2014

Decreasing Central Line Complications with a Dedicated Team Approach

Donna DeGennaro
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Donna DeGennaro

has been found to be completed and satisfactory in all respects,
and that any and all revisions required by
the review commit have been made.

Review Committee
Dr. Sue Bell, Committee Chairperson, Health Services Faculty
Dr. Mercy Popoola, Committee Member, Health Services Faculty
Dr. Oscar Lee, University Reviewer, Health Services Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2014

Decreasing Central Line Complications with a Dedicated Team Approach

by

Donna DeGennaro

MS, Walden University, 2007

BS, University of Central Florida, 2005

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

December 2014

Abstract

Central-line catheters save lives, but they can also bring about complications, such as hospital-acquired infections. The Institute of Healthcare Improvement has collected data indicating that using proper insertion techniques and maintenance care, known as "the bundle," can prevent bloodstream infections associated with central lines. Progress has been made toward that end: The bundle has been used in intensive care units in a variety of hospitals and reportable central-line infections have decreased by 38%. However, because infections continue to occur inside and outside intensive care units, more needs to be done to protect all patients from these deadly infections. The purpose of this project was to initiate a dedicated central-line access team to insert and maintain all central-line apparatus at the target hospital. One month of data was collected before and after implementing the dedicated team approach and included when the order was written, when the central line apparatus was inserted, who inserted the central line, the number of infections, and the number of complications associated with the central-line apparatus. According to the results, complications, such as infections and occlusions—known to be associated with central lines—decreased twofold and placement delays decreased by 3 hours (57%). The results support the establishment of a committed multidisciplinary team to insert and maintain all central lines. Hospital safety and quality departments will be interested in the methods and outcomes of this project that reduced central line-associated bloodstream infections, decreased treatment delays, and saved the patient and the healthcare organization from costly additional services.

Dedicated Team for Central Line Placement

by

Donna DeGennaro

MS, Walden University, 2007

BS, University of Central Florida, 2005

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November, 2014

Acknowledgments

I wish to acknowledge Walden University for their support in producing this work. I would also like to take this opportunity to acknowledge the following individuals for their guidance and expertise:

Dr. Cheryl Holly

Dr. Julia Bucher

Dr. Mercy Popoola

Dr. Deanna Reising

Dr. Sue Ellen Bell

Table of Contents

List of Tables

Section 1: Overview of Evidence-Based Project

Introduction

The majority of patients who come into the hospital require intravenous catheters for medication and fluids. Some medications can only be given intravenously into the central circulation system through a central line catheter. These central lines are a vital link for the majority of infusion treatments in acutely and chronically ill patients. They are used as a portal to transport life-saving medications into the bloodstream system. Along with their life-saving benefits, come risk factors. These risk factors are known to cause additional complications such as a central line-associated bloodstream infection (CLABSI). They can cause substantial morbidity and additional expense (Guerin et al., 2010). Various studies have been collected on methods utilized to decrease the incidence of CLABSIs including going beyond the bundle and establishing a multi-disciplinary team for the insertion and care of these central line catheters. A multi-disciplinary team will be able to perform the surveillance needed to eliminate CLABSIs, decrease mortality rates and associated cost factors. The purpose of this section is to introduce the research project and the array of known problems related to the central line-associated bloodstream infections (CLABSI) and complications.

Background

Central line-associated bloodstream infection prevention programs have shown great success in the intensive care units (ICUs). Infection rates related to CLABSIs have been reported from various hospitals to the National Healthcare Surveillance Network ranging from 0.2 to 4.2 infections per 1,000 catheter days, showing a 38% decrease (Sons

et al., 2012). Even though the infection rates have decreased, they still happen. Further investigation has revealed that the surveillance routinely performed in the units is not as stringent in other areas of the hospitals (Guerin et al., 2010). The success of the units CLABSI prevention programs has trigger regulatory agents to call for expansion of efforts that will go beyond the bundle with the focus on other inpatient areas of the hospital (CDC, 2009). The implementation of having a committed multi-disciplinary team to oversee all central line catheters throughout the hospital can prove to be an asset for the hospital settings

Problem Statement

According to the Centers for Disease Control and Prevention (CDC; 2008), an estimated 41,000 CLABSIs occur each year in the hospitals nationwide (p. 3). The estimated cost for treatment of a CLABSI is approximately $38,000.00 per case (SHEA, 2009). Unfortunately, the implementation of other than basic care for preventing central line infections was not on the forefront until the Medicare and Medicaid Services (CMS) declared there would be no reimbursement for hospital-acquired infections (HAIs). This CMS regulation went into effect October 1, 2008 (CMS, 2008). Hospitals are now required to report all CLABSIs in the intensive care units (ICUs) to the National Healthcare Safety Network (NHSN) of the Center for Disease Control (CDC, 2009). Aggressive measures have been initiated nationwide utilizing the concept of the "bundle" requested by CDC and IHI at the time of insertion of a central line apparatus. The results reported to NHSN shows a promising improvement. CLABSIs are starting to decrease in the ICUs. Implementing proven interventions outside the ICU areas and expand it

throughout the entire hospital utilizing a dedicated team approach for inserting and monitoring all central line apparatuses is the next step. Attaining the goal of reaching and sustaining a zero infection rate with CLABSIs will prove to be a reality that can be achieved.

Preventive intervention practices will exceed the bundle by employing a committed multi-disciplinary central line team for the entire hospital. Establishing a recognized dedicated team to perform stringent surveillance throughout the entire hospital will provide data collection of maintenance compliance. This compliance includes proper dressing changes, daily review of line necessity, early signs and symptoms of complications including delays of catheter insertion. These data will provide the information needed to justify having a dedicated team to insert and monitor all central line apparatuses throughout the entire hospital and will help achieve better patient outcomes. While the ICUs are the only required reportable CLABSIs, it is estimated that the actual rate for CLABSI in the hospital setting is approximately 3 times higher than what is reported, if it were to include the non-ICU settings (Klevins et al., 2007). The data collected consisted of tracking all central line catheters utilizing the definitions and formula from the Center for Disease Control and Prevention to measure outcomes (CDC, 2009). The team utilized the same methodology from the ICUs into the other inpatient areas following a similar preventive program structure with the plan to reach the same type of success that the units

Purpose Statement

Utilizing the expertise of a dedicated team approach at the time of admission can provide the best vascular access in an efficient manner. The ability to avoid delays in treatment related to vascular access can improve patient outcomes. The team consisted of physicians and nurses specialized in vascular access for the entire hospital. Approximately, 90% of patients admitted to the hospital need a type of vascular access to deliver intravenous medication, blood products, and fluids (CDC, 2009). Approximately 40% of those patients will require their access to be placed in a central location known as a central line access (CLA). Physicians are the only ones who can place direct access into the central venous system. However, registered nurses who obtain advanced training in vascular access can place a peripheral inserted central line catheter (PICC) into the upper extremity, and advance the catheter into the central venous system. Both types of access are associated with risk factors such as pneumothorax, accidental arterial puncture, air embolism, and cardiac dysrhythmia. CLA are associated with infection; they can act as a conduit for infections that could advance into septicemia, a life-threating infection. It is of the upmost importance that these CLA are cared for appropriately because the majority of these patients are critically ill, and their immune systems are already jeopardized. Infections that become clinically evident within 48 hours after admission are deemed HAIs, which means no reimbursements for hospitals. There are three categories of hospital-acquired infections:

- Iatrogenic – infections associated with intubation, indwelling lines.
- Organizational – infections associated with contaminated air conditioning,

water, beds too close, staffing levels, staff skill and expertise.

- Patient related – infections associated with the type of illness, acuity, length of stay.

In additional to the measures included in the bundle to prevent CLABSIs, the literature and data collected supports having a dedicated team not only to insert the central lines but also to monitor and maintain the central line apparatus. This intervention has proven to decrease CLABSIs in the hospital setting by eliminating iatrogenic (central line) and organizational (staff skill and expertise) causes associated with central line infections.

Definition of Terms

Bundle - Grouping of best practices applied together results in a substantially greater improvement (IHI, 2009). The bundle consisted of a sterile gown, gloves, mask, buffont, antimicrobial wafer, and chlorhexidine gluconate utilized with insertion. In this project, a dedicated team was also added.

Central line catheter - A catheter that resides in the central venous system (subclavian, superior vena cava, brachial-cephalic, inferior vena cava).

Multi-disciplinary team - Experienced vascular access register nurses, physicians and radiologists.

Significance/Relevance of Catheter Relate Infections

A significant issue with hospital patients who have a central line catheter is infection. Central line catheters provide the access needed for infusing medication. However, they are associated with a risk of acquiring a bloodstream infection caused by microorganisms colonizing the external surface of the device, and then being introduced into the bloodstream through the portal (Healthy People 2020, 2013). Catheter-related infections are a common cause for hospital-acquired infections (HAIs) among hospital patients due to improper care of the central line apparatus (Fridkin, Hageman, & Morrison, 2005). If the infection develops while patients are receiving care in the hospital, it is deemed an HAI (Healthy People 2020, 2013).

According to surveillance data from the CDC, an estimated 41,000 central line-associated bloodstream infections occur in hospitals throughout the United States each year (CDC, 2005). The surveillance was conducted in 12 states, South Carolina, Pennsylvania, Tennessee, New Jersey, Oregon, New York, Minnesota, Georgia, Maryland, California, Colorado, Rhode Island and Connecticut. These infections are not only costly to individuals and the health care systems, but they are also known to increase morbidity and mortality significantly. The encouraging news is that many HAIs are preventable when evidence-based guidelines are incorporated into patient care. The HAIs in the intensive care setting of hospitals have dropped because of such guidelines being followed, and now the focus is switching toward the step-down units throughout the hospitals. Because these areas often have limited capacity for oversight and infection control compared to the intensive care settings, the risk for HAIs has been identified as

being higher. Hospital step-down units have also been recognized as having a poor basic infection control practice that needs more attention (Klevins, Edwards, & Richards, 2002).

Project Question

One of the most common types of hospital-acquired infections is CLABSIs. CLABSIs have resulted in thousands of deaths each year and have increased the cost of healthcare by billions of dollars (Pronovost et al., 2011). The question addressed: Does having a dedicated team to oversee all central lines insertions in the hospital versus having the bedside nurse be responsible for the care and maintenance of the patient central line decrease CLABSIs? In PICO format the question is:

- P – Inpatients
- I -- Having a dedicated team to oversee all central lines
- C --Bedside nurses responsible for care/maintenance of central lines
- O --Decreased complications/infections with central lines.

The focus toward infection control among the hospitals has intensified. Questioning the prevention and control methods utilized is at the forefront of this scrutiny. Nursing practice is questioned on the way nurses handle, maintain, and monitor patients with central lines. Implementing evidence-based knowledge focused on reaching positive goals for better patient outcomes is a priority. To decrease the CLABSIs, hospitals need to be focused on prevention through clinical reasoning and preventive action (McCurry, Revell, & Roy, 2009). A research framework used to integrate evidence

into practice was used to help expedite the development of CLABSI prevention programs.

It is a nursing care responsibility to provide the best care possible and to follow infection control standards. Variables that might prevent strict adherence to standards are nurse to patient ratios and the acuity of the patients. The development and implementation of the hospital-wide dedicated team established overseen all central lines for inpatients and data collected reveals a decrease in CLABSIs. The hospital has not met its goal of zero CLABSI, but is steering in the right direction. Having a dedicated team has a better chance of following evidence-based protocols for preventive care by controlling conditions related to insertions and dressing care (Silow-Carroll & Edwards, 2011).

Evidence-Based Significance

For the last few years, hospitals have focused on implementing evidence-based practices to decrease central line infections in intensive care units (ICUs). This became an important issue to address after the CMS stated that stays for HAIs related to central line catheters, particularly in the ICUs, would no longer be reimbursed (CMS 2008). Numerous research projects claim that to prevent CLABSIs the "bundle" needs to be implemented (Stone et al., 2010). The bundle, consisting of five elements (hand washing, sterile barriers, proper cleaning prep, site selection, and continuous monitoring), has been recognized as effective by numerous federal agencies, including the CDC, the Society for Healthcare Epidemiology of America (SHEA), IHI, and others (CDC, 2008; SHEA, 2010; IHI, 2009). These federal agencies have recommended and supported the bundle

implementations (CDC, 2008). Bundles have been implemented throughout hospitals ICUs and have demonstrated a striking reduction in the rate of central line infections (IHI, 2009). During a 5-year period, reduction in rates ranged from 38% to 71% nationwide (Stone et al., 2010). Now is the time to take these EBP bundles and implement them throughout the other areas of the hospital such as the step down units. Taking the bundle and expanding it with additional evidence-based prevention methods hospital wide is the next hurdle for hospitals to conquer nationally in realistically reaching the goal of zero CLABSIs. Central line catheters are increasingly being utilized in the step-down units of hospitals, but without the appropriate follow up care (CDC, 2008).

HAIs are a serious and costly problem for healthcare, in financial terms as well as in prolonged hospitalizations and increased mortality. The economic impact can be enormous. In 2009, the decrease in HAIs in the ICUs saved $414 million in healthcare costs (CDC, 2008). Reducing HAIs is imperative in order to continue to reduce health care costs for consumers, payers, and hospitals (IHI, 2009). Taking the evidence identified and implementing it in hospitals nationwide will be financially effective. Patients expect to get better when they go to the hospital, not worse. Unfortunately, every year thousands of patients die from illnesses they contract after they enter the hospital (Scott, 2008). The $414 million saved through appropriate infection control measures represented 6000 lives saved (CDC, 2008). In order to provide best patient care, the central lines in the step-down units must be considered as important as the ones in the ICUs. Proper care must be continued to these units in order to prevent the introduction of

bacteria into the bloodstream during the frequent access to and care of the line. Stringent monitoring and maintenance recommended with the bundle for the ICUs must be implemented outside these units as well. Compelling evidence has shown that nearly all HAIs are preventable when staff members adhere to the preventive measures recommended (McCaughey, 2006).

Implications for Social Change

CLABSIs are a significant health problem. They can lead to longer lengths of stay, morbidity, mortality, and financial burden not only to the healthcare system, but to the families and individuals. Utilizing evidence-based guidelines on the care and maintenance of central line apparatus, the project was initiated in the step down units of the hospital. Empiric evidence toward the prevention of CLABSIs utilized by the dedicated team demonstrated to be effective in reducing the risk in hospitals. The strategies exploited consist of multiple interventions that bundled together have shown to be beneficial for the patient and the health care system (IHI, 2009).

Assumptions and Limitation

Once the protocol for a central line access team was in place, it was the assumption that nurses would follow the recommendations, and notify the dedicated team if there was any evidence of complications observed with the central line catheter in their patient. Another assumption was that physicians would place all their orders related to central line access under the consult for IV therapy in the patient's electronic healthcare record (EHR). This would trigger the dedicated access team to come and assess the patient, and identify the proper access needed. If deemed out of their scope of practice,

they would notify the physician on the team to come and place the central line. Limitations that were identified were toward the delays in placing the central line by the dedicated team physician. The team physician sometimes would wait to place the line until they finished their patient rounding. Another limitation acknowledged was when the dedicated team physicians left the hospital, they would request the nurse to find another team physician to place the line or ask one of the team nurses to place a short-term peripheral intravascular (IV) to prevent delay in medications that can be infused in a peripheral vein until the central line is placed by the physician.

Positive Attributes

Positive attributes of the team process in creating improvement are applying the tools, techniques, and methodology. This will help to understand, measure, innovate, improve, and manage the process to achieve quality while controlling cost and deliver organizational goals. One of the senior leader roles is to set the agenda for change and identify a process that will be a high priority for improvement that the team can adjust to easily. Setting specific goals such as decreasing CLABSI in the hospital will highlight a manageable scope because everyone is on board. Accomplishing goals can be achieved by empowering the team to develop efficient and effective approaches through the collection of evidence base data implemented into practice for no CLABSI by a set time is a priority. (Nicolini, Waring, & Mengis, 2011).

Engaging an array of stakeholders from the target population helped build the support needed for both internal and external buy-in including the support for the evaluation process. Stakeholders involved helped make the evaluation process more

unbiased, and helped enhance communication among the different representatives that collaborated and ensured the data collection was completed (Roberts & Mahoney, 2004). Having key stakeholders engaged into the program from the beginning helped support the program. Integrating communications, teamwork, and leadership helped create a "harm free" patient care culture toward patients needing a central line apparatus. The program created has a focused goal of decreasing catheter-related infections, which so far has been improving with the assistance of the facility stakeholder's involvement (Kallen, Arduino, & Patel, 2010). With their support, best practice toward the prevention of catheter-associated infections has been implemented throughout the facility and on a downward slide.

Summary

Reducing central line–associated bloodstream infections (CLABSIs) is still at the forefront of preventive care in hospital settings. In 2002, the Centers for Disease Control and Prevention established guidelines for the prevention of CLABSI by utilizing a bundle that consisted of five elements. Since the implementation of the recommended elements, CLABSIs have decreased but have not been totally eliminated. IHI (2009) reported the average cost for a CLABSI was estimated at $38,000.00 per incidence. Although hospitals are implementing and utilizing the bundle requested by CDC and IHI at the time of insertion of a central line apparatus, CLABSIs still occur. Reaching and sustaining a zero infection rate goal for CLABSIs can become a reality by going beyond the bundle to initiate a dedicated team to monitor and maintain central line apparatuses. The evidence has insinuated that by employing a dedicated team to insert all central line catheters,

including maintenance care and the monitoring for early removal of the catheter when deemed no longer necessary, will increase better patient outcomes by decreasing CLABSI. The team has adopted techniques and procedures learned through the collection of evidence from the literature that can reduce the harm to patients through central line infections.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Review of Literature

The purpose of this section is to provide a review of the literature that is relevant for validating the necessity of having a dedicated vascular access team. Strategies for the prevention of CLABSIs will also be reviewed along with recommendations for the insertion and maintenance of central line catheters. Search methodology, quality assessment, and research related to the prevention of CLABSIs were presented. In addition, a synopsis of related themes found in the literature was emphasized. Literature inclusion and exclusion was based on the relevance to the project.

Search Method

Articles collected through literature searches of the following databases were utilized: Cumulative Index for Nursing and Allied Health Literature (CNHAL); PubMed; MEDLINE; Science Direct; Up-To-Date, and the Walden Library. The searches retrieved literature from 2000 to 2013, written in English, and used the individual and combined search terms *central line-associated bloodstream infection*, *CLABSIs*, *central venous catheters*, *hospital-acquired infections*, *HAI*, *dedicated IV team*, *PICC team*, *preventing central line infections*, *quality improvement*, *preventing infections*, *bundle*, and *positive blood cultures*. Titles and abstracts of 57 articles were reviewed with 18 of the articles used to support this DNP project.

The goal of the literature review was to collect data from the reviewed articles on how to prevent CLABSIs. The majority of the studies used a cohort methodology with pre and post examination of the infection rates after implementation of interventions

identified to prevent infections. The data collected were based on the CDC criteria for central line infections that are required to be reported to the National Healthcare Safety Network (NHSN). Utilizing the formula:

# of infections per # of dwell days multiplied by 1000 central line days

Sixteen of the 18 studies were published in peer-review journals with the majority of the research articles collected from the Intensive Care Unit (ICU) patient population. Two of the articles reviewed were retrieved from evidence-based guidelines published by the CDC and the IHI and available on their websites.

Specific Literature

All of the research studies employed the same strategy aimed at preventing CLABSIs by implementing the recommendations from the CDC and IHI evidence-based practice guidelines. All 15 recognized the necessity of having a central line placed by someone who has the expertise to insert central line catheters. (Rinke et al., 2012; Miller & Maragakis, 2012; Davis, 2011; Han et al., 2010; Band & Gaynes, 2010; Silow-Carroll & Edwards, 2011; Kallen, Arduino, & Patel, 2010; Olrich, 2011; Maki et al., 2006; Marra et al., 2008; Marschall et al., 2008; O'Grady et al. 2011; Pronovost et al., 2006; Wolfenden et al., 2007; Ruseva et al., 2009; Earsing et al., 2005). Six of the studies agreed that the risk for infection increased with the disruption of the skin integrity (Han et al., 2010; Ruseva et al., 2009; O'Grady et al., 2011; Pronovoast et al., 2006; Davis, 2011; Band & Gaynes, 2010). Eight of the articles agreed that the need for monitoring and removing the central line apparatus as soon as possible could help with preventing an HAI to occur. (Han et al., 2010; O'Grady et al., 2011; Marschal el al., 2008; Silow-Carrol

& Edwards, 2011; Maki et al., 2006; Band & Gaynes, 2010; Kallen et al., 2010; Earsing et al., 2005). Five of the studies revealed that location of the catheter played an important role in the risk of acquiring a HAI (Band & Gaynes, 2010; Pronovost et al., 2006; Wolfenden et al., 2007; O'Grady et al., 2011; Earsing et al., 2005). Two of the studies documented that the femoral site is an unacceptable insertion site unless there was no other option for access (Maki et al., 2006; Silow-Carroll & Edwards, 2011).

The majority of the research articles followed the recommended bundle from CDC and IHI that focused on catheter insertion with the number one preventive measure being strict adherence to hand hygiene (Band & Gaynes 2010; Earsing et al., 2005). Additional recommendations were identified in the articles including the utilization of aseptic techniques with scheduled central line dressing changes (Maki et al., 2006). There were five themes identified throughout the articles reviewed: professional education, implementation of a dedicated team to insert and care for the central line catheters, a preventive bundle, unit-based hospital acquired infection (HAIs) reports, and evidence-based equipment enhancement.

Professional education was an important aspect of the reviewed articles. By educating staff on certain techniques to use with accessing the central line catheters such as daily inspection of the insertion site and utilization of the appropriate antiseptic cleaner CLABSIs could be decreased. One of the articles emphasized on the importance of implementing a post insertion care bundle that consisted of daily assessment of the site, site care if the area got wet or soiled, and dressing changes no earlier than every seven days unless the dressing was soiled (Guerin et al., 2010).

Some of the articles discussed the need for a specialized team to insert and care for the central line catheters, using a variety of strategies that included specially trained nurses and physicians to assess and implement access if needed. Creating criteria for the insertion of a central line helped to prevent unnecessary central line access through a check off system. This check off system helped to keep everyone on the same page by following the agreed upon central line insertion criteria.

All the articles discussed some type of bundles to help prevent infection at the time of central line insertion. Bundles consisted of hand washing; utilizing sterile technique including gown, mask, and cap; avoiding the femoral site unless there were no other options and limiting the dwell time if the femoral area was used; daily assessment of the site and the need for the central line; and scheduled dressing changes using sterile technique and a central line dressing kit (Pronovost et al., 2006).

There was also discussion in some of the research articles about posting each unit's CLABSI statistics with open discussion of possible causes and creation of evidence-based protocols to follow on preventive care at the bedside. The protocols incorporated infection prevention equipment such as antimicrobial wafers placed at the insertion site with dressing changes. Having committed advocates or "champions" to facilitate prevention activities was recommended. These champions could role model stopping the procedure if sterile technique was not being followed (O'Grady et al., 2011).

The articles provided techniques and recommendations that could be implemented to assist with decreasing catheter-related infections. The Institute of Healthcare Improvement (2009) stated that implementing a central line bundle consisting of using

sterile technique; gowns, masks, gloves, and drapes; hand hygiene; and chlorhexidine preparation will decrease central line infections. This qualitative data has triggered quantitative research on central line infections and the prevention of them. Numerous studies have been published using quantitative data on the prevention of central line infections using bundles as the preventive method that included:

- Washing hands
- Wearing a mask, cap, gown, and sterile gloves during line insertions
- Establishing a sterile field for the central line procedure
- Using Chlorhexidine Gluconate as the solution for prepping the site
- Avoiding the femoral area for insertion of the central line
- Applying antimicrobial wafer to site
- Securing site with transparent dressing

Hospitals are moving forward in following the recommendations set by CDC and IHI on utilizing these bundles to help decrease CLABSIs.

General Literature

CLABSIs are not only costly to individuals and health care systems; they are known to significantly increase morbidity and mortality. The encouraging news is that many CLABSIs are preventable when evidence-based guidelines are incorporated into patient care. The literature reviewed revealed efforts to prevent CLABSIs in the intensive care setting of hospitals have dropped because of guidelines are being followed, and now the focus is switching to the step-down units of the hospitals (Silow-Carroll & Edwards, 2011). Because these areas often have limited capacity for oversight and infection control

compared to the intensive care units, the risk for CLABSIs has been identified as being higher (Barraclough et al., 2009). Hospitals have also been recognized as having poor basic infection control practices in the step-down units. In 2002, the National Nosocomial Infection Surveillance (NNIS) reported the estimated number of HAIs outside the ICU was 1,195,142 compared to approximately 394,288 inside the ICU, showing an increase in HAIs of 33% outside the ICU (Klevins, Edwards, & Richards, 2002). The step-down units tend to have five patients to one nurse on a good day. A VA hospital studied CLABSI over a 12-month period and estimated the cost of a CLABSI to be approximately $23,451.00 per hospitalization (Nissenson et al., 2005). CLABSIs have resulted in thousands of deaths each year and increased the cost to healthcare by billions of dollars (Pronovost et al., 2011).

The focus toward infection control on the step-down units is starting to intensify. Nursing practice is questioned regarding the way nurses handle, maintain, and monitor patients' care of all types of central line catheters. CVCs are recognized as vital to the delivery of medications, nurses need education on infection prevention. Educating nurses in a culture focused on patient safety is an endless process that needs to include central line care. Nursing education focused on clinical reasoning and action can be accomplished (McCurry et al., 2009). Step-down units need to integrate nursing education and new evidence for the development of needed CLABSI prevention programs (Mermel et al., 2001).

A prospective study was performed over a 24-month period with a sample of 101 patients who had a central line. The risk for bacteremia was 5.5 per 1000 catheter days

(Saad, 1999). However, after implementation of the bundle, the rates declined to as low as 1 per 1000 catheter days (Saad, 1999). Developing, implementing and educating nurses on protocols aimed at decreasing CLABSIs not only included the bundle but also included education on central line maintenance care. The maintenance care beyond the "bundle" included daily assessment of the catheter site and observing and detecting purulent drainage, increased warmth, and/or induration extending around the site as early signs of catheter infection (Blot et al., 1998).

Measures to prevent catheter-related infections include the use of an aseptic technique and antiseptic cleaning solution at the time of insertion and throughout each dressing change (McCann & Moore, 2010). The bundle utilized maximal barrier protection including cap, gown, gloves, and drape during the insertion of a central line catheter, and this protection has been shown to decrease the incidence of infections. With each dressing change, antiseptic technique should be used for cleaning the catheter insertion site, including removal of tape residue on the catheter, which is known to harbor microorganism and increase the risk of catheter-related infections (O'Grady et al., 2011).

Prevention of CLABSIs is based on improving catheter care. To optimize patient outcomes, nurses must focus on preventive measures that have been shown to improve patient care (Klevins et al., 2002). The literature focused on a variety of strategies that have been successful in decreasing CLABSIs in the ICUs. Taking these same strategies and implementing them throughout all the medical surgical step-down units would seem to benefit not only the patients by helping to decrease CLABSIs outside the ICUs but also the hospitals by shortening lengths of stay and decreasing unreimbursed patient care.

Explanation of the Social Change Related to Expected Health Outcomes

CLABSIs are serious complications that affect any patient with a central line apparatus including patients with hemodialysis catheters. CLABSIs complications have been associated with high rates of morbidity and mortality. According to McKinney (2007), approximately 2,750 to 5,500 people who have a central line die each year related to a CLASBI attributed to their catheter. Facilities that participated in implementing the recommended interventions, including the use of bundles, have shown a decrease in the CLABSIs from 1.09 per 100 patient months to 0.73 per 100 patient months. Lower incidence of CLABSIs has saved lives and also saved approximately $38,000.00 per event for the healthcare system (O'Grady et-al., 2011).

Theoretical Framework for the Project

The project was based on the model of improvement recommended by IHI. The model is a framework that can be used to guide improvement work through testing, and implementing changes (Planas, 2008). It helps to assist with improving issues that have been identified through the process and outcomes of the healthcare delivery system. The model has two parts that can be utilized and encourages questions focused on guiding improvements to assist with setting clear goals, and establishing measurable outcomes by using a mixed-method collection of qualitative and quantitative data (Planas, 2008). Questions that can be asked using a team approach can be:

- What are we trying to accomplish?
- How will we know if a change is an improvement?
- What changes can we make that will result in an improvement?

The model of improvement will benefit the DNP project by having the team members' answer the first question listed above "What are we trying to accomplish?" All team members will understand the goal is to reach zero CLABSIs in the hospital setting. Collecting and implementing evidence-based recommendations will help to achieve this goal. Educating the team on insertion and maintenance care is one of the elements included in the recommended bundle (CDC, 2009; IHI, 2009). Ongoing assessment of team competency check offs will confirm that all team members are educated, experienced, and knowledgeable in inserting and maintaining the CVC apparatus. The effectiveness of these processes is only as good as a follow through based on the guidelines and procedures (Viswanatha, 2011).

The second question the team will be able to answer is "How will we know if a change is an improvement?" Having the team collect data for a specific timeframe consisting of how many lines were placed, their location, who inserted the line, who did the maintenance care, complications (if any), how many dwell days, and how many CLABSIs occurred will help to establish a baseline. The next step is to collect data over a specific timeframe after the implementation of the project interventions. Comparing data from the two data collection timeframes will answer the second question.

The final model for improvement question, "What changes can we make that will result in an improvement?" will be answered by the literature review and the implementation and testing the recommended changes. Having the ability to develop, implement, and test changes are essential to reach the goal of improvement (IHI, 2009).

Section 3: Methodology

Project Design and Method

Having a strong vision and mission statement can help stakeholders understand what needs to be accomplished. It is the statement of the goal the organization is striving to reach (see Appendix A). The facility and physicians who are stakeholders in this project were very supported of this planned project because it addressed recommended prevention practices that will, in turn, affect reimbursement through the Affordable Care Act (CDC, 2009). Although reimbursement plays a part in initiating this preventive care project, the main focus was on the best care possible to improve patient outcomes.

Incorporating a five-phase model for clinical outcome research utilizing a mixed-method approach allowed the collection of qualitative and quantitative data on central lines (Brett, 2002). The model consists of the following phases:

- Organizing structure
- Creating relationships
- Underpinning evidence-based practice
- Decision making
- Implementing

Project Plan

An improvement model plan to decrease CLABSIs using the five-step DMAIC model that marks the five-step process was developed (Jacowski, 2006). At each step of the DMAIC model there were questions and actions to address before the process could advance to the next step. The DMAIC model is widely used as a structure improvement

model because it provides a step-by-step approach to problem solving by attempting to determine the underlying root cause and then suggesting methods that could be utilized to improve the process for reaching the organization's set goals (see Appendix B).

During a 1-month timeframe, a dedicated team consisting of four nurses who specialize in vascular access such as peripheral inserted central lines (PICC), midlines, and difficult accesses and two physicians who placed central lines routinely was formed. Included in the team was also one radiologist who specialized in invasive procedures. The team is committed and has agreed to practice toward the goal of establishing the best vascular access at the time of admission. When a vascular access consult was ordered, the vascular access nurse saw the patient and provided the access needed. When it was deemed out of the scope of nursing practice, the physician on the team would be notified and updated on the situation. He would come and place the line and if a challenge were identified he would consult the radiologist for his assistance. After the line has been placed following the "bundle" recommended by the CDC and IHI, the nursing aspect of the team would continue to monitor the line on a daily basis for necessity and early signs of complications. The nursing aspect of the team would do all scheduled central line dressing changes and remove it when identified no longer needed. The team met weekly to review overall progress of the project and discuss additional strategies to create change (if needed) that would produce improvement related to central line care with a focus on decreasing complications. The team provided a structural and systematic approach necessary to improve outcomes. Having a small, selected team of providers to perform specific tasks such as PICC and central lines has proved to be effective with decreasing

CLABSIs (Robey, 2004). The quality data collected for the project consisted of who inserted the line, what protocols were followed, and who is maintaining and monitoring the central line. The quantity data collected follow the national formula utilized for central line infections reported to the CDC. The formula is:

- Number of infections / number of line days x 1000

CLABSIs prevention is a complex process that if not followed properly and in compliance with each step may not prevent infections. If the person inserting the line does not use the full barrier requested, then a breach in the bundle has occurred, and the possibility of an infection has been heighten. If a sterile field is not set up during a central line dressing change, then the insertion site has been jeopardized for contamination. With the proper management of central lines, CLABSIs can be conquered. Evidence generated as a result of the project assisted with filling the gap of establishing protocols needed at the facility to reach the ultimate goal of zero infections with CLABSIs. Nurses using the evidence-based protocols provide the best patient care possible, increase patient satisfaction, and decrease hospital non-reimbursable cost factors.

Measurement is a key component of testing and implementing changes. It is a way of knowing if a change represented an improvement. Two outcome measurements were utilized to evaluate the success of this project. The two formulas were those used in reporting data to the National Healthcare Safety Network (NHSN). Outcomes are important in the evaluation of the project as they are directly related to the results of the change implemented. The outcomes of this DNP project are related to preventing

CLABSIs and are the result of the treatment provided. To measure outcomes, the process needs to be detailed and the data to be collected need to be specified.

Primary Measurement

These data are the standard measures for surveillance by the CDC and are utilized by all facilities that are mandated to report CLABSIs to the NHSN website (CDC, 2009). Formula 1 measures infection rate. These data consist of the number of central line infections divided by the number of dwell days multiplied by 1000.

- Formula 1 (# of infections/# of dwell days (x) 1000)

Formula 2 measures compliance or how well the bundle was followed. This measurement is formulated as an "all or nothing" measurement recorded on the "check off" insertion record. The data collected will indicate how many "check off" forms were fully completed, verifying that the complete bundle was implemented during the insertion of the central line apparatus. Formula 2 will be the number of bundles completely utilized divided by the number of central lines inserted in a given day multiplied by 100.

- Formula 2 (# of bundles checked off in a given day/# of central lines inserted in a given day x 100)

CLABSIs are known to increase morbidity, mortality, and cost in hospitals. Both of these formulas can assist with identifying the need for additional changes to achieve zero CLABSIs. Both measurements are patient care driven and can assist with identifying key factors that could prevent or decrease CLABSIs.

In compliance with human subjects' protection measures, Institutional Review Board (IRB) approval was obtained from the hospital and Walden University (IRB approval # 06-17-14-0106924).

The Quality Improvement Team

Developing and implementing a multidisciplinary dedicated team to oversee all central lines for inpatients can decrease CLABSIs and help to meet the goal of zero CLABSIs (Silow-Carroll & Edwards, 2011). A dedicated team is more likely to follow evidence-based protocols to prevent infections. The team, known as the "Vascular Access Team" (VAT), consisted of four PICC nurses from the hospital's infusion services. Included in the dedicated team were physicians from infectious disease and internal medicine. There were one nephrologist and three pulmonologists who assisted at the bedside with central access (such as triple lumen catheters and temporary dialysis catheters). Another physician from interventional radiology provided backup when the physician at the bedside was having difficulties with insertion. Other team members included the director of infusion services, an emergency room physician, and a representative from the pharmacy. Each individual's role in the performance improvement process was clearly defined at the initial team meeting. The team met weekly and reviewed current data that included the evaluation of the patient treatment plans, potential complications, and the duration of the catheters, and the appropriate location for catheter placement. The agenda included a monthly CLABSI report including the investigation of the organisms involved in any infections and the potential cause or risk involved. A criterion was created to ensure the proper selection of catheter needed for the patient's treatment. The PICC nurse role included assisting with difficult access and use of ultrasound guidance whenever possible to avoid "routine" central lines due to difficult access only. At the beginning of each day, the scheduled PICC nurse reviewed

orders and consultations to provide the best vascular access needs. Included in the weekly meeting was the review of dwell days of the central line apparatus and the quantity of lines placed. The "senior leader" elected at the initial meeting was the Director of the Infusion Services and agreed to be the champion of the VAT team to carry out the duties of the role. As part of the position, the Director has the ability to execute project changes and present a strong role model for the team (Kelley, 2011). The Director of Infusion services is also responsible for building a work environment that encourages team members to express themselves and to challenge assumptions.

As a leadership team in a healthcare organization, it is important to be able to take the prevailing perception of quality care to the next level. Encouraging the senior leader to provide a forum for quality improvement ideas, patient safety education, and training at all levels of vascular access will be essential (White & Dudley-Brown, 2012). The Director of Infusion Services is expected to support values that represent providing the highest quality patient care in an economic manner that is underpinned by evidence.

Promoting healthcare that is safe, effective, patient-centered, timely, efficient, and equitable should be a shared responsibility between the senior leader and the team. Implementing change for better patient care and outcomes should be supported through leadership toward best practice and policy change (Ridenour & Trautman, 2009). Keeping an open mind can help motivate the desire among the team members and the staff to continue improvements in the organization's delivery of patient care.

Project Deliverables

Complications (infection and occlusions) are the root cause of the problem with central line access. Root cause analysis was used to determine why the problem was happening and what could be done to prevent it. The use of DMAIC five-step process to eliminate problems is an approach to enhance the quality with central line access. The five-step process consists of:

- Define the problem
- Fix the problem
- Identify the root cause
- Take corrective actions
- Evaluate and follow up

The project resulted in several documents related to the DMAIC steps that are being used in the organization to guide central line placement and maintenance. These documents include the project mission statement, the project goal statement, a definition of central line, the policy/protocol for placing and managing central lines, a process map, the evaluation plan, the timelines for implementation and evaluation, and a competency assessment plan. These deliverables are discussed below and are attached as appendices A to L.

The DMAIC process emphasizes ongoing prevention. Identifying and eliminating the causes of the problems, in this instance the CLABSIs, can improve patient outcomes and requires no additional treatment costs. The mission statement, the goal statement, and the definition of central line provided the definition of the problem (see Appendices

A, B, and C). Appendix D provides the timeline used for the project implementation. A Gantt chart presented a visual for the task planning of the project and made it easy to track the project progress. Having an outline of the project tasks shown against a timeframe gives an instant overview of a project, its associated tasks, and when these tasks need to be finished. The responsible party for each of the tasks in the project is specified in the chart.

The findings of the literature review and the root cause analysis provided clarity on how to fix the problem. Creating a detailed process map helped staff and team members visualize the new process and served as a corrective measure. The process map utilized is a valuable tool that quickly communicates the actual flow of the process. The objective of the detailed process map was to capture all the improvement opportunities by analyzing each step of the process as it was implemented. Appendix E depicts the process map for the CLABSI reduction bundle.

A policy/protocol was also created that includes a detailed description of the techniques and supplies aka ”the bundle” utilized with the insertion and maintenance care on all central lines catheter inserted during the trial phase (see Appendix F). The team followed the central line insertion and maintenance care described in the protocol and initiated the data collection for the evaluation.

Evaluation Plan

An evaluation plan describes how to monitor and evaluate the intended project outcomes (Klevens et al., 2002). In order to monitor the progress of a project, the evaluation plan must have its own goals and objectives (see Appendix G). Evaluation is a

necessary component when implementing an improvement plan to assess the project's activities and to help link the progress to the outcomes.

This DNP project's evaluation plan began with the collection of 4 weeks of previous CLABSI data. Quantitative and qualitative data were pulled from the electronic charts of patients who had a central line inserted. The data were then analyzed using the National Healthcare Safety Network (NHSN) criteria for CLABSIs. The data collected and analyzed helped to establish a baseline to compare before and after implementation of interventions described in the policy/protocol.

Evaluation and Follow Up

Collecting data throughout the project timeframe allowed the team to obtain infection rates and compared them to infection rates before the implementation of the project. The data collected consisted of positive blood cultures, dwell time, a check off list of the processed used, and who inserted the central line catheter. The team met weekly to review data collected and address any issues. Clinical evaluations were also performed utilizing a checklist of the interventions implemented. The team reviewed the progress toward consistency with the recommended techniques. Evaluating staff on the same techniques will enhance attitudes, perceptions, and advance knowledge on an on-going basis (McCurry et al., 2009). Staff education was performed with updated results on the infection rates related to CLABSI for each unit. The data reported and collected was from confirmed access related bloodstream infections (ARB) through blood cultures. ARB is defined as a positive blood culture attributed to either the central line access or an unknown source (CDC, 2009). These results were also shared with the stakeholders.

Keeping staff informed of the infection rate on their unit incentivized them to decrease CLABSIs to zero or to maintain already low rates and is part of project follow up. Patient education was performed on a one-on-one basis during insertion and throughout catheter care. This education is expected to help the patient take ownership of the central line and utilize preventive care techniques. Having patients repeat back their understanding will help evaluate the success of the education. By reporting the outcomes to the CDC (NHSN), the evaluation will be completed. The team was able to compare their rates with those of other NHSN facilities nationally, which showed a measure of whether the interventions that were implemented were effective, and if any improvements in the protocol or process are needed.

Summary

The issue chosen to address was decreasing central line complications throughout all areas of the hospital. For the last few years' hospitals have focused on implementing evidence-based data to decrease central line infections in the intensive care units. This became an important issue to address when the Central for Medicare & Medicaid Services (CMS) stated they will no longer reimburse hospital stays and treatments related to hospital-acquired infections, particularly in the ICUs (CMS, 2008).

The literature provided evidence showing that developing a dedicated team trained in vascular access and creating a preventive bundle is decreasing CLABSIs. Preventing CLABSI is one of the most pressing issues hospitals are facing today. Having a dedicated team to insert and maintain all central line catheters throughout the hospital can conquer reaching and sustaining zero CLABSIs. As a part of this DNP project, data

were collected during the implementation phase of the quality improvement project and a hospital-wide vascular access team was initiated. For all catheter insertions and subsequent care in the hospital, data were collected on who placed the line (the dedicated team or the bedside nurses), what maintenance care was done and by whom, the dwell time, the location of the catheter, positive blood cultures and type of infection, the check list outcome for insertion compliance, and daily documentation of line necessity, Data were reviewed against the criteria set for CLABSI by the NHSN (see Appendix C).

The impact can be enormous, not only financially but also due to providing improved patient care. HAI is a serious and costly problem for healthcare, in financial terms as well as prolonged hospitalizations and increased patient mortality. Reducing HAIs is imperative to continue to reduce health care costs and improve outcomes for consumers, payers, and hospitals (IHI, 2009).

Section 4: Results, Implications, and Discussion

The purpose of this section is to share the results of the project implemented utilizing the model of improvement framework recommended by IHI. This section will begin by highlighting the weekly results of the implementation process of the project including the engagement of the access team. The comparison between pre project implementation and post project implementation mean time to central line placement, adherence to site best practice, infection rates, and DVT numbers are also presented. Implications, limitations, strengths, and recommendations are provided. An analysis of my personal growth as a practitioner/scholar follows. And, lastly, this section summarizes the expected sustainability of the CLABSI prevention plan.

The Project Implementation Process Results

The IHI model of improvement is a simple, yet powerful tool that uses four steps. Before the project could begin, The Director of Infusion Services (who is the team leader of the project) called a meeting with the team of vascular access. Present at the meeting were the Director of Infusion Services, two physicians, and all four peripheral inserted central catheter (PICC) nurses. The purpose of the meeting was to have a clear understanding of the goal for the project. Three questions open for discussion was asked of the team:

- “What are we trying to accomplish?”
- “How will we know that a change is an improvement?”
- “What changes can we make that will result in improvement?”

All team members understood that the goal was to improve outcomes of patients with central lines and agreed that this outcome could be achieved by implementing a dedicated team approach. The team then created a step-by-step plan to accomplish the goal. The project was then implemented in the steps outlined below.

An action plan was established with a target timeline listing a detailed step-by-step process for before, during, and after the project (See Appendix H). The process is described below in detail.

Week 1-The first step was to get the support from stakeholders. This was achieved by scheduling a meeting and inviting stakeholders and administrators to attend. A power point presentation of the proposed project was presented for their approval and support. Both were given unanimously. The next step was to create the central line vascular access team. The team was managed by the Director of Infusion services and consisted of four registered nurses who specialize in PICC central line insertions, two physicians who agreed to assist with central line insertions at the bedside when the procedure is out of the scope of the RN's practice, and one radiologist who agreed to be "back up" for any unsuccessful bedside central line insertion attempt. The Director of Infusion services agreed to be responsible for coordinating and implementing the services of the team.

A mission and vision statements were created by the Director of Infusion services and each team member acknowledged and signed the mission and vision statements and the Code of Professionalism established for the dedicated team (see Appendix I). Next, a policy with protocols was created using evidence-based interventions from the literature

research done by the Director of Infusion and reviewed by the team, who all agreed to support the policy and protocols (see Appendix I). The purpose of the policy/protocol was to validate the method to be used with every insertion/monitoring of the central line apparatus during the patient stay. The policy included a description of NHSN definitions (see Appendix J) along with the qualifications required for the nurses to be a member of the team. It also described the techniques and supplies (aka the bundle) required with the insertion and maintenance care of central lines including dressing changes. The bundle recommended by the CDC and IHI was incorporated into the protocols for the team to utilize with each insertion of a central line catheter. The policy states that everyone on the team will use the bundle and document "bundle utilized" into the patient electronic healthcare record. A template to document "bundle utilized" was created and inserted into the electronic healthcare record documentation query by the informatics system team last year when the hospital converted to an electronic healthcare system. When the "bundle utilized" box is check, the computer automatically lists in detail the bundle content (i.e., wash hands, applied sterile gown, gloves, cap, mask, drape, and used chlorhexidine gluconate for cleaning). Each member of the team completed a return demonstration confirming competency of techniques from the bundle outlined in the policy/protocol (see Appendix K). Implementing the evidence-based recommendations, the team showed consistency with the proper techniques of insertion and maintenance care, which is one of the elements included in the recommended bundle (CDC, 2009; IHI, 2009). Members of the team were then signed off on a competency form.

Week 2 - Education to the nursing staff was completed through numerous educational sessions was conducted by the Director of Infusion Services in the attempt to cover all shifts and as many nurses as possible. The Director of Infusion Services went to a medical staff meeting to inform the physicians of the project being implemented throughout the hospital. The information given was well received by the physicians. Flyers were posted in nursing staff break-rooms, indicating the initiation date of the team. Hospital leaders and stakeholders were notified via e-mail of the team start date.

Week 3 - Retrospective data were collected from the month of June 2014 and consisted of information from 282 patients who received a central line apparatus. The data collected included the location of insertion, who inserted the central line, dwell days, infection rates, DVT rates, dressing changes, timeframe from order to insertion, and whether the bundle was utilized with the insertion.

The PICC nurse placed a total of 206 PICCs with a total of 1309 dwell days. Seventy-six other types of central lines were inserted with a total of 364 dwell days; the radiologist placed 24 of them and physicians placed 52 of the catheters at bedside. The mean time between the PICC order and the actual insertion time was 4 hours. The mean time for central lines inserted in radiology was 22 hours, and the mean time for central line insertion by physicians at the bedside was 12 hours. Complications consisted of 2 infections (one PICC and one central line) identified by positive blood cultures, and 4 DVTs confirmed through venous Doppler studies.

Documentation of utilizing the bundle was inconsistent. If “bundle utilized” was not specifically documented, it was recorded for the evaluation as not being utilized. All

206 PICCs inserted by the nurses were accounted for by an electronic form version of the paper check-off list describing the utilization of the bundle. Documentation of the lines placed by the radiologist did not use the electronic check-off form; instead, the documentation described in details how the sterile field was established. The description of the use of the bundle interventions was not always presented in the same order, but it was documented that the bundle was used. The physicians who placed central lines at the bedside were inconsistence with documentation of using all the elements defined in the bundle. Each physician had his own method of documentation. Numerous charts stated use of two or three interventions from the bundle; however, without clear documentation of all interventions being used, it was counted for the evaluation as being non-compliant. None of the 26 bedside central line placements by physicians could be counted as being in compliance with utilizing the "bundle.

Weeks 4 to 9 - The implementation of the team approach was initiated and the live data collection commenced including maintenance care and complications. For the month of July 2014, the team inserted 277 central lines. The PICC nurses inserted 187 PICCS with a total of 1153 dwell days. The team's physicians placed 89 central lines, and the team's radiologist placed one central line, for a total of 443 dwell days. The mean time for the PICC insertion by the nurses from the time the order was entered into the computer to the time the insertion occurred was 4 hours. The mean time between the order and the insertion by the physicians at the bedside was also 4 hours. The mean time to place a central line for the radiologist was 2 hours. Two DVTs were recorded during the month. The team met weekly to review data collected and address any issues. The

data collected included location of the catheter, who inserted the catheter, dwell days, infections, DVTs, scheduled dressing changes, utilization of the bundle, and the time from the order to the insertion. The team members performed patient education on a one-to-one basis during catheter insertion and throughout catheter care. Patients repeated back their understanding of the procedure to demonstrate knowledge.

Patient Safety Impact of the Project

The sample population compared was 282 pre bundle implementation and 277 post bundle implementation central line catheter insertions. The aggregated data consisted of the time frame, whether the bundle was used, dwell days, type of line, location, who inserted the line, maintenance care, and any complications during and after the catheter insertion. The results revealed the mean time from the order in the electronic health system to the time the catheter was actually inserted in the pre implementation data was 7 hours. The mean time from the order for the catheter to insertion utilizing the dedicated team approach was 4 hours. The results showed that the dedicated team approach helped expedite the catheter insertion by decreasing the delay by 3 hours (57%) for intravenous infusion therapy to be initiated (see Table 1). The dedicated team approach avoided scheduling of line placements in the radiology suite if the team's physicians could place them at bedside. This approach increased the availability of the radiology suite and freed the radiologist for more invasive procedures. This change produced a substantial cost savings for the hospital and the patient because the procedure could be performed at the bedside and not in the radiology suite.

The compliance with using the bundle was compared before and after the team was implemented. The only data that could be counted as compliant in using the pre implementation data were the PICC lines inserted by the PICC nurses. All 206 PICCs were inserted using the bundle. The post implementation data for PICC insertion (n=187) was 100% compliant with the use of the bundle. There was no difference in the nurses PICC line bundle compliance before and after the implementation of the team. The physicians had little or no documentation regarding utilization of the bundle with insertion. Whether the bundle was utilized or not by the physicians was a guessing game and none of the pre-implementation insertions could be counted as compliant.

Consistency and compliance were easily identified both with the PICCS and central lines after implementation of the team. The physicians began using the same computer query as the nurses with every central line insertion and had 100% compliance with documentation of utilizing the bundle as described in the protocol. The location of the central lines from the pre-implementation data showed 48 lines (17%) were inserted in the femoral vein, while the post-implementation data using the dedicated team approach showed 6 lines (2%) were inserted in the femoral vein. This improvement in compliance decreased by 88% the risk for CLABSI related to the insertion site (see Table 2). The data revealed that the 6 lines inserted in the femoral vein were done in crisis situations and once the patient was stable, a PICC line was placed and the femoral line was removed promptly. The femoral site has been deemed a greater risk for CLABSI in adults and should be avoided if possible (IHI, 2009). The dedicated team approach decreased the risk factor of using the femoral site. However, emergency physicians tend

to favor the femoral line access due to decreased risk for complications such as a pneumothorax and the ability to use the site without having to wait for a chest x-ray for placement (McGee & Gould, 2003).

Collection of pre-implementation data identified two CLABSIs through positive blood cultures and the post-implementation data identified one CLABSI (see Table 3). Even though the difference between the infection rates was only one case, the results showed that one additional life may have been saved from becoming a statistic. The number of DVTs from the pre-implementation data was 4 DVTs and from the post-implementation data was 2 DVTs. The dedicated team approach improved the ability to monitor lines daily for early detection and intervention before a central-line associated complication occurred, thus decreasing DVT complications by 50% (see Table 4). Scheduled dressing change documentation in the pre-implementation data was inconsistent, and it was not possible to determine how and when the dressing changes occurred. In the post- implementation data, all dressing changes were performed by the PICC nurses on the dedicated team; documentation was consistent with the time scheduled for the dressing change and the use of the appropriate dressing as stated in the policy and protocol.

Implications

Healthcare delivery is forever changing to provide safe, cost-effective, evidence-based care. Regulatory standards are constantly shifting to try and meet annual safety goals for preventive healthcare. The standard of patient care includes improving patient safety while improving patient outcomes and satisfaction. Central line apparatuses can

save lives; however, there is a risk that comes with them such as infection and complications related to a foreign object placed in the body that has direct access into the bloodstream. An additional implication in relation to nursing care can be identified as one of being proactive with utilizing preventive measures such as cleaning the access port when accessing it to infuse into the bloodstream. There are advantages and disadvantages with having a central line catheter placed, and adherence to sterile protocols and awareness of possible infection mechanisms is imperative for all aspects of nursing care. The goal of being a patient advocate for safe central line use is to provide the best access needed for the intravenous therapy required. In addition, by bringing the awareness of the problems encountered in the pre-implementation phase to the attention of the radiologist and the physicians, a culture change occurred and their actions throughout the post-implementation phase of the project demonstrated much improved compliance.

Limitations

Limitations that could affect future outcome data are that the emergency department physicians continue to place central lines in the femoral area, instead of calling for the team to insert a central line. Their history has shown non-compliance with utilizing the recommended bundle from CDC and IHI, creating outliers on the effectiveness of a dedicated team approach results.

Strengths

The project dealt with improving results on a nursing quality indicator recognized by the National Database of Nursing Quality Indicators (NDNQI). Another strength was the collection of evidence-based interventions from the literature and actual practice data.

This information proved to be invaluable in implementing best practices in helping to decrease a known complication such as CLABSIs. An additional strength was from the support and participation of the nursing staff. Nurses tend to be highly motivated when it comes to implementing quality care, safety, and any improved process for better patient outcomes. Still another strength identified was the support from the physicians and the administration; their encouragement gave the team the ability and confidence to make inform decisions on providing the best vascular access needed for each patient's individualized treatment. And lastly, working closely with the informatics department and creating queries in the electronic healthcare system that helped with orders, protocols, and documentation, including having the ability to track complications was a strength that cannot go without mention.

Recommendations

Recommendations to sustain the dedicated team approach following the central line apparatus policy and protocol implemented for better patient outcomes can be accomplished by:

- Providing the positive results to the stakeholders involved who supported the project implementation.
- Sustaining the dedicated team approach throughout the hospital to provide 100% compliance with the recommendations from the CDC and IHI for the insertion and maintenance care of central line apparatuses.
- Continuing ongoing assessment of team competence.

- Continuing surveillance of central line associated bloodstream infections and complications.
- Continuing to discourage femoral venous access.
- Providing updated results to nursing staff and administrators on CLABSIs and incidence of complications.

Self-Assessment

Doctor of Nursing Practice (DNP) Role

As I become a DNP, I will be able to act as a catalyst for change in nursing with the goal of improving patient care outcomes. The DNP program has helped mold me to understand the importance of the healthcare delivery system and how I can participate in the dynamic role of providing the best healthcare available. Becoming an advocate to improve the quality, and safety of care for the hospitalized populations is rewarding. As I prepare for my new role with the executive leadership team, I will be able to educate the nursing staff on the "why we do what we do" for optimal patient care. An example from this project that I will take into the leadership role is the effect a preventive care policy and procedures had on increasing compliance and decreasing CLABSIs. I will be able to translate the evidence of the research project into nursing practice by utilizing nursing theories, collecting evidence, and incorporating quantum leadership skills. I take with conviction and pride recognition of the importance of evidence-based practice guidelines as well as the necessity for ensuring implementation of the guidelines in a clinical setting. As an innovator and leader I will take clinical practice improvements to a new level by understanding use of technology, strategic planning, and adaptive leadership skills in

translation, demonstration, and application of evidence. The importance of engaging staff has been magnified for me. This knowledge will support any change in patient care. Nurses can provide optimal patient care with the implementation of evidence from the literature and practice data analysis.

Summary

CLABSIs occur when there is a lapse in the care with insertion and maintenance. Comprehensive infection prevention protocols must be implemented with zero tolerance toward non-compliancy. Utilizing each step recommend by the CDC and IHI produces a multilayered defense mechanism against CLABSIs, and the desired outcome of better patient care can be achieved. The complexity of the healthcare system and how we deliver care to patients can sometimes make healthcare unpredictable. Measurement of the quality of healthcare needs to be part of the structure and process of health care delivery. Outcomes must be measured and acknowledged.

In conclusion, the majority of patients who come into the hospital require intravenous catheters for medication and fluids. Some of these medications can only be given intravenously into the central circulation system through a central line catheter. Central line catheters save lives; however, their use can also bring about complications such as CLABSIs. Numerous research studies have declared central line infections are preventable with proper care methods designed following strict guidelines on the insertion and maintenance care (Roberts & Mahoney, 2004). The IHI collected the evidence from these studies and created a bundle that is highly recommended to prevent central line infections. Clinical experts in the field of preventing infection throughout

hospitals nationwide support the utilization of the bundle identified by IHI (IHI, 2009). The DNP project implemented the bundle house-wide by having a dedicated team to insert all central lines and monitor them throughout the patients' hospital stay. This intervention decreased CLABSIs by implementing specific preventive measures toward iatrogenic (central line) and organizational (such as with staff) associated central line infections. The goal of the project was to reduce CLABSIs and associated complications such as DVTs. The dedicated team approach did improve the quality and safety of health care for a sample of patients with central line insertion and maintenance care. It is expected that the dedicated team will also assist the hospital to continue a downward slope toward achieving zero CLABSIs and DVTs. The effectiveness of a project, however, is only as good as the sustained follow through based on the guidelines, policies, and procedures established (Viswanatha, 2011).

Section 5: Scholarly Product

Executive Summary

The purpose of this paper is to report on the implementation of a dedicated team approach to inserting and maintaining central line access in the hospital so that patients who require such access can have the same meticulous care treatment as in the intensive care units. A vast variety of patients who come to the hospital need some type of intravenous access (IV) to deliver medication and fluids into the venous blood system. There are IV medications that can irritate or inflame the veins, or become caustic to the veins. These types of medications must be infused into the central venous system through a central line. Central venous access can save lives; however, there is risk for complications associated with central line access. Known complications are central line associated bloodstream infections (CLABSIs) and deep venous thromboses (DVTs). Approximately 41,000 CLABSIs occur nationally per year with a total cost of $38,000 per case. Studies have determined that these complications can be prevented when evidence-based guidelines are followed. Due to these findings, Medicare and Medicaid will no longer reimburse hospitals for CLABSIs and their associated hospital stays.

Efforts to decrease CLABSIs complications are on the rise. A bundle of methods used at the time of insertion can help prevent CLABSIs. Additionally, evidence indicates that using a limited staff to insert and maintain the central lines will also help to decrease CLABSIs. Although there is increasing evidence on how to prevent CLABSIs by implementing these recommendations, all the data have been focused toward the patients in the intensive care units. This project extends that work by implementing a bundle

approach and a dedicated central venous line team not only in the ICUs, but also the step down units of the hospital.

A dedicated team was established that consisted of four IV nurses, three physicians and one radiologist; these team members have committed to inserting, monitoring, and maintaining central line apparatus inserted at the hospital. The team met and agreed to create a goal and mission statement (see Appendix A). A project plan was developed to help collect and measure data to determine if having a dedicated team decreased central line complications (see Appendix B). The team's main role was to establish the best IV access needed for the patient's treatment plan. The physicians agreed to be back-up and to assist when the access needed was out of the IV nurses' scope of practice. The purpose of having the physicians on board was to help expedite the central line access and avoid having to send the patient to radiology for a simple line access. The radiologist agreed to insert the central line for complicated cases.

The dedicated team members all follow the same guidelines for the insertion of the central line access utilizing the Institute of Healthcare Improvement recommendation of the bundle method (see Appendix C). A detailed map was outlined for the team to follow with inserting a central line access (see Appendix E). The purpose of the map was to have the team utilize the same techniques with each insertion. A template was created in the electronic healthcare record for documentation purposes. The dedicated team took ownership of all central line accesses in the hospital, and the IV nurse reviewed the access catheters daily for signs and symptoms of complications and reviewed the continued necessity for them as part of the treatment plan.

An evaluation plan was developed to facilitate data collection and review of the data collected (see Appendix G). The data demonstrated that having a dedicated team to insert, maintain, and care for the patient central lines throughout the hospital decreased complications associated with central lines by 50%. In addition, having a dedicated team committed to the vascular access needs of the patients increased patient satisfaction by:

- Decreasing the many unwarranted needle sticks
- Decreasing the wait time for a central line access
- Decreasing the wait time for the medication infusion
- Expediting discharges for patients going home with a central line access.

The dedicate team approach has improved the quality and safety of heath care for patients who have a central line access. The team approach also has helped the hospital to achieve a downward slope toward achieving zero CLABSIs. The results will be present the stakeholders of the hospital with the recommendation to continue with a dedicated team approach as outlined (see Appendix L).

References

American Association of Colleges of Nursing. (2004). *Indicators of quality in research-focused doctoral programs in nursing* (AACN Position Statement). Washington, DC.

Band, J., & Gaynes, R. (2010). Prevention of intravascular catheter-related infections. *UpToDate.* Retrieved from http://www.uptodate.com/contents/prevention of intravascular catheter related infections.

Berenholtz, S., Pronovost, P., Lipsett, P., Hobson, D., Earsing, K., Farley, J., & Perl, T. (2004). Elimination catheter-related bloodstream infections in the intensive care unit. *Critical Care Medicine, 32*, 2014-2020.

Bigelow, L., Wolkowski, C., Baskin, L., & Gorko, M. (2010) Lean six sigma: Sustaining the gains in a hospital laboratory. *Clinical Leadership & Management Review, 24(3),* 1-14.

Blot, F., Schmidt, E., Nitenberg, G., Tancrede C., Leclercq, B., Laplanche, A., & Andremon A. (1998). Earlier positivity of central venous versus peripheral blood cultures is highly predictive of catheter-related sepsis. *Journal of Clinical Microbiology, 36(1),* 195-9.

Brett, J. (2002). Use of nursing practice research findings. *Nursing Research, 36*, 344.

Burns, N., & Grove, S. K. (2009). The practice of nursing research appraisal, synthesis and generations of evidence (6th ed.). St. Louis, MO: Saunders Elsevier.

Centers for Disease Control and Prevention (2005). Recommendations for preventing transmission of infections among chronic hemodialysis patients. *Morbidity and Mortality Weekly Review*, 50(5).

Centers for Disease Control and Prevention. (2008). *Central line-associated bloodstream infections: Resources for patients and healthcare providers*. Retrieved from: http://www.cdc.gov/HAI/bsi?CLABSI-resources.html

Center for Medicare & Medicaid (2008). *Medicare non-payment of hospital-acquired infections: Infection rates three years post implementation*. Retrieved from: http://www.CMS.gov/mmrr/download/mmrr2009_+003_03_a08.pdf

Cooper, M.R., Duquette, C. E., McWilliams, T., Orsini, M., & Klein, A. A., (2009). The unintended consequences of being friendly: A case study. *Journal for Healthcare Quality: Promoting Excellence in Healthcare*, *31*(5), 43–47

Clutter, P. C. (2009). Clinical practice guidelines: Key resources to guide clinical decision-making and enhance quality health care. *Journal of Emergency Nursing, 35(5*), 460-461.

Davis, J. (2011). *Central line associated bloodstream infection: Comprehensive, data driven prevention*. Retrieved from: http//patientsafetyauthority.org/ADVISORIES /Advisory Library/2011/sept8(3)/Pages/100/aspx

Earsing, K., Baugher Hobson, D., & White, K. (2005). Best-practice protocols: Preventing central line infections. *Nursing Management, 36(10),* 18-20.

Fitzpatrick, J. (2002) *Perceptions of the relationship between self-assessment and ethical decision making in the community nursing*. Doctoral Thesis. Bristol, UK.

Fineout-Overholt, E., Cox, J., Robbins, B., & Gray, Y. (2004). Teaching evidence-based Practice. *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice* (pp. 407-442). Philadelphia PA: Lippincott, Williams & Wilkins.

Fridkin, S., Hageman, J., & Morrison M., (2005) Methicillin-resistant Staphylococcus aureus disease in three communities. *New England Medical Journal*, 352, 1436-44.

Gay, L. R. (1996). *Educational research: Competencies for analysis and application*. Upper Saddle River, NJ: Merrill.

Goode, C. (2000) A meta-analysis of effects of heparin flush and saline flush: Quality and cost implications. Nursing Research, 40, 324–330.

Guerin, K., Wagner, J., Raines, K., & Bessesen M. (2010). Reduction in central line associated bloodstream infection by implementation of a post insertion care bundle. *American Journal of Infection Control, 38(6),* 430-433.

Health People 2020 (2013). *The cornerstone for prevention*. Retrieved from http://www.healthypeople.gov/2020/ Topics objectives 2020/ overview.aspx?topicid=17

Institute for Healthcare Improvement. (2009). *Implement the IHI central line bundle*. Retrieved from http://www.ihi.org

Jacowski, T. (2006). DMAICL *What and why?* Retrived from: http://www.ezinearticles.com/

Kallen, A., Arduino M., & Patel, P. (2010). Preventing infections in patients undergoing hemodialysis. Retrieved from: http://www.medscape.com/ view article/723600-

Kelly, D. L. (2011). *Applying quality management in healthcare: A systems approach* (3rd ed.). Chicago, IL: Health Administration Press.

Klevens R., Edwards J., & Richards C. (2002) Estimating health care-associated infections and deaths in US hospitals, 2002. *Public Health Report, 122*(2), 160.

Lecture, E. (2011) *Stakeholder mapping and communication*. Retrieved from: http://www.expertprogrammanagement.com/2011/07/stakeholder-mapping-and communication

Maki, D. G., Kluger, D. M., & Crnich, C. J. (2006). The risk of bloodstream infection in adults with different intravascular devices: A systematic review of 200 published prospective studies. *Mayo Clinic Proceedings, Mayo Clinic, 81*, 1159-1171.

Marra, A., Cal, R., Durao, M., Correa, L., Buastelli, L, Moura, D….dos Santos, P. (2010). Impact of a program to prevent central line-associated bloodstream infection in the zero tolerance era. *American Journal of Infection Control, 38,* 434-439.

Marschall, J., Mermel, L. A., Classen, D., Arias, K. M., Podgorny, K., Andersonn, D. J….Yokoe, D. S. (2008). Strategies to prevent central line-associated bloodstream infections in acute care hospitals [Supplemental material]. *Infection Control and Hospital Epidemiology, 29,* 22-30.

Mermel, L., Farr, B., Sherertz, R., Raad, I., Ogrady, N., & Craven D. (2001) Guidelines for the management of intravascular catheter-related infections. *Clinical Infectious Disease, 32*(9), 1249-1272.

McCaughey, B. (2006). Hospital infection is the next asbestos. *New York Law Journal*, Retrieved from: http//:www.hospitalinfection.org

McCurry, M. K., Revell, S. M. H., & Roy, C. (2009). Knowledge for the good of the individual and society: Linking philosophy, disciplinary goals, theory, and practice. *Nursing Philosophy, 11(1),* 42-52

McEwen, M., & Wills, E. M. (2011). *Theoretical basis for nursing*, (3rd ed.). Philadelphia PA: Lippincott, Williams & Wilkins.

Nicolini, D., Waring, J., & Mengis, J. (2011). Policy and practice in the use of root cause analysis to investigate clinical adverse events: Mind the gap. *Social Science & Medicine, 73*(2), 217-225.

O'Grady, N., Alexander, M., Burns, L. A., Dellinger, P., Garland, J., Heard, S. O., Rupp, M. (2011). Guidelines for the prevention of intravascular catheter-related infections. *Center for Disease Prevention and Control*. Retrieved from: http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf

Olrich, T. (March, 2011). *Achieving zero line infections in adult acute care: A replication study*. Presented at the meeting of the National Association of Clinical Nurse Specialists, Baltimore, MD.

Pennsylvania Patient Safety Advisor (2010). Beyond the bundle: Reducing the risk of central line-associated bloodstream infections. [Supplemental material]. *Pennsylvania Patient Safety Advisory, 7(1),* 1-9.

Planas, L. G. (2008). Intervention design, implementation, and evaluation. *American Journal of Health-System Pharmacy, 6.*

Pronovost, M. D., Needham, D., Berenholtz, S., Sinopoli, D., Chu, H., Cosgrove, S., & Goeschel, C. (2006). An intervention to decrease catheter-related bloodstream infections in the ICU. *New England Journal of Medicine, 5(19),* 1854-1863.

Pronovost, P., Cardo, D., Goeschel, C., Berenholtz, S., Saint, S., & Jernigan, J. (2011). A research framework for reducing preventable patient harm, *Clinical Infectious Disease,* (*52)4,* 507-513.

Ridenour, N., & Trautman, D. (2009). A primer for nurses on advancing health reform policy. *Journal of Professional Nursing, 25*(6), 358-362.

Rinke, M. L., Chen, A. R., Bundy, D. G., Colantuoni, E., Fratino, L., Drucis, K. M., & Miller, M. R. (2012). Implementation of a central line maintenance care bundle in hospitalized pediatric oncology patients. *Pediatrics, 130 (4),* 996-1004.

Richardson, A., Miller, M., & Potter, H. (2002). Developing, delivering, and evaluating cancer nursing services: Searching for a United Kingdom evidence base for practice. *Cancer Nursing,* 25(5), 404-415.

Roberts, R., & Mahoney, L. (2004) Stakeholder conceptions of the corporation: Their meaning and influence in accounting research. *Business Ethics Quarterly, 14 (*2), 275-293.

Robey, R. (2004). A five-phase model for clinical outcome research, *Journal of Communication Disorders,* 37(5), 401-411.

Ruseva, E., Sohr, D., Bucholz, S., Ganser, A., Mattner, F. & Gastmeier, P. (2009). Surveillance with successful reduction of central line-associated bloodstream infections among neutropenic patients with hematologic or oncologic malignancies. *Annals of Hematology, 88,* 907-912. doi:10.1007/s00277-008-0687-1

Scott, D. (2008). *The direct medical cost of healthcare-associated infection in US hospitals and the benefits of prevention.* Retrieved from CDC/prevention/org.

Society for Healthcare Epidemiology of America (SHEA) (2010). *CLABSI prevention efforts result in up to 200,000 infections preventive in intensive care units nationwide*. Retrieved from: http://www.shea.online.org./Article/scmid/428/ArticleId/209.aspx

Silow-Carroll, S., & Edwards, J. (2011) Eliminating central line infections and spreading success at high-performing hospitals. *The Commonwealth Fund*. Retrieved from http://www.commonwealthfund.org

Silva, M. C., & Rothbart, D. (2004). An analysis of changing trends in philosophies of science on nursing theory development and testing. *Advanced Nursing Science, 6*(2), 1-12.

Son, C., Daniels, T., & Sepkowitz, K. (2012) Central line associated bloodstream infection surveillance outside the intensive care unit: A multicenter survey. *Infection Control Hospital Epidemiology, 33(9),* 869-874.

Stone, P., Glied, S., McNair, P., Matthes, N., Cohen, B., Landers, T., & Larson, E. (2010). CMS changes in reimbursement for HAIs: Setting a research agenda. *Medical Care, 48(5),* 433-443.

Terry, A. (2012). *Clinical research for the doctor of nursing practice*, Sudbury, MA: Jones and Bartlett Learning.

Titler, M. G., Kleiber, C., Steelman, V., Rakel, B. A., Budreau, G., Everett, L. Q., Buckwalter, K. C....Goode, T. (2001). The Iowa model of evidence-based practice to promote quality care. *Critical Care Nursing Clinics of North America*,*13*(4), 497-509.

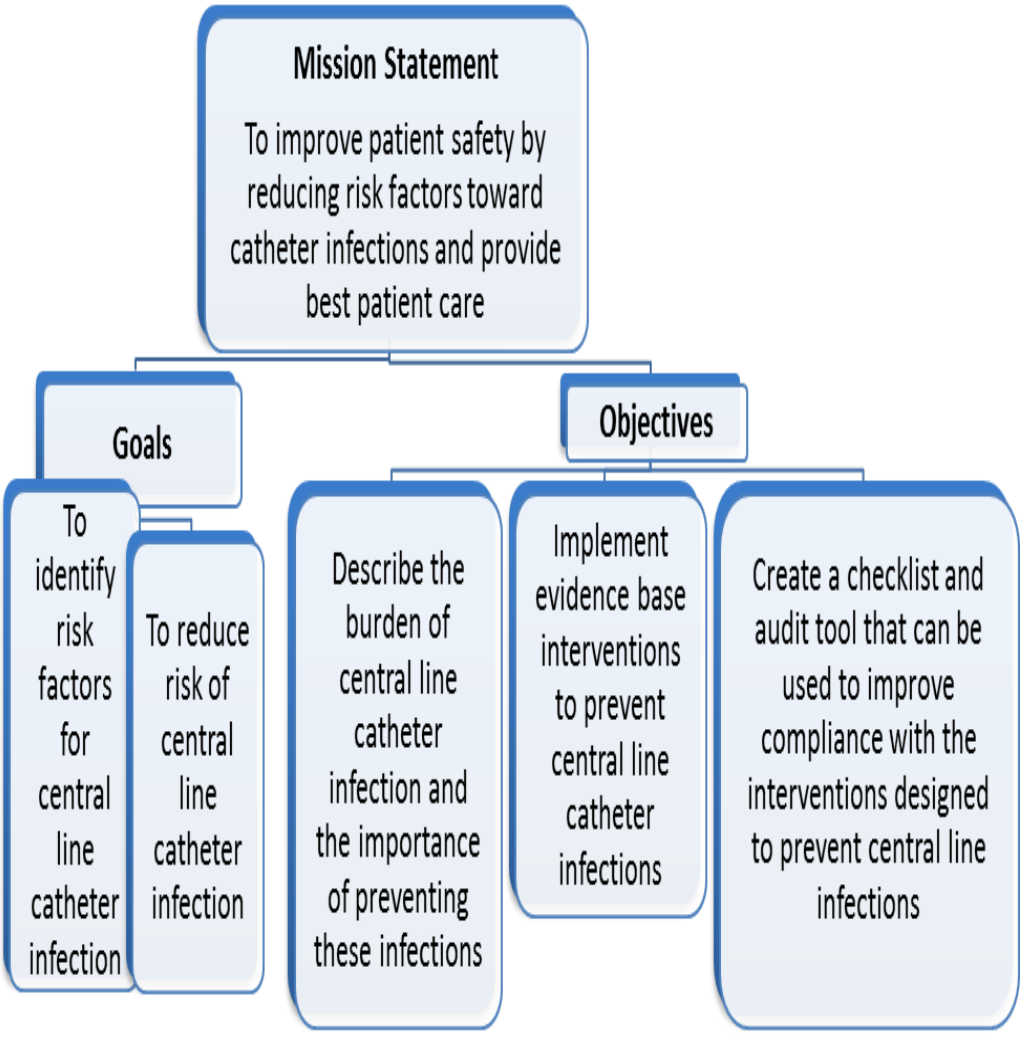
Viswanath, K. P. (2011). Applying Donabedian's theory as a framework for bariatric surgery accreditation. *Bariatric Nursing and Surgical Patient Care, 6(1),* 33-37.

White, K., & Dudley-Brown, S. (2012). *Translation of evidence into practice*. New York, NY: Springer.

Wolfenden, L. L., Anderson, G., Veledar, E., & Srinivasan, A. (2007). Catheter associated bloodstream infections in 2 long-term acute care hospitals. *Infection Control and Hospital Epidemiology*, *28*, 105-106.

Appendix A: Goal Statement

Goal statement: Reduce the CLABSI rate to < 1.0 /1000 lines days in the hospital and achieve 75% bundle compliance in the hospital by 7/30/2014.



Appendix B: The DMAIC model

The DMAIC model

Project Plan												
Time frame	Wk 1	Wk 2	Wk 3	WK 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk10	Wk11	WK12
Define												
Measure												
Analyze												
Improve												
Control												

Appendix C: Outline of Interventions planned

1) Create a protocol that will consist of data collected about the care of the central line
2) Apparatus used for central lines. The protocol will include cleaning the hubs prior to accessing the line for catheter treatment. The hub needs to be handled aseptically, and once cleaned with an antiseptic cleaner, the hubs should not be allowed to touch a non-sterile area. The protocol will also emphasize the importance of cleaning the hubs after disconnecting from catheter, which will include removing any blood/medication residue from the crevices of the hubs. The protocol for dressing changes will consist of utilizing a recommended bundle of components that includes elements that when applied together will results in positive outcome toward safety for patients, (IHI, 2009). The components consist of: hand-washing and a custom made central line dressing kit that consist of:
    a. Sterile gloves
    b. Mask
    c. Chlorhexidine gluconate cleaner
    d. Antimicrobial wafer
    e. Hubs
    f. Transparent dressing with boarder tape
    g. 2 10ml Normal saline flushes
3) Educate and train the staff on the recommended protocol

4) Create a bundle that will consist of evidence based elements to be used to implement sterile technique with dressing changes (The bundle will be custom made by the manufacturer to include all the elements in one package for easy use and compliancy) Step-by-step instructions will be included for:
    - Hand hygiene
    - Cleaning the site with a chlorhexidine gluconate saturated sponge
    - Utilizing the "central line dressing kit"
    - Applying chlorhexidine gluconate wafer to site
    - Securing with air tight transparent dressing
    - Applying an alcohol foam insert dead end cap when the catheter is not in use.
    - Changing hubs with every dressing change and removing old adhesive glue attached to the catheter.
    - Scheduling routine sterile dressing changes
5) Schedule a class for the hospital nursing staff by the team's director demonstrating the proper technique utilized when accessing the catheter for medication and fluids that includes:
    a. Scrubbing the hub with a 30 second scrub using chlorhexidine gluconate sponges.
    b. Flushing techniques with normal saline before and after medication.
    c. Attaching the alcohol saturated sponge dead end caps when the line is not in use.

d. Minimize connecting and disconnecting tubing from catheter.

e. Stress the importance of not touching the tip of the tubing and catheter access.

Proper cleaning before each connection of the central line catheter, avoiding touching the tip of tubing that will be attached to catheter, and minimizing the connection and disconnection of the side ports of the tubing will help decrease the potential risk of an iatrogenic event. Proper flushing technique will help prevent occlusion from medication precipitation and the utilization of the dead end caps saturated with alcohol sponges will help prevent catheter contamination when not in use. The teaching class will consist of hands on demonstration and return demonstration to sign off the competency of the staff members of performing proper technique with catheter care. The hands on demonstration will be performed using "Chester" chest and a fake arm mannequin. The maintenance care aspect of the teaching will be with a power point presentation and copies made available for the staff.

6) Establish monthly meeting to create a positive relationship with the staff. Establishing a positive environment assists with social and behavioral changes by engaging the staff members in the effort to prevent catheter infection (McCurry et al., 2009). The meetings will help with adherence to the recommended intervention by the staff and allow them to take ownership of the change. Involvement includes reporting on:

- Catheter/vascular access care observation - The team director will report *observe vascular access care quarterly by monitoring staff adherence to aseptic technique when connecting and disconnecting catheter and with general maintenance care and technique*.
- Hand hygiene observation - The team director will *observe hand washing opportunities and compliance monthly at the staff meetings, If improper technique was identified, the team director will review the proper technique with staff at the time and again, have return demonstration and competency signed off.*

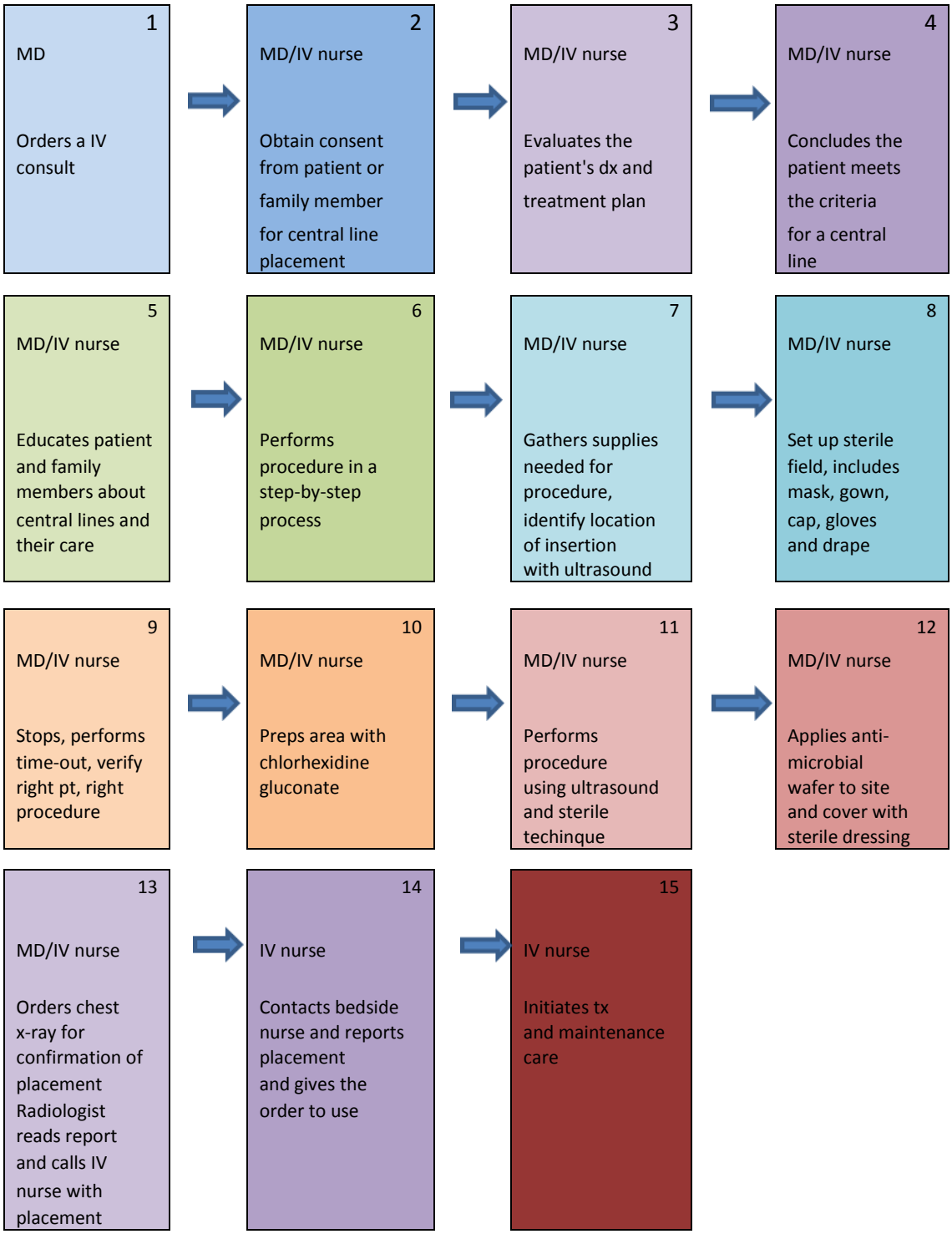
To have effective outcomes for the prevention of CLABSI in a facility, interventions must be evidence base, have the endorsement of the facility administrators, and provide empowerment of the frontline staff to intervene on behalf of the patient care when infection control has been breached. Positive encouragement is recommended to continue adherence with the recommended new practices and infection prevention principles (McCurry et al., 2009). To help keep staff involved and compliant, updated result data are a necessity. Ongoing surveillance can be used to identify specific catheter related infection outbreaks (if any) and assist with promoting additional interventions to reduce infection and promote patient safety.

Appendix D: Gantt chart for time line

Gantt Chart for project time line													
Week #	1	2	3	4	5	6	7	8	9	10	11	12	13
Activity:													
Retro data collection													
to reveal causative factors													
Organize effective infection													
control protocols using evidence													
Educate staff of the purpose													
of the study													
Train team on the implementation													
of dressing changes/arrange for													
dressing change kits													
Monitor team in dressing change													
technique with new kits													
Evaluate process													
Collect new data and compare													
to previous data collected													
Evaluate process													
Report outcomes													

Appendix E: Detail Process Map

Detail Process Map



Appendix F: Department Policy/Protocol

POLICY: It is the policy to have a central line access protocol to follow. The protocol was approved through the medical staff and may be instituted by the dedicated team. All registered nurses who insert PICC lines must complete a PICC certification class and perform a return competency demonstration. The physicians on the team will be proficient with central line access. All members will follow the protocol listed below.

PROCEDURE: A central line consult by a physician or a verbal order, repeat order from physician to nurse must be enter into the patient's electronic healthcare record.

The team will pull up daily a list of consults and evaluate each one for the best vascular access for the patient's treatment plan.

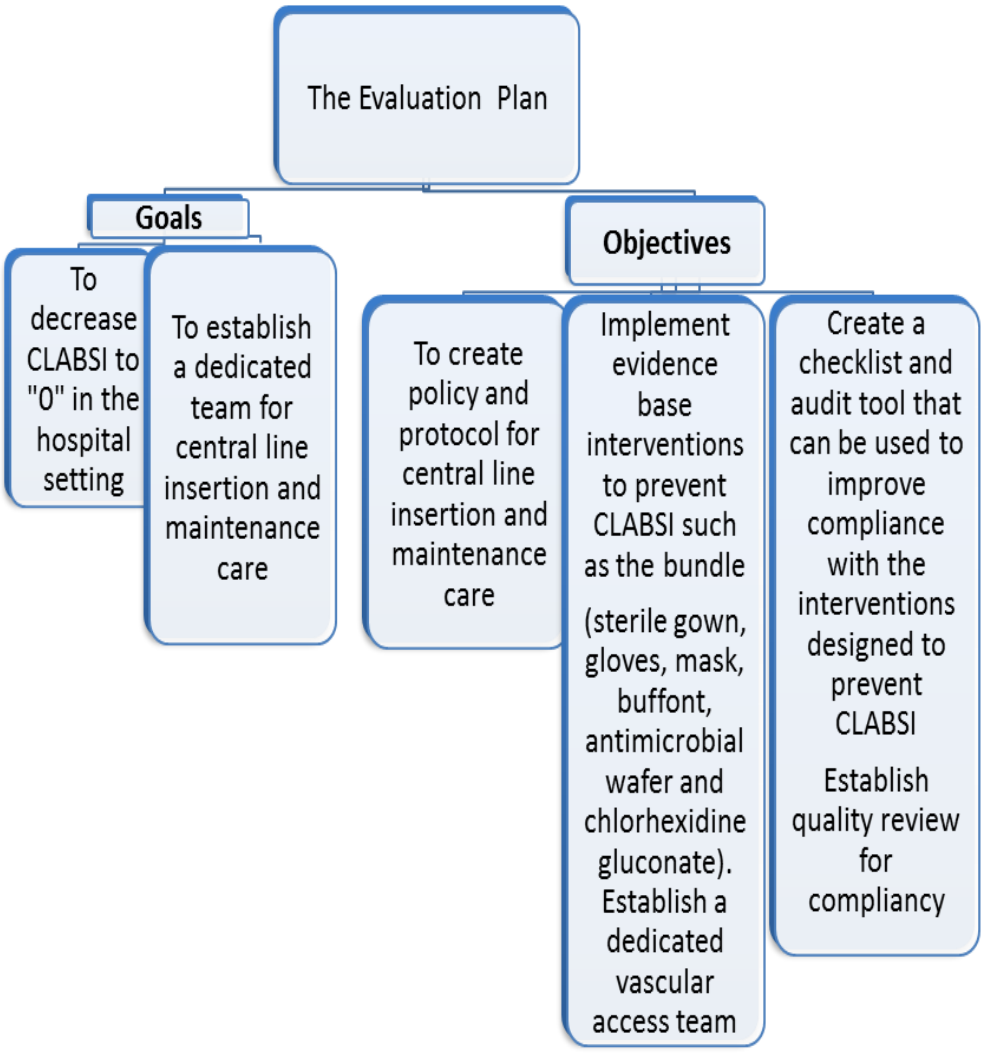
Protocol

- Maximum barrier precautions with strict compliance of hand hygiene, cap, mask,sterile gown, body drape, and gloves will be utilized as recommended by the CDC for every central line access performed.
- Local anesthetic for PICC insertion, if applicable:
- Utilize Site-Rite ultrasound device for PICC insertion, if needed.
- Portable chest x-ray post insertion to check for tip placement.
- Document catheter internal length on the patient's electronic medical record.
- Avoid femoral line if possible.
- Observe daily for necessity of line, and signs and symptoms of complications.
- Perform, date and document dressing change every 7 days and PRN: dislodgement, soiling, ect.

Dressing Change:

- Obtain central line dressing kit. Remove old dressing and inspect site for complications.
- Using sterile technique, cleanse site with Chlorhexidine solution provided in kit.
- Change stat-lock, wings, anti-microbial wafer, and infusion caps.
- Secure with TSM dressing.
- Flush each lumen with 10ml of normal saline solution.
- Document intervention on electronic medical record.
- Measure mid-arm circumference every 24 hours and chart in vascular intervention.
- Flush catheter with at 10ml of normal saline daily during line assessment. (Use only 10ml or larger syringes).
- When line removal is ordered:
- Documentation of catheter length must be established before PICC can be removed.
- Remove line and apply direct pressure to site until hemostasis obtained.
- Apply gauze dressing and secure with tape.

Appendix G: The Evaluation Plan



Appendix H: Gantt chart for step-by-step process

Gantt Chart for project time line									
Week #	1	2	3	4	5	6	7	8	9
Activity:									
Meeting with stakeholders									
Central line team established									
Template for bundle developed									
Policy & Protocol created									
Control protocols using evidence									
Educate staff of the purpose									
of the study									
Review charts and data collected									
from the month of June									
Implement team approach and live									
data collected from the month of July									

Appendix I: Mission Statement

Infusion Services

Mission

The Infusion department provides both inpatient and outpatient evaluations to obtain high quality vascular access necessary for their intravenous (IV) treatment plan. The department also offers the flexibility of having outpatient infusions services to help expedite patients back to the comfort of their home while still receiving patient center care.

Vision

To be recognized by the community and surrounding areas as the number one choice for providing the highest quality vascular access needs and outpatient infusion services.

Code of Professionalism

1. We will provide services that consist of insertion, delivery, and maintenance of all infusions and vascular access therapies, including fluids, medications, blood and blood components, parenteral nutrition, and chemotherapy to the inpatient/outpatient arena.
2. We will demonstrate accuracy, efficiency, and consistency for safe delivery of all infusion services, along with reduction and /or elimination of complications.
3. We will assist with reducing liability, lower costs, and decrease length of stay, while promoting vascular preservation, greater patient satisfaction and better outcomes.
4. We will collaborate with physicians and nursing staff to assist with enhancing patient safety, provide quality care and increase patient satisfaction.
5. We will demonstrate, assist and share our knowledge for safe practice as a direct care provider, educator, consultant, coach, mentor, advocate, and coordinator to strive in providing high quality outcomes.
6. We will practice and establish policies and practices for patient infusions needs according to the national recognized Infusion Nursing Standards of Practice.
7. We will continue to participate in quality improvement initiatives utilizing evidence base data.
8. We will be able to assist patient with their infusion needs as they transition to the home environment.
9. We will demonstrate compassion with patients who have anxiety related to pain form vascular cannulation to minimize discomfort.
10. We will deliver professional quality care for all inpatient/outpatient needs without discrimination on the basis of gender, race, creed, religion, or socio-economic status.
11. We will practice to the fullest utilizing core values of Respect, Attitude, Responsibility, and Integrity.
12. We will practice on a daily basic "AIDET" A=Acknowledge; I= Introduce; D=Duration; E= Explain; T= Thank you; that will be utilized with all encounters of patients, guests, and co-workers to establish an emotional connection with everyone we engage upon.

I, _____, have read and understand the Department of Infusion Services Code of Professionalism. I affirm that I am committed to maintaining these non-negotiable standards as an expectation of my job, and that I will be held accountable for compliance of all principles outlined in this document.

_____ _____

Signature **Date**

Appendix J: Central line definition

Central Line Associated Bloodstream Infection (CLABSI) definition by the National Healthcare Safety Network (NHSN)

Central line- An intravascular catheter inserted into the vein and terminates into one of the great vessels

- Superior vena cava
- Inferior vena cava
- Brachiocephalic vein
- Subclavian veins
- External or common iliac veins
- Femoral veins

Central line associated bloodstream infection (CLABSI)- A laboratory-confirmed bloodstream infection (LCBI) when central line (CL) in place >2 calendar days on the date of event, with day of device placement being day 1 and no other source can be identified.

Appendix K: Competency assessment

Central line Catheter insertion competency assessment

- **Name_____**
- **Date_____**
- This to verify that the nurse named above has successfully completed 10 PICC/midline
- insertions utilizing the following requires steps.
- **ASSESSMENT** **Date/Initials of**
- **Supervisor**
- 1. Verbalized steps occurring when MD orders received. _____
- 2. Confirm diagnosis, therapy and duration. Obtains patient history _____
- and completes patient education.
- 3. Performs vein assessment, locate vein of choice. (Basilic, Median, _____
- Cephalic)
- 4. Collect supplies: Insertion kit, ultra site machine, antimicrobial _____
- wafer, secure wings, and universal protection equipment.
- 5. Measures vein by 3 step process. (insertion site, midclavicular, third _____
- intercostal – SVC)
- 6. Establishes sterile field by following principles of sterility, arrange _____
- items at least 2" from edge of sterile filed, prepares area of patient's
- arm.
- 7. Preps patient's arm utilizing 2% chlorexidine gluconate or other _____
- Infusion Nursing Society (INS) accepted agent. Apply tourniquet in appropriate
- manner. Re-establish sterile field.
- 8. Prepares catheter following manufacturers recommendations for _____
- pre-flushed measurements, positioning guidewire, trimming as
- appropriate to the product and policy. Does not cut guide-wire
- or allow to extend past tip of catheter.
- 9. Access vein, established blood return, follows manufacturer's _____
- recommendation for introducer usage, remove stylet as applicable,
- controlling of blood return.
- 10. Remove tourniquet as threading of catheter begins. Position patient _____
- for completion of threading (Arm extended, chin to clavicle same
- side as insertion.)
- 11. Check for blood return and flush with appropriate solution. _____
- 12. Remove introducer and guidewire per manufacture's _____
- recommendations.
- 13. Apply positive pressure hubs, secure catheter utilizing _____
- securing wings and stat-lock device.
- 14 Apply anti-microbial wafer to insertion site, and cover with _____
- sterile dressing.
- 15. Account for all supplies/sharps and dispose of all items properly. _____
- 16. Measures upper arm circumference above insertion site and _____
- mark area of measurement.
- 16. Document all insertion information in the patient computerized _____
- chart and schedule maintenance care and monitoring.
- Name of Supervisor_____

- Signature of Supervisor_____
- By signing this document you have viewed the insertion and confirm the participant's
- performance with your initials each individual competency.
- Signature of employee_____

Appendix L: Gantt chart for evaluation

	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Activity:														
Retro data collection														
Create policy/protocol														
Establish dedicated team														
Present to stakeholders														
Implement plan														
Evaluate with team														
Collect data & compare to														
previous data collected														
Report back to stakeholders														

Table 1. Time frame

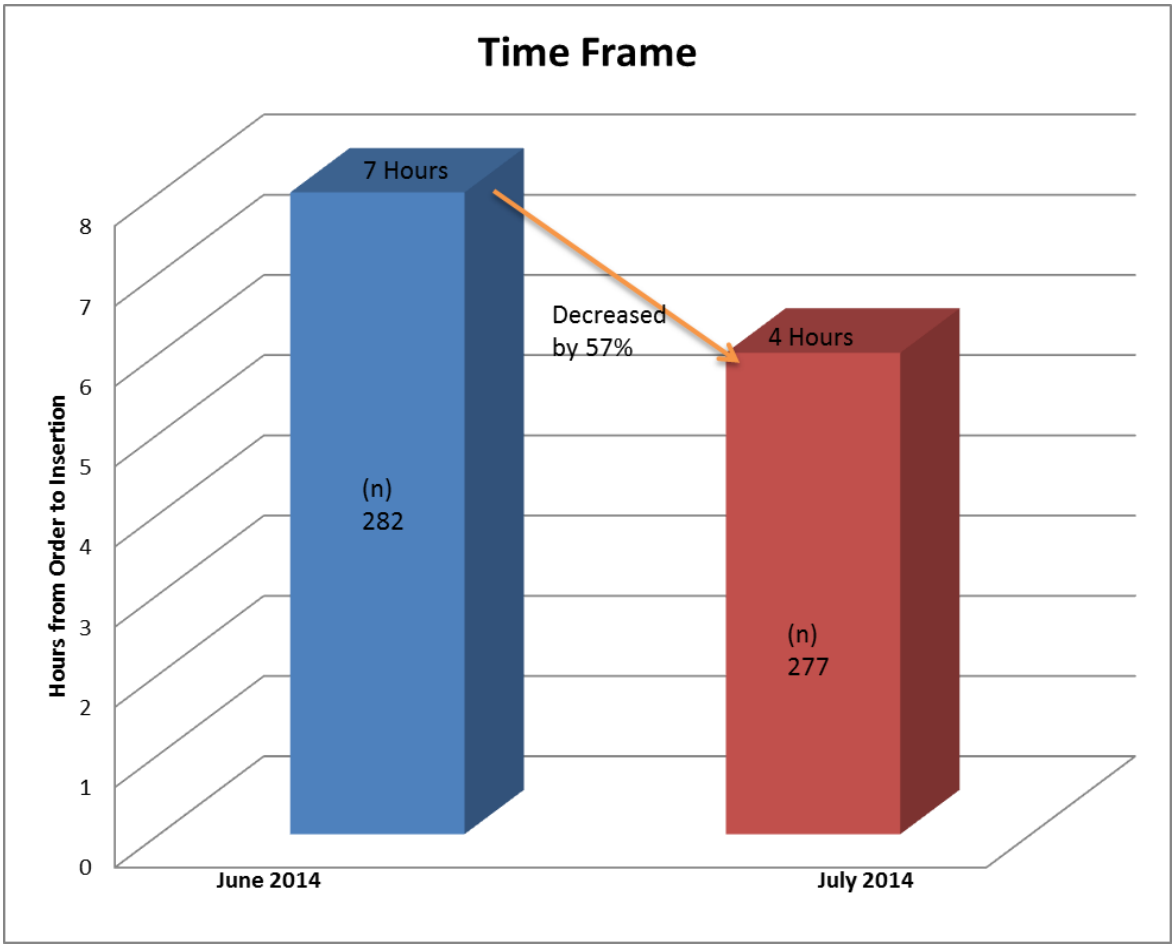
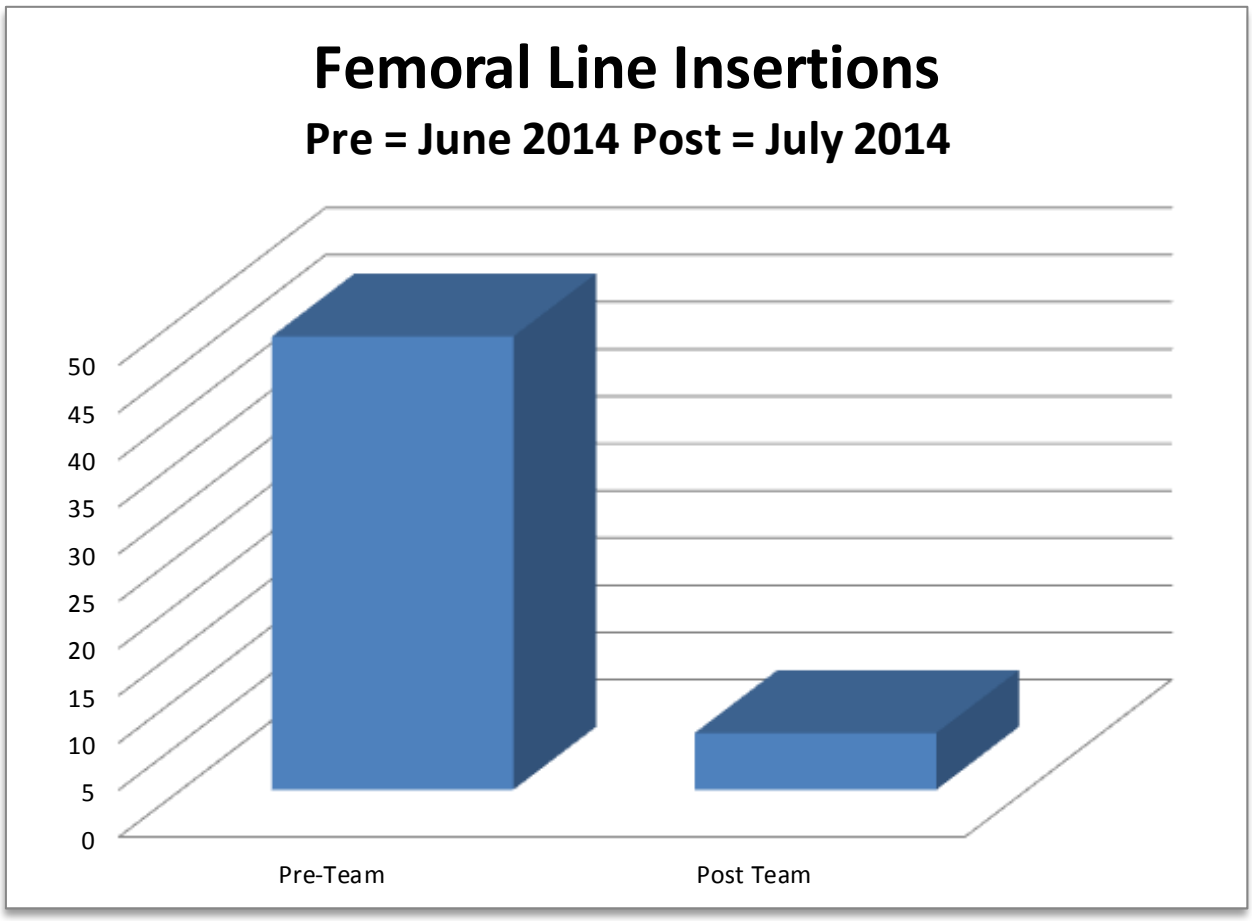
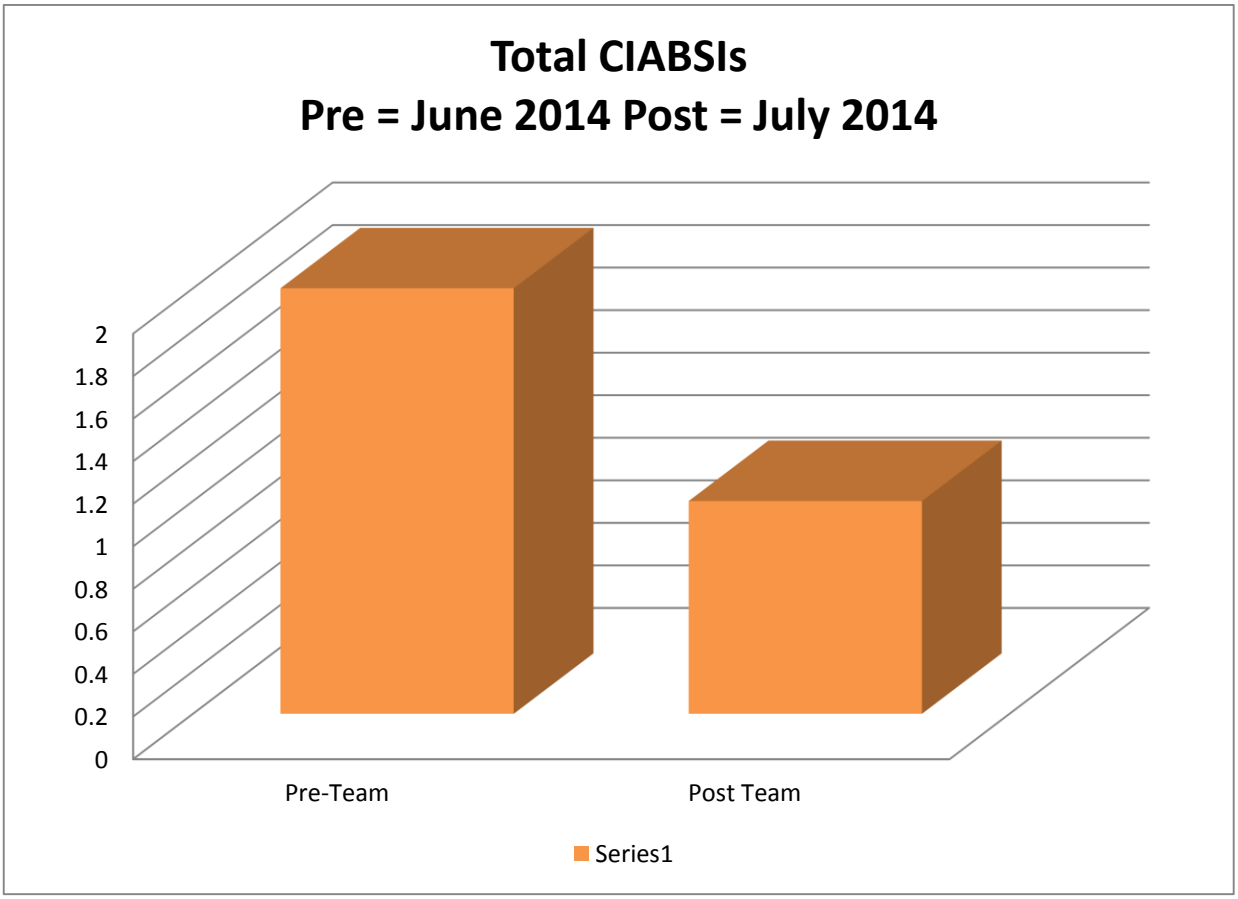


Table 2 Femoral Lines



\

Table 3 CLABSIs



Curriculum Vitae

Curriculum Vitae
Donna DeGennaro

2538 Shore Drive • Saint Augustine, Florida 32086
904-797-6471(home) • 904347-9076 (cell)
1groovychic@bellsouth.net

Education:

1996 Flagler County Vocational Technical Institute – Palm Coast, FL
Certified Nursing Assistant Program

1997 St. Augustine Vocational Technical Institute – St. Augustine, FL
Licensed Practical Nurse Program

2000 Daytona Beach Community College – Daytona Beach, FL
Associate of Science Degree
Completion of Registered Nurse Program

2004 University of Central Florida – Orlando, FL
Bachelors in Nursing Program
Completion of Bachelor in Nursing

2007 Walden University-Minneapolis, Minn
Master in Nursing Education
Completion of Master in Nursing Education

2014 Walden University-Minneapolis, Minn
Doctoral of Nursing Practice
Completion of Doctoral of Nursing Practice (DNP) December 2014

Certifications / Licensure:

1996 CNA Certification
1997 License Practicing Nurse (LPN)
1999 ACLS Certification
2000 Registered Nurse (RN)
2000 PICC Line Insertion Certification (PICC)
2002 Certification as Wound Care Nurse
2003 Chemotherapy Certification
2005 Certified Registered Nurse of Infusion (CRNI)
2010 Vascular Access Board Certification (VA-BC)
2010 Certified PICC Ultrasound Insertion (CPUI)

2011 Vascular Access Ultrasound insertion certification (VA-BC)
2012 Certified Neonate, Infant, Pediatric PICC nurse (PN-PICC)
2013 FEMA Emergency Management Certification
2013 Certified Hazmet Certification Instructor
2013 Six-Sigma Lean Certification
2013 Sigma Theta Tau Honor Roll Nursing Society

Awards and Honor

Outstanding Nursing Recognition Care award	08/2005
Dean Honor Roll University of Central Florida	08/2005
Great 100 Nurses of Northeast Florida	05/2007
Dean Honor Roll Walden University	08/2007
Employee of the month	08/2008
Employee of the year	2009
Sigma Theta Tau Honor Roll Nursing Society	2013
CRNI of 2014	2014

Professional Membership

Sigma Theta Tau International Honor Society
Association of Vascular Access
Infusion Nursing Society
Oncology Nursing Society
Northeast Florida Organization of Nurse Executives

Work History:

1996 – 1997: Certified Nursing Assistant –
Care Tenders Home Health

- Assistance to the RN and LPN
- Skills include all elements of personal care, vitals, signs, body mechanics, safety measures, resident's rights, infection control, communication and observation.

1997 – 2000: Licensed Practical Nurse –
Flagler Hospital Med-Surg.

- Provide basic bedside care
- Responsible for vital signs such as temperature, blood pressure, pulse and respiration
- Prepared and give injections and enemas, monitor catheters, apply dressings
- Monitor patients and report adverse reactions to medications or treatment
- Collect samples for testing
- Feed patients, and record food and fluid intakes and output
- Assist with bathing, dressing, and personal hygiene

- Supervise nursing assistants and aides
- Help evaluate patient's needs and develop care plans

2000 – 2001: Registered Nurse –
Flagler Hospital Med-Surg.

- Provide basic bedside care
- Responsible for vital signs such as temperature, blood pressure, pulse and respiration
- Prepared and give injections and enemas, monitor catheters, apply dressings
- Monitor patients and report adverse reactions to medications or treatment
- Collect samples for testing
- Feed patients, and record food and fluid intakes and output
- Assist with bathing, dressing, and personal hygiene
- Supervise License Practical Nurse and Nursing assistants
- Help evaluate patient's needs and develop care plans

2001 – 2003: Skin Care Team –
Flagler Hospital

- Assessed and evaluate multiple types of wounds in a 320 bed facility including diabetics, pressure 7 stasis ulcers, surgical and traumatic wounds
- Performed and educate nurses on different types of ostomy care
- Educate nursing staff on preventive care of in-patient admissions
- Educate home health agencies on the care and prevention of pressure ulcers
- Correlate wound care with physicians
- Manage wound care

2002 – 2005: Infusion Nurse Specialist –
Flagler Hospital

- Perform peripheral inserted central catheters (PICCs) in a 320 bed facility
- Create and establish the PICC department
- Create policy and procedures to the vascular aspect of patient care
- Serve as consult to nursing and medical staff for vascular access needs
- Monitor all vascular access (IV) devices in a 320 bed facility
- Troubleshoot IV complications (i.e., phlebitis, infiltration, extravasation)
- Implement preventive care

2005-2010: Vascular Access Coordinator
Flagler Hospital

- Perform peripheral inserted central catheters (PICC in a 320 bed facility)
- Create and establish the PICC department
- Create and establish Outpatient Infusion services
- Create and establish Discharge patient lounge
- Create and establish a Chemotherapy infusion team

- Create policy and procedures for medication infusions and vascular access patient needs
- Create policy/protocol for Chemotherapy in the inpatient/outpatient setting
- Coordinate and present in-services programs for the nursing staff on identifying the appropriate vascular access device
- Monitor all vascular access (IV) devices in a 320 bed facility
- Troubleshoot IV complications
- Implement preventive care
- Oversee employees in the PICC department
- Serve as consult to nursing and medical staff for vascular access needs
- Chair on the Practice council Committee
- Member of the Infection Control Committee
- Member of the Education Council Committee
- Adjunct to all inter-disciplinary departments

2010-present: Director of Infusion Services

- Perform peripheral inserted central catheters (PICC in a 320 bed facility)
- Maintain current updated policy and procedures to the vascular access, chemotherapy, outpatient infusion for patient care
- Manage and oversee 6 employees in the vascular access/chemotherapy/outpatient infusion services
- Coordinate and present in-services programs for the nursing staff on identifying the appropriate vascular access device for providing best patient care
- Outpatient infusion education to the community
- Monitor all vascular access (IV) devices in a 320 bed facility
- Track and troubleshoot infections, complications related to vascular access and report to appropriate areas
- Implement preventive care protocols for vascular access complications (i.e. phlebitis, infiltration, extravasation)
- Member of the Infection Control Committee
- Member of the Education Council Committee
- Member of the Practice Council Committee
- Member of the Pharmacy and Therapeutic Committee
- Member of Transfusion Committee
- Member of Cancer Committee
- Adjunct to all inter-disciplinary departments
- Adjunct to all inter-disciplinary department and physicians on inpatient/outpatient infusion therapy including chemotherapy
- Chemotherapy outpatient infusion education
- Coordinate and present in-services programs for outpatient facilities and home health agencies on identifying the appropriate vascular access device needed for home therapy, troubleshooting, etc.

- Create and establish Discharge patient lounge
- Research for evidence base best practice for patients
- Research for cost saving methods and products pertaining to providing best patient care
- Implement lean fundamentals
- Educate and train HAZMET protocols

Scholarly Activities:

2002 - Assisted with development of Infusion specialist role – including development of relevant policies and procedures.
2003 - Developed Infusion Therapy orientation for New Nurse Orientation.
2003 - Present Monthly presentation to nursing orientation regarding IV therapy program.
2005- Present Developed and update Extravasation and Infiltration preventive care policy and procedure.
2006 – Present Monthly educational poster display in relation to vascular access and needs.
2009- Presented an education poster on vascular access at the 2009 Association of Vascular Access convention.
2009- Published education abstract article on the care and maintenance of vascular access
2012 Presentation at 2012 Association of Vascular Access and published abstract article on DVT prevention with PICC lines.
2014 Present poster presentation of process improvement for patient care

Informal Education Completed:

2001 - Certified in PICC line placement.
2012 - ACLS Certification
2001 - Certified Wound Care Nurse
2003 - Training as Baxter Patient Care Systems Super-User
2005 - Chemotherapy Internship at Oncology Clinic
2005 - Introduction to Chemotherapy Infusion
2011 - Intravenous Nurses Society 4-day Conference
2010 - AVA vascular access Conference 4 days
2014 - Continuing Education course completed
Care for the Elderly
HIV, Domestic Violence, Medical Errors
Statistical Process Control
Monthly Medical Grand Rounds

Monthly Tumor Board Meeting
Monthly Infection Control Meeting

Objectives

To continue to be an active participant in nursing's future growth and development
To support Flagler hospital with professional expert leadership skills
To apply evidence-based practice for better patient care
To provide excellence in nursing care to patients and their families