al[9] noted that the U.S. Department of Veterans Affairs hospital system quality infrastructure successfully reduced its CLABSI rates when it included the following: engaging multiple levels of leadership, support of the microsystem, measurement, benchmarking, tools, policies/procedure samples, training, interdependence with daily goal sheets, performance results, and information technology.

Bianco et al[10] found that a knowledge deficit in hand hygiene was contributing to higher CLABSI rates. Health care workers' hands represent the main route of transmission of hospital pathogens, and hand hygiene is the most basic and essential intervention for reducing hospital-acquired infections. The study showed that written policies, formal training in infection control and hand hygiene, and length of experience working as a nurse all contributed to a reduction of CLABSI.

Guerin et al[11] assessed the effectiveness of daily inspection of the central catheter, site care if the dressing was wet, soiled, or had not been changed for 7 days; documentation for ongoing need of the catheter; proper application of chlorohexidine gluconate sponge at the insertion site; performance of hand hygiene before handling the intravenous (IV) system; and alcohol scrub to the infusion hub for 15 seconds before each entry. The study demonstrated that implementation of a central catheter quality assessment routine was associated with a significant reduction in CLABSIs. The study states that with staff training and reinforcement of proper central catheter care after insertion, along with careful cleaning of the hub before each access, staff can reduce the incidence of infection on inpatient units.

The theme throughout the research articles on CLABSI prevention is the importance of an informed health care practitioner. Health care personnel should understand the appropriate care and maintenance needed to prevent CLABSI infection after central catheter insertion as well as the proper techniques in postinsertion care.[12] The research of Zaiton and Taha[12] assessed the effect of implementing central line bundles to minimize the rate of CLABSIs among ICU patients. The recommendation that arose was that nursing needs to be empowered to enforce the use of central line bundles to be sure that all processes related to central catheter placement are executed for each placement. This study was aligned with this project of creating a patient safety environment to empower staff to voice their concern if they see a breach in protocol at any time.

CONCEPTUAL FRAMEWORK

The theoretical framework chosen was Jean Watson's Theory of Human Caring. The theory encompasses the practice of loving-kindness and equanimity, being authentically present by enabling deep belief of other, cultivating one's own spiritual practice toward wholeness, being in the caring-healing environment, and allowing miracles to occur.[5] Being in the caring-healing environment allowed the nurse empowerment to speak up if she or he viewed a breach in protocol. The prevention of a bloodstream infection relies very heavily on the nurse's authentic presence with the patient and being cognizant of taking the extra steps necessary to prevent a bloodstream infection from occurring. The theory also harbors a moral commitment to protect and enhance human dignity by respecting the patient's needs, which is very important with ICU patients. The project created a caring-healing environment in which the nurses, physicians, and doctors were authentically present with the patient, which enhanced human dignity by providing a safe environment of care.

PROJECT DESCRIPTION

Steps in the Process

Nurses and physicians working on the unit with the highest incidence of CLABSIs were given a pretest to identify causes for the high infection rate. On evaluation of the data obtained from the pretest, nursing leadership assessed the 2014 infection control policies. An evidence-based training course using Watson's caring framework prepared the nurses and physicians for a higher quality of patient care. Evidenced-based training was conducted and disseminated to physician and nurse health care workers in the cardiac ICU during the month of May.

After full instructions were given, the unit was placed under observation for a 3-month period. At the completion of this period, the posttest was administered. The posttest was used to quantify a change in health care worker knowledge, with an improvement in scores denoting effective training. Training effectiveness was also determined by a decrease in the CLABSI rate. The control for the study was the CLABSI rate recorded on the same unit the previous year. Thus, the study's CLABSI rates were compared with the control group to assess whether a statistically significant improvement in rates existed.

Research Design

This study was conducted using an exploratory sequential mixed method design. Qualitative data were collected and used to develop an educational intervention. A pretest/posttest, preexperimental design was used to measure changes in knowledge and practice and to determine the effectiveness of an educational intervention. Lastly, a quasi-experimental design was used to compare the previous year's infection rate to the infection rates post intervention.

A quasi-experimental approach was used to conduct this study by combining the pretest/posttest assessment questionnaire with a control group to evaluate the educational intervention. The data were then analyzed using inferential statistics (χ^2 tests) because of their ability to allow conclusions to be drawn about the relationships between compliance rates before and after the educational intervention took place.

Statistical Treatment

The statistical method chosen for this study was the χ^2. Plichta and Kelvin described the χ^2 statistical method as a "nonparametric test used to assess whether a statistically significant association exists between the rows and columns in a cross-tabulation (contingency) table."[13(p456)] This method was chosen because the CLABSI rate in the cardiac ICU during 2014 was compared with the rate in 2015 after a comprehensive training program that was given to all of the treatment population, with the CLABSI rate of the same unit during the previous year when no training program was given. The overall objective was to decrease the number of infections as a result of the educational intervention. A χ^2 was completed for each question in the pretest/posttest questionnaire to evaluate the statistical significance of each response.

Participants

The study participants for this research were divided into 2 distinct categories: treatment population and outcome population. The total study participants in the treatment population consisted of the 150 health care providers who had patient access to the cardiac ICU and who had participated in the mandatory comprehensive training program regarding the proper care technique of PICCs. The pretest/posttest tool was an anonymous questionnaire given to all 150 participants. Participants consisted of both physicians and registered nurses working in the cardiac ICU during the study period. The sample from this research came from data collected on the total CLABSI rate on the cardiac ICU in 2015 and was compared with the total CLABSI rate from the same unit recorded the previous year. Criteria for sample eligibility in CLABSI outcome data included the following: adult patients in the cardiac ICU who were 18 years of age or older, had current inpatient status, and had a PICC inserted during their hospital stay.

Sampling Procedures

Sampling was conducted in a purposive manner. The data in this study stemmed from a very specific group of respondents: the ICU nursing and physician staff members who had inserted and maintained PICCs on the hospital's ICU with the highest CLABSI rates. Information was gained from only those individuals working on this particular unit. Every individual on the unit involved in insertion or maintenance of PICCs was placed in the study. The sampling procedure specific to the patient population for the CLABSI outcome data was as follows: every adult patient with a PICC from the cardiac ICU being studied was included as long as the PICC was not present before that individual's arrival.

Educational Intervention

The evidence-based training course was drawn from the most current CDC definitions of CLABSI, guidelines on PICC maintenance as well as from the hospital's infection control protocols and procedures. The education was developed and customized after the responses in the pretest questionnaire were completed in an effort to standardize the learning experience for the nurses and physicians. The learning began with the basic definition of what a PICC is and how the infection cultivates in a human body on insertion without correct sterile techniques and nursing maintenance on a day-to-day basis. The education focused on the importance of CLABSI rates to nursing as a publicly reported measure, as well as cost to the hospital and, most important, the harm it does to the patient. The physicians and nurses were then shown their individual unit's CLABSI rate when compared with the rest of the hospital as well as nationally. Patient acuity risk factors were discussed such as site of insertion (groin or jugular site pose a higher risk), multiple lumen catheters (the more the lumens, the more risk for infection), or infection elsewhere such as urinary tract infection or wound. The importance of hand hygiene, scrubbing the hub with a juicing motion for 5 to 15 seconds before access and having a free flowing blood return on catheter aspiration was also mentioned in the presentation, which are the current CDC guidelines for PICC care. Daily assessment of the PICC was reviewed, such as using aseptic techniques for access, inspecting the PICC site for signs of infection, always using a 10-mL syringe to access the PICC, flushing each lumen routinely every 12-hour nursing shift to maintain patency, and reducing a chance of embolism in the catheter. The electronic medical record documentation for PICC insertion, education, and maintenance was also reviewed in the class as well as teaching on empowerment to stop the insertion if you see a break in sterile procedure. A "Bad Habits" slide was presented on observed behaviors of nurses in the hospital when they did not have the correct supplies or were in a rush. The behavior consequences were explained to the physicians and nurses as detrimental to patients (Appendix 1). Lastly a caring-healing environment slide was discussed on the importance of patient safety and quality.

In addition, a focus was placed on both cultivating a caring-healing environment and on the critical importance of patient safety. The training was conducted by the hospital's education department within the unit being studied. The education department gave oral instructions to each individual and

conducted group-oriented presentations. The training occurred with biweekly educational sessions scheduled at different times for day- and night-shift health care workers.

Data Collection

CLABSI rate data were collected during the months of June through August, and the posttest was administered in September. Analysis of the data was completed when all the posttests were collected. The methods of evaluation were to demonstrate increased knowledge of CLABSI rates through the training competence tool.

The CLABSI rate surveillance was monitored with the assistance of the infection control coordinator at the hospital, who followed CDC guidelines for identification of an infection in a PICC. A pre- and postquestionnaire, evaluated for its reliability and validity, was used to help evaluate both the training effectiveness and the adoption of an improved culture of patient safety. The project outcomes measured were CLABSI rates, training effectiveness, and the culture of patient safety on the hospital unit. The data were paired with daily rounds of PICCs by the infection control team. The pre- and posttraining assessment tool data were analyzed using comparative χ^2 statistics. The data were trended to see whether an increase in CLABSI knowledge was directly correlated to a decrease in CLABSI rates.

Instrument

The pre- and postquestionnaire, used in a previous CLABSI performance assessment and improvement project (Appendix 2), had been tested for reliability and validity, and was selected to identify reasons for the high infection rate. Ramos and Beriones[14] tested the tool for usability at the Methodist Hospital in Houston, Texas. This tool was created using the plan-do-check-act process model, which had its underpinnings from the Johns Hopkins' comprehensive unit-based safety and translating evidence into practice conceptual model. The final 3 questions, designed to assess patient safety, were from the Agency for Healthcare Research and Quality's Hospital survey on patient safety.[15]

RESULTS

A data analysis was completed by providing binary codes for the pre- and posttest answers for each response posed on the questionnaire. To determine whether a statistically significant change occurred, a χ^2 analysis was completed for each item. According to the results, there were no significant associations noted between the educational intervention and the staff's compliance with labeling the PICC dressings, $\chi^2(1,150)=0.207$, $P=.324$, changing soiled or loose dressings, changing the transparent dressing weekly, scrubbing the hub, or changing tubing per protocol, all of which reflect the following data, $\chi^2(1,150)=1.007$, $P=.158$. Though not statistically significant, it is important to note that for each of these activities, staff compliance actually decreased. Instead of comparing the total scale score it was most beneficial to investigate each item to help evaluate what areas the training and checklist were improving the most.

Some significant changes were noted, however. According to the Pearson χ^2 analysis, there was a significant association between educational intervention and an increase in the frequency in which the needleless access ports were changed $\chi^2(1,150) = 3.061$, $P = .04$. Additionally, there was a significant association between educational intervention and a change in the participants' perception of whether or not mistakes were held against them, $\chi^2(1, 150) = 31.452$, $P < .001$, suggesting that this perception had decreased. In support of this finding, the posttest indicated an improved outlook regarding the participants' ability to speak up when an action was not in alignment with the facility protocol or with best practice, $\chi^2(1, 150) = 16.667$, $P < .001$. Finally, and most important, there was a statistically significant decline in the occurrence of CLABSI following the intervention, $\chi^2(1,2000) = 5.496$, $P = .009$, when compared with the CLABSI rate from the same unit the year before.

Care barriers had 3 subsections: lack of time, lack of supplies, and lack of knowledge regarding standard practice and protocol. In general, there was a statistically significant change among all the perceived barriers, $\chi^2(2, N = 150) = 32.557$, $P < .001$; however, staff increasingly identified lack of supplies as the primary obstacle in providing appropriate care. This may be the result of an increase in knowledge regarding which supplies are considered appropriate for proper PICC care, or it may be attributable to an unknown factor. The increase in the identification that a lack of supplies affects care, and the decrease in compliance with certain care techniques, are both important issues that could be considered subjects for further exploration.

Overall, the data represent a significant improvement in compliance with many factors related to lowering CLABSI rates. The data also support a significant decrease in the occurrence of PICC infections, as evidenced by the final data reflecting a decrease from the 3.4 infections per 1000 in 2014 to 1.2 per 1000 central line days infection rate in 2015 (Appendix 3). There are multiple points that require further inquiry and could, therefore, be the focus of future research. Qualitative data and participant identifiers may have clarified the rationale for the unexpected changes.

HYPOTHESES AND RESULTS

The research hypothesis—that evidence-based CLABSI training, in the context of a caring-healing environment with an emphasis on patient safety, would decrease ICU CLABSI rates in high-risk adults when compared with the CLABSI rates from the same month in the previous year—was tested and proven to be true. The results of this study suggested that implementation of a CLABSI training program, which focused on CLABSI reduction and patient safety, would result in an increase in each participant's knowledge

of policies and procedures, and thus in a higher degree of compliance to protocol. The evidence indicated that nurses and physicians not only gained a higher level of understanding of CLABSI through training, but that their ability to detect CLABSI early had improved. Readministration of the questionnaire not only evaluated knowledge gained, but exposed the facility's need for ongoing educational updates and daily infection control rounds.

There was no significant association between educational interventions and whether the staff label the PICC dressing, change soiled or loose dressings, or scrub the hubs. There was, however, a significant association between educational intervention and an increase in the frequency with which the needleless access ports were changed. There was also a significant association between educational intervention grounded in caring and the perception of whether or not mistakes are held against staff members. After the intervention, the staff felt significantly more confident in their ability to speak up when they observed breaches in PICC care.

DISCUSSION

The goal to decrease the CLABSI rate to fewer than 3.4 infections per 1000 central line days with an effective training program was met. The repercussions of CLABSI are formidable. CLABSI not only threatens the life of the afflicted patient, but it can also destroy a hospital's reputation and financial stability. The CDC has a zero tolerance for CLABSI, and the CMS has mandated that no hospital will be reimbursed for the care of a patient who develops CLABSI. In a concerted effort to lower the incidence of CLABSI from 3.4 infections per 1000 central line days in the hospital's cardiac ICU, this study has shown that an educational intervention grounded in caring could effectively reduce this number, while simultaneously building a culture of patient safety and staff cooperation. The implications of this study are far-reaching and can be viewed as a template for hospitals everywhere. It has also opened the door for further exploration into the fine-tuned determinants of CLABSI. Most important, however, in its journey toward eradication of CLABSI, this study has made an important and noble effort to prove that education, in the spirit of a caring-healing milieu, can effectively facilitate any hospital's aspiration to reach for that previously elusive, albeit critically needed, zero.

CONCLUSION

The unacceptable 2014 CLABSI rate at the cardiac ICU was 3.4 infections per 1000 central line days. By implementing a comprehensive CLABSI-reducing training program that embraced a caring-healing philosophy, the hospital was able to successfully lower its 2015 rate to 1.2 infections per 1000 central line days during the observation period. This downward trajectory of the CLABSI rates from 2014 to 2015 proved to be a positive quality indicator that evidence-based training can help prevent CLABSI. By cultivating a culture of zero tolerance for CLABSI, the hospital has reduced morbidity, saved lives, and controlled hospital costs. By using Watson's caring theory as a conceptual framework to formulate and reinforce caring within a health model that emphasizes patient safety, the hospital can significantly impact its long-term rate of CLABSI. By addressing the attitudes and behaviors of both nurses and physicians and by assessing their technical skills, improvement in performance and effective teamwork can be realized. Health care workers should now be able to voice their concerns freely when they see a breach in infection control protocol without the threat of punitive action.

LIMITATIONS

Limitations included not only the inclusion of new staff members, but the loss of educated employees during the observation period. In addition, the study was limited by the inability to reach all physicians and nurses for CLABSI training because of scheduling conflicts. Because the education was targeted toward visual (PowerPoint) and audiovisual (teaching/talking) learners, and not toward tactile (those who learn by physically actually doing the tasks) learners, some participants could be viewed as having been at a disadvantage. Also, assumptions have been made that participants answered the questionnaire honestly and that they paid attention to and understood the CLABSI educational material. It is also assumed that the training sessions affected the behavior of the health care workers.

IMPLICATIONS

The results from this study indicate that there was an overall positive correlation between the implementation of educational intervention and a decrease in the CLASBI rate. Further assumptions can be made that the baseline compliance of policies and procedures relating to PICCs before the intervention were poor, but after receiving education, the compliance increased, inevitably contributing to the decrease in the overall CLABSI rate.

Additional findings revealed that there was a decrease in compliance with regard to care barriers, specifically those involving a lack of supplies. Nurses may be unable to do their job properly in the event of a supply shortage. This may have been a major contributing factor to the decrease in staff compliance, and would, therefore, warrant further evaluation. In addition, implications for practice should focus on a reduction of CLABSI rate for quality improvement across all hospital settings. This study was a good indicator that best practices lead to quality patient care. By providing appropriate resources and useful tools, nurses can be

better equipped to provide the type of optimal, quality care that all patients deserve.

SUGGESTIONS FOR FURTHER RESEARCH

The suggestions for further research include tracking the difference in infection rates depending on who placed the PICC (physicians or nurses) and determining whether the rate is higher depending on where the catheter was inserted (ie, emergency room or operating room). Research can also be implemented on whether the infection rate is influenced by the anatomical location of the catheter insertion site. Finally, research could be conducted on developing and evaluating strategies to remove reported barriers to following practice guidelines.

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APPENDIX 1

Bad Habits

What should be done	DO NOT
When disconnecting the IV from the patient, put the correct sterile cap on the end.	Loop the end back up on to itself.
Scrub the hub for 5-15 seconds.	Just connect and push when in a rush.
Change the IV tubing every 4 days.	Pass it off to the next shift.
Throw away NS flush after part of it has been used/given.	Recap and keep in your pocket-This will harbor infections in the cap.

REMEMBER to Practice Watson's Caring Theory!

- The being in the caring-healing environment allows the nurse empowerment to speak up if they view a breach in protocol.
- The prevention of a blood stream infection relies heavily on the nurse's authentic presence with the patient and being cognizant of taking extra steps necessary to prevent an infection.
- Watson's caring theory harbors a moral commitment to protect and enhance human dignity by respecting the patient's needs which is important with ICU patients.
- We want to create a caring-healing environment in which the nurses and physicians are authentically present with the patient to order to enhance human dignity by providing a safe environment of care.

Watson (2008)

APPENDIX 2

Central Line-Associated Bloodstream Infection Prevention Project

Please answer these questions honestly to help us improve the practice (all questionnaires are anonymous).

1. During your daily practice on your unit do you consistently comply with the following standards of practice/policies and procedures for handling central venous catheters?
   a. Do you change the transparent dressings weekly per protocol?[14]
   ☐ YES ☐ NO
   b. Do you change the dressing when it is soiled, bloody, or loose?[14]
   ☐ YES ☐ NO
   c. Do you date the dressing with the insertion and dressing change date?[14]
   ☐ YES ☐ NO
   d. Do you scrub the hub with a juicing motion for 5 seconds with alcohol swab before every use and as needed?[14]
   ☐ YES ☐ NO
   e. Do you change the IV tubing every 4 days?[14]
   ☐ YES ☐ NO
   f. Do you change needleless valves every tubing change?[14]
   ☐ YES ☐ NO
2. Please check the barriers that you feel prevent you from consistently complying with the standards of practice/policies and procedures.[14]
   ☐ Lack of time ☐ Lack of supplies ☐ Lack of knowledge about policy and procedure[14]
3. Do you feel mistakes are held against you on your unit?[15]
   ☐ YES ☐ NO
4. Can you freely speak up if you see something that may negatively affect patient care?[15]
   ☐ YES ☐ NO
5. Please feel free to write any comments about patient safety, error, or event reporting in your unit.[15]

APPENDIX 3

Central Line-Associated Bloodstream Infections 2014 through 2015