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Assessment of Nurse Behaviors that Influence Care and Maintenance of Pediatric Oncology Central Venous Catheters

Susan Elizabeth McKenna

California State University, Northern California Consortium Doctor of Nursing Practice

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Assessment of Nurse Behaviors that Influence Care and Maintenance
of Pediatric Oncology Central Venous Catheters

By

Susan Elizabeth McKenna

A project

submitted in partial

fulfillment of the requirements for the degree of

Doctor of Nursing Practice

California State University, Northern Consortium

Doctor of Nursing Practice


May, 2018

APPROVED


For the California State University, Northern Consortium
Doctor of Nursing Practice:

We, the undersigned, certify that the project of the following student meets the required standards of scholarship, format, and style of the university and the student's graduate degree program for the awarding of the master's degree.

Susan Elizabeth McKenna
Project Author

 5/10/2018
Dr. Constance Hill (Chair) SJSU Nursing Department

 5/16/2018
Kinnery Patel, MPH Infection Prevention Department
(Committee Member)

 5-16-2018
Jennifer Delozer-Smith, MSN, CPNP, CNS Pediatrics
(Committee Member)

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Signature of project author: Susan E. McKenna

DEDICATION

I dedicate this capstone project to my wonderful father: Richard J. McKenna and my favorite psychology professor: Dr. Robert J. Pellegrini.

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ABSTRACT

Central venous catheters (CVC) are devices necessary to medically treat pediatric patients diagnosed with conditions such as cancer. Central line associated bloodstream infection (CLABSI) is a complication associated with utilizing a central line. Nurses are responsible for maintaining and complying with strict prevention protocols. The aims of this quality improvement project are to: (a) gain an understanding of perceptions of CLABSI prevention, (b) observe adherence to the CLABSI prevention bundle, (c) measure adherence to the current CLASBI prevention bundle (post-training), (d) identify ways to improve adherence to the CLASBI bundle, and (e) ascertain potential strategies for further compliance efforts. Three sources of data included (1) medical charts, (2) online survey, and (3) observation. The survey contained questions based on the Health Belief Model including (1) Perceived Susceptibility, (2) Perceived Severity, (3) Perceived Benefits, (4) Perceived Barriers, and (5) Self-Efficacy. Charts and observational data recorded the use of CLABSI prevention bundle components. Outcomes suggested that health beliefs were strong and non-compliance was likely not a result of questionable health beliefs. Adherence to the bundle components reported through medical record review (66%) and observation (90.9%) were compared. A one sample t-test estimated that the difference in compliance reported through records versus observation were highly significant ($t=11.2$, $p < 0.001$) and suggest that lack of compliance may be due to factors other than health perceptions. Adherence between patients treated was also noted. Approximately half (48%) the respondents expressed interest in becoming a “champion”. Survey responses were compared by interest groups. These findings can be used to inform the implementation of CLABSI infection prevention efforts inclusive of supporting the use of “champions” respondent suggestions such as lowering the nurse-patient ratio and increasing family engagement.

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CHAPTER 1: INTRODUCTION

It is estimated that 14,000 children and infants are diagnosed with cancer each year in the United States (Horde, Rehman, Hannon, Anderson-Shaw, & Schmidt, 2006). Acute lymphocytic leukemia (ALL) comprises approximately one-third of cancers diagnosed (Hord et al., 2006). In 2017, the American Cancer Association reported that major treatment advances in recent decades have resulted in more than an 80 percent 5-year survival rate for pediatric cancer cases. The standard treatment for ALL consists of various types of chemotherapy regimens requiring long hospital stays (Horde et al., 2006). Post-discharge care typically involves administering chemotherapy and prophylactic antibiotics, monitoring for side effects, managing the central venous catheter, and frequent visits to the pediatric oncology clinic. Parents are clearly expected to play a significant role in the child's post-discharge care (Horde et al., 2006).

Central venous catheters (CVC) are necessary devices to medically treat pediatric patients diagnosed with various conditions such as childhood cancer (Ludeman, 2007). The two main types of tunneled catheters (the proximal end is tunneled to an exit under the skin on the child's chest) used in children with cancer include Broviac® and implanted ports (Powerport®) in addition to peripherally inserted central venous catheters (PICC) in which the distal catheter tip is advanced via a large vein which terminates in the superior vena cava in all types of central line (Ludeman, 2007).

Central-line associated bloodstream infection is one of the many risks associated with utilizing a central line and they cause: (a) tremendous pain and suffering; (b) increased hospital costs; and (c) longer hospital stays. In addition to morbidity, CLABSI has been associated with higher risk of mortality. It is most often acquired in a hospital and can be

prevented if the device is properly handled and maintained (Milestone et al., 2013). Nurses are responsible for handling and maintenance of central lines of hospitalized patients. Since nurses are continuously exposed to microorganisms in the hospital setting, it is critically important that they comply with strict protocols in order to prevent the spread of infections to their patients (Efstathiou, Papastaviou, Raftopoulos, & Merkouris, 2011). However, it has been found that compliance with standard precaution guidelines is low among nurses. Therefore, noncompliance and solutions to increase the CLABSI prevention efforts is an issue of critical importance to investigate (Osbourne, 2003).

It is crucial to understand the various factors that influence compliance with infection prevention protocols when charged with caring and maintaining central lines in pediatric acute care settings. Behavioral factors framed by the Health Belief Model such as Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy clearly influence compliance in nurses and need to be further investigated (Efstathiou, Papastaviou, Raftopoulos, and Merkouris, 2011).

In another study by Thom et al. (2014), the concept of “champions” was employed as a strategy to increase compliance rates in nurses. A champion is a “point person” who has special knowledge and commitment toward CLABSI prevention and reducing publicly reported infection rates in their healthcare systems. Champions can be expected to perform periodic spot checks and assure supplies and products are accessible and bedside nurses are engaged and well informed. Champions must be helpful, supportive, and available to provide feedback. They are not merely enforcers of infection prevention protocols for the purpose of improving audits or any reported negative outcomes (Thom et al., 2014). The purpose of this project is to: (a) review the current literature regarding CLASBI in the pediatric population,

(b) examine factors that influence the handling and maintenance of central lines, and (c) consider strategies to increase compliance with standard central line maintenance protocols.

Background

Healthcare-associated infections (HAIs) such as CLABSI are acquired while receiving medical or surgical treatment. CLABSIs can be caused from microorganisms derived from the patient's skin in and around the venous central line catheter site (Climo et al., 2013). An estimated 250,000 central line-associated bloodstream infections (CLABSIs) occur in patients with central lines each year and the CLASBI infection rate in children is as high as 7.4 infections per 1,000 catheter days (Rinke et al., 2012).

CLABSIs result in an average of 24 extra days in hospital stays, cause extreme pain and suffering, and can be fatal. This form of infection has a mortality rate of 35 percent. Not only does the infection carry a heavy burden to the child and their family, but the financial expense to the hospital is estimated to be between \$16,000 to \$29,000 per adult and as much as \$45,000 per pediatric infection (Johnson et al., 2017; Climo et al., 2013). In fact, CLABSI is a preventable hospital acquired infection if the device is cared for properly (Milestone et al., 2013).

Use of evidence-based bundles has demonstrated a significant decrease in the incidence rates of CLABSI in the pediatric patient population (Rinke et al., 2012). The components of evidence-based bundles include: (a) strict hand hygiene; (b) standardized dressing change protocols; (c) aseptic techniques during central venous line access/dressing changes; (d) daily evaluation of line necessity, and (e) prompt removal of lines (Rinke et al., 2012). Another strategy for prevention and reducing the incidence of CLABSIs is to bath patients daily with Chlorhexidine (Climo et al., 2013). It has been found that bathing patients with

chlorhexidine wipes decreases CLABSI rates by approximately 60 percent (Climo et al., 2013).

According to Westson (2013), not all nurses adhere to infection prevention practices. Various factors may prevent adherence to the CLABSI prevention protocols such as workload, misunderstanding of protocol, and unavailability of equipment. It is not only essential that the nurse leaders of medical facilities understand potential barriers to compliance with prevention protocols, but it is imperative that nurses understand the importance of following the protocol for protecting their young vulnerable patients from acquiring CLABSI.

Problem Statement

An estimated 250,000 central line-associated bloodstream infections (CLABSIs) occur in patients with central lines each year and the CLASBI infection rate in children has been found to be as high as 7.4 infections per 1,000 catheter days (Rinke et al., 2012). The project conducted by this capstone author, an audit (2015-2016) revealed 6 infections with 3 of them being muscosal barrier injuries. The audit also revealed a gradual increase in CLASBI rates in pediatric patients over the years and that approximately three-quarters of nurses were not fully adhering to strict infection prevention policies for the care central lines. A thorough review of evidence-based literature on central line management was compared to the central line management practices at this medical facility and concluded that the current pediatric bundle lacked an effective “hygiene” component. The finding of low adherence rate prompted efforts to improve practices in CL line maintenance bundles inclusive of requiring daily linen change, daily bathing with soap and water, and mouth care with Chlorhexidine twice daily. Toward the end of 2017-2017, an extensive educational program

introducing a modified CLABSI prevention protocol was implemented for all staff nurses.

Reminders on the importance of following CLABSI prevention techniques are sent to clinical staff on a regular basis. Regardless of the efforts made to increase compliance, many factors may continue to interfere with full compliance with the CLABSI prevention protocol in this pediatric oncology health care setting. It is critical that practices and beliefs that act as barriers to full compliance are identified in order to further develop corrective measures.

Significance of Quality Improvement Project

According to the Joint Commission, nurses are well positioned to stop dangerous and costly bloodstream infections (CLABSI) caused by the improper placement and care management of central lines. Pediatric nurses are on the front line of contact with their young patients, have extensive infection prevention training, and can play a vital role in creating a culture of patient safety and evidence-based practices to reduce CLABSI rates in their various units. According to the Joint Commission, approximately 100,000 deaths from healthcare-associated infections occur each year. In fact, one-third of these fatalities are from infected central line catheters (ICT, 2013). These infections drive up healthcare costs, waste resources, and can carry serious implications for patient care. This quality improvement project can assist in understanding opportunities and challenges for making sure nurses are able to follow prevention protocols designed to keep patients safe.

Research Question

The questions which will be answered through this capstone project include:

1. Does educating staff nurses regarding the revised CLABSI prevention protocol, modify the likelihood of adherence to standard protocol reflected in observation and/or auditing?

2. What factors influence non-adherence to the standard CLABSI protocol for maintaining central lines?
3. What is the perception of the nurses regarding the CLABSI prevention protocol based on the health belief model?

The aims of this project are three-fold and include:

1. Gaining an understanding of pediatric nurse perceptions of CLABSI prevention
2. Observing nursing practices in relation to central venous catheter care bundle protocol.
3. Identifying opportunities for creating effective educational tools to enhance nursing care for children with central venous catheters.

CHAPTER 2: LITERATURE REVIEW

This chapter consists of a thorough and focused, review of the literature in order to critically analyze the evidence to provide a balanced view.

Methods of Literature Review

The application of the health belief model in infection prevention has been used extensively to study central line associated-blood stream infection (CLABSI) prevention. Research articles included in this literature review were identified through several databases including: CINAHL, PubMed, MEDLINE, and Cochrane Library. The searches were limited to peer-reviewed studies published in the English language on or after 2011. The keywords used to conduct the search were: “compliance in infection prevention” (yielding 4,696 results); “CLABSI prevention” (yielding 374 results), “CLABSI prevention in children” (yielding 70 results); CLABSI bundle compliance” (yielding 33 results); and “Health Belief Model in infection prevention” (yielding 447 results). When inclusion criteria and relevance to the study were considered, a total of 36 were found appropriate for inclusion in the literature review.

CLABSI Prevention in Children

Milstone et al., (2013) conducted an un-blinded, cluster-randomized, two-period crossover trial to compare differences in the CLABSI incidence rate between patients bathed daily with Chlorhexidine wipes versus the standard soap and water bathing practices. Ten pediatric intensive care units (ICUs) at five hospitals were randomly assigned to the Chlorhexidine-2% bathing group or the standard bathing group for a six-month period. Children were at least two months of age and were admitted to the ICUs for a two-day minimum unit stay. A total of N=4947 children were enrolled in the study. The ICUs were

used to randomize the 2 groups (bathing with Chlorhexidine/standard bathing). Data collection was done by measuring compliance rates by auditing the daily bathing sessions performed by the nurses via the medical charts and bathing logs. The patients were then tested for evidence of bacteria in the blood (any single positive blood culture qualified). Poisson regression models were utilized in order to estimate the modified incidence rate ratios over time. The results revealed that the incidence of bacteremia was 36% lower in children who were in the daily CHG bathing group (cases) compared to those in the standard bathing group (controls). While children in both groups had similar characteristics, it was noted that different treatment protocols were used by different hospitals, which potentially presented a major limitation of the study.

Choi et al., (2012), investigated if an evidenced-based central line bundle for the daily care of central lines decreased the incidence rate of CLABSI in pediatric oncology patients. The study was conducted at a 26-bed oncology unit at the University of Michigan Mott Children's Hospital. A non-random prospective design was used to examine the rate at which CLABSI was identified among 130 children during their hospital stay (Choi et al., 2012). The study focused on a central line bundle used and self-reported compliance among nurses. The actual CLABSI incidence rates among the children treated over a discrete period of time were measured. A time analysis was employed to determine whether the pre and post interventions had an impact on changing practices and/or the incidence of CLABSI. A decrease in the CLABSI rate was found to be impacted by proper use of the central line bundle, employing good teamwork, and emphasizing patient safety within the pediatric unit. One limitation was that the CLABSI incidence rate must reflect cases developed while the child is in the hospital and not developed as outpatients while care for at home or elsewhere.

Bundy et al. (2014) assessed a multicenter effort to standardize evidence-based central line care and lower CLABSI rates among pediatric oncology patients. Thirty-two centers operated by the Children's Hospital Association collaborated in a study to examine the use of a CL bundle in the care of patients. Data included a maintenance audit and an exploratory analysis of CLABSI cases developed during the study period. A repeated measure analysis identified a significant decline in CLABSI infection rates during the months in which children with central lines were observed. Additional interventions need to be implemented in order to eradicate CLABSI (Bundy et al., 2014). Confounding factors in CLASBI rates among children can include a poor immune system.

Climo et al. (2013) investigated whether having immune-compromised patients bathe with Chlorhexidine would have a reduction in the incidence of multi-organism and CLABSI. A multicenter, cluster-randomized, non-blinded crossover trial experimental/quantitative type of design for the study was used. A total of 7,727 hospitalized patients participated in the study. The study setting was six pediatric intensive-care units, randomly assigned to the control group (soap and water bathing cloths) or treatment group (Chlorhexidine bathing cloths). The development of CLABSIs caused by multi-resistant organisms was monitored and then analyzed by utilizing the Poisson regression model. The time between the hospital admission and the development of CLABSI was estimated. These findings revealed that daily bathing with Chlorhexidine bathing cloths had a significant decrease in the incidence of CLABSIs. Bathing with Chlorhexidine may be beneficial in other hospital settings in addition to pediatrics and was found beneficial for patients who required a longer hospital stay in the ICU. Use of a randomized multicenter design allowed the authors to determine whether a decrease in CLABSIs correlated to the type of unit occupied by the child. They

found no significant interaction with the type of nursing unit and whether the child developed CLABSI. This finding suggests that Chlorhexidine bathing may be used in various settings with positive effects. The participants (children) were not randomly assigned to treatment groups, which can be considered a limitation of the study.

Rinke et al. (2012) conducted a prospective time series study to learn more about the epidemiology of CLASBIs in pediatric patients. The setting for the study was an urban tertiary university-affiliated hospital containing a 186-bed pediatric medical center and an 18-bed pediatric oncology ward. The researchers hypothesized that utilizing a strict central line maintenance bundle would decrease the CLABSI rates in their young pediatric patients. A descriptive analysis of the demographic data determined that the comparison groups were similar in order to avoid this type of design bias. A Poisson regression model determined a significant decline in monthly CLABSI rate from 2.25 CLABSIs for every 1,000 central line days at baseline to 1.79 CLABSIs per 1,000 central line days after the intervention (Rinke et al., 2012). Fifty-nine percent of the infected central lines resulted from gram-positive organisms. The authors discovered that children who had Hickman catheters were highly susceptible to developing CLABSI compared to those who had a Medi-Port. It was concluded that best-practice central line bundles must be used in an effective manner in order to decrease CLABSI rates in children with central lines. This protocol of best practice to reduce fatal CLABSIs in young vulnerable pediatric patients may be used in other areas in the hospital in which children have central lines. Prevention related interventions that emphasize central line maintenance are pertinent for front-line nurses to utilize in order to prevent the occurrence of CLABSIs. Additional research is necessary to determine if interventions that help reduce fatal health care-associated infections can be sustained and

utilized in other patient units such the ambulatory care oncology clinic. Limitations include the following: (a) the study did not use an experimental design; (b) confounding variables may have occurred to cause an increased awareness of the importance of emphasis of decreasing the CLABSI rates; (c) risk for miscalculation bias due to the non-blinded of the researcher during the intervention; and, (d) it may be difficult to generalize the results to other patient areas due to the large number of patients with special oncological diagnoses. A positive aspect of the study is that one of the authors was a registered nurse and able to provide direct input as to what the nurses on the unit experience as they care for these vulnerable children with central lines.

Rinke et al. (2015) investigated the effects of central line maintenance care performed by parents of children with central lines in addition to the caregivers' ideas about the caring for and barriers to providing the best care for their child. The study design was a quantitative investigative using a survey. The research questions were not formulated per se but statements for the purpose the study were presented. They were as follows: (a) how are the parents of children with central lines caring for their child's central lines at home; (b) what are the parents' beliefs regarding central line care at home and risk of developing CLABSI; (c) are there any barriers to caring for central lines at home; and, (d) what are the best way to impart information regarding the care of central lines to parents. This study was done at an urban university-affiliated medical center for children in an oncology unit and reflected the responses of 105 caregivers. A CLABSI prevention program was initiated in the inpatient unit in November of 2009. In December 2010, the teaching program was started in the ambulatory clinic. Patients were taught how to care for the central line using a standardized best practice protocol by the staff nurses. The researchers developed a 50 question survey

asking about demographic related data, types of care provided by the caretaker/parent, barriers for caring for the central lines, and types of instructions given to care for the central lines including learning preferences. Data analysis consisted of descriptive statistics and the Fisher's exact test. The Fisher's exact test was utilized in order to check for associations between the parent's perception of infection risk related to central care when not done properly in addition to the parent's education level and infections developed in their children that were reported by the parents. The results of the study revealed that of the 105 participants, 50 parents stated that they or another family member of the household changed the child's central line dressing and 48% of the respondents replaced the dressing when it became stained with residue. In addition, 67% of the parents stated that the nurses in the pediatric oncology clinic change the central line dressing whereas 29% of the parents stated that they or the patient took care of the dressing changes. Eight patients stated that they took care of their central line all the time or most of the time. In terms of risk of infection, 13% of the parents stated that their children were not at risk of CLABSIs if they did not change the central line correctly. The authors noted that 18% of the parents preferred and are glad that the ambulatory clinic nurses are caring for the lines in addition to providing more in-depth teaching as a way to reinforce the concepts and sequence for the central dressing changes.

A potential strength of the study was the opportunity to teach parents how to prevent CLASBIs in the home environment. A limitation of this study is social desirability (the parent not being truthful in their responses in regards to reporting their central line care techniques). In order to determine the extent of this bias, the researchers need to conduct observations of the parent's techniques in the home settings.

The last research study reviewed related to CLABSI prevention was by Vecchio et al. (2016) who investigated whether maintaining appropriate central line hygiene and management through active involvement of parents would have an effect on the reduction of CLABSIs in pediatric patients. The study design was a quantitative quality improvement project with educational interventions. A total of 118 children with acute leukemia admitted to a large Children's Hospital participated in this study. During the first part of the study, a parent education program regarding the care of their child's central line was developed and implemented. This education program also became the part of the CLABSI prevention protocol for the unit. The outcome measures were the CLABSI rate per 1,000 days in the young study participants. In order to evaluate the effectiveness of the parent educational program, CLABSIs rates were analyzed by the level in which the parents were at in terms of the education training at the time of the development of CLABSIs. Process control charts were used to analyze the outcome of the educational sessions. A reduction in CLABSI rates was revealed after the implementation of the evidence-based parent educational program. A limitation of this study was that the parents who refused to participate in the education program may have affected the "reliability of the comparison" (p 6). A positive outcome of this study was that the parent education intervention was incorporated into a quality improvement project. There was a high acceptance level among the parents who were invited to participate in this study which shows that they understand the importance of meticulously caring for their child's central line in order to prevent CLABSIs.

Nurse Adherence in Infection Prevention

In a study by Efstathiou, Papastaviou, Raftopoulos, and Merkouris (2011), the researchers investigated the value and effects of the health belief model (HBM) in the types

of behaviors that are associated with the compliance of strict infection prevention guidelines. A Qualitative study design with the use of focus groups was employed for this research project. The study consisted of a focus group approach to explore the issue under study. A purposeful sampling method was used to recruit (N=30) nurses organized into 4 focus groups to examine nurses' perception of the factors that influence their compliance with Standard Precautions. The researchers sent a letter to the participants that described the intent of the study, their expectations, and explanation of the HBM. The focus group sessions were conducted in a controlled and quiet environment in which the researcher asked specific questions related to the HBM. Each response was recorded and transcribed accordingly. The analysis of the responses consisted of the researchers coding, fitting emerged themes that were associated with behavioral factors that contributed being in compliance with the Standard Precaution as they relate to the HBM. The quality of the study was done by utilizing the four criteria used by Guba and Lincoln (1985) to determine the trustworthiness of qualitative data which are as follows: (a) credibility; (b) transferability; (c) dependability; and, (d) conformability. The results of the study revealed several factors that contribute to noncompliance in nurses when they know they are supposed to adhere to strict infection prevention protocol. The various contributing factors discovered in this study were as follows: (a) Barriers; (b) Susceptibility; (c) Benefits; (d) Cues to Action; (e) Severity; and, (g) Self-Efficacy. One limitation of this study was that this was qualitative in design. Therefore, the researchers acknowledge the fact that will not be able to generalize the results to the overall of the population of nurses. However, they did consider implementing a quantitative study by abiding by the 4 factors that establish the trustworthiness of the data that are obtained in qualitative studies. Another limitation was that some additional factors that

influence non-compliant behaviors may not have been mentioned to the researchers. This study demonstrated that nurse's value abiding by infection prevention protocols as a method to prevent exposure to the microorganisms in addition to spreading infectious diseases to their vulnerable patients. Several behavioral factors were acknowledged as potential influencers in their decision not to comply with strict infection prevention protocol. The ability to adopt compliant behavior may be influenced by the balance of these behavioral factors and being able to acknowledge them. As Efstathiou et al. stated: "If those factors that lead to noncompliance overcome those that lead to compliance, then it is unlikely that Standard Precautions would be followed" (Efstathiou et al., 2011, p 4). Therefore, it is crucial that all factors that contribute to compliance are emphasized in educational plans. The authors emphasized the fact the results revealed from this study may be used for devising and implementing questionnaires that focus on the HBM as a way to evaluate various factors that may contribute to decision making and compliance with the Standard Precautions protocol.

Zeigheimat, Ebadi, Rahmati-Najarkolaei, and Ghadamgahi, (2016) studied the effects of the health belief model (HBM) on nurses' compliance behaviors as required to prevent nosocomial infection in the hospital setting. The researchers used a quasi-experimental design for this study that consisted of an experimental group and a control group. A total of 135 nurses were selected by way of purposeful sampling method and census method. The pretest consisted of a questionnaire that was completed by the nurses. Nurses who qualified to participate were asked to complete a questionnaire. The first part of the questionnaire consisted of demographic information of the participant. The second part was comprised of 3 difference subsections based on the HBM components which were as follows: (a) basic knowledge of infection prevention; (b) questions related to perceived threats and barriers;

and, (c) questions focused on self-efficacy. Validity and reliability of the questionnaire were verified and data were analyzed utilizing descriptive statistics, t-test and a partial correlation test to examine the relationship between compliance and the health beliefs of the participants. The researchers estimated a significant relationship between knowledge ($p=0.001$), perceived threat ($p=0.004$), perceived benefits ($p=0.001$), and compliance practices ($p=0.001$). The results of the study revealed that HBM-based educational interventions were effective in improving knowledge of infection prevention. In addition, nurses were more inclined to comply with infection prevention protocols when they realize they are at risk of becoming infected (perceived threat). The limitations of this study were that the data were self-reported and small sample size which limits the ability to generalize the findings to other staff and facilities. It was suggested that a randomized longitudinal study be conducted in order to determine the impact of the intervention on awareness and compliance.

Summary of Literature Review

Evidenced-based protocols (CLABSI Bundles) used by health providers for the prevention of CLABSI demonstrated significant decreases in the rates of these types of infections in children (Rinke et al., 2012). Another strategy that has shown to decrease CLABSI rates is when health providers are in communication with each other at different facilities and within their own hospitals in order to discuss issues and research findings related to the care of central lines (Shah, Bosch, Thompson, & Hellinger, 2014).

Additional studies are needed in order to investigate the effects of daily skin decontamination with only soap and water in the reduction of CLABSI rates. The results of a study by Milstone et al. (2013) revealed that ill children who were bathed with Chlorhexidine

suffered fewer incidence of bacteremia than children who received “standard bathing routine”.

In addition, the effects of mouth care with chlorhexidine in oncology patients have not been extensively studied (an intervention that will be implemented in this capstone project). Due to the fact that the translocation of microorganisms to the bloodstream may derive from the gastrointestinal tract or mucositis during and after chemotherapy treatment in patients (Chopra, Krein, Olmsted, Safdar, & Saint, 2003), daily oral care with chlorhexidine is crucial. The cytotoxic effects of chemotherapy treatment cause damage to the oral mucosa. Oral care is necessary in order to avoid severe inflammation and the prevention of a sepsis that was derived from the child’s mouth (Elad et al., 2015). According to DePaola and Spolarich (2017), the use of chlorhexidine in children does not pose any threat to soft tissues and it causes no serious consequences related to saliva flow, taste, or deposits on the child’s teeth.

CHAPTER 3: THEORETICAL FRAMEWORK

The theoretical frameworks that will be applied to guide this quality improvement project include Knowles Adult Learning Theory and The Health Belief Model.

Knowles Adult Learning Theory

In 1833, Alexander Kapp coined the term andragogy in order to describe the education theory of Plato (Abela, 2009). Andragogy refers to methods and principles used in adult education and was promoted by popular intellectuals such as John Dewey. In the 1980's, Malcolm Knowles continued to refine the concept or theory of adult learning (Abela, 2009). Knowles Adult Learning Theory (Theory of Andragogy) is based on humanist psychology which focuses on utilizing the adult learners' past experiences as a foundation for new learning (Aliakbari et al., 2015). This theoretical framework has been tested, researched and published in literature across education, medicine, criminal justice, and management (Chan, 2010). Knowles presented six main assumptions about the characteristics of adult learners: (a) self-concept (self-directed and independent), (b) role of experience (past experience as a great resource for current learning), (c) readiness to learn (ready to learn topics related to their lives), (d) orientation to learning (problem centered/life centered), (e) internal motivation (motivated by internal investment), and, (f) need to know (desire to know the rationale and the value of what is learned (Figure 1.)). Knowles Theory of Adult Learning further emphasizes that nurse educators must provide all learners the opportunities to be actively engaged in learner-centered educational experiences (Chan, 2010).



Figure 1. Six Principles of Knowles Theory of Andragogy

Nurses and parents of ill children appreciate new knowledge that is immediately applicable to the situation of importance. Knowles Adult Learning Theory is applicable to this project since the intent is to teach adult learners inclusive of pediatric nurses and parents. By applying the principles of Knowles Theory, the nurse educator is able to individualize the lesson plan by having the learner be involved with devising the learning goals and objectives, as the learning activity is designed to solve real word problems related to caring for the central lines with the emphasis on the purpose of the daily hygiene bundle. The communication process is enhanced between the learner and nurse educator since they are working together with the instructional plan as it relates to the learner's goals. Consequently,

the application of the andragogy principles, trust between the learner and nurse educator, self-awareness, and self-confidence of the learner are increased. In order for adults to effectively learn a concept or skill, they need to become an active participant in the learning process in order to acquire the knowledge, make sense of what they learn, and to use what they learned in real life situations (Chan, 2010).

Health Belief Model

The Health Belief Model (HBM) is one of the most commonly used theoretical frameworks used in the area of health care promotion/prevention and health education for patients and compliance related behavioral issues for health professionals especially in the area of infection prevention (Efstathiou, Papastaviou, Raftopoulos, & Merkouris, 2011). The HBM was proposed by four psychologists in the 1950s (Becker & Rosenstock, 1984). They were interested in analyzing the rationale of why individuals refused to attend free health screening programs. The main idea of the HBM is that “health behavior is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrences” (Becker & Rosenstock, 1984).

The main constructs of the HBM consist of four key components including: (a) Perceived Susceptibility, (b) Perceived Benefits, (c) Perceived Barriers, and (d) Perceived Seriousness. Two modifying constructs can also be considered to frame the study including: (a) Cues to Action and (b) Self-Efficacy: Personal beliefs in one’s own ability to do something. The HBM has been used in the area of infection prevention and has been found to be an excellent theoretical model to use for measuring attitudes of health professionals in

adopting compliant behaviors (Efstathiou, Papastaviou, Raftopoulos, & Merkouris, 2011).

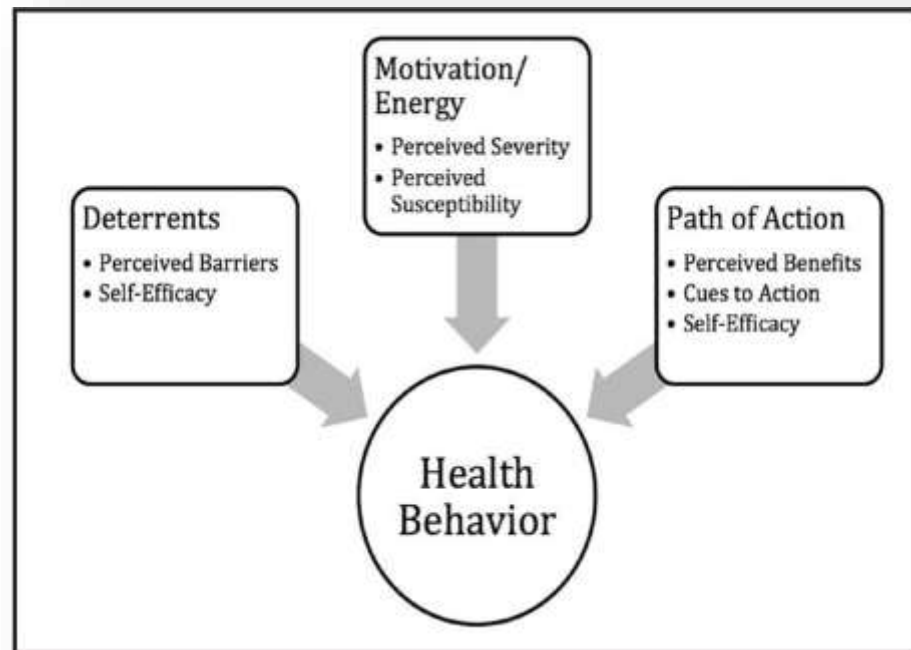


Figure 2. Health Belief Model: Rosenstock, Hochbaum, Kegeles, and Leventhal, 1974

Application of the HBM to this project can be described as: (a) Perceived Susceptibility: Nurses' beliefs about the consequences of not adhering to the components of our CLABSI Prevention Bundle as part of their job description. Answers to this statement by the nurse will include increased susceptibility to CLASBIs in children with central including the serious consequences of the complications of CLABSI from which these vulnerable children will suffer; (b) Perceived Severity: Nurses' beliefs about the severity of CLABSI in children as a health issue and severity of complications deriving from a CLABSI; (c) Perceived Benefits: Nurses' perception of how being in compliance with the CLABSI Prevention Bundle Protocol will benefit their young patients' overall health; (d) Perceived Barriers: Nurses' perception of the various barriers that may be contributing being noncompliant with the

CLABSI Prevention Bundle Protocol (such as short staff, unexpected urgent activities on the unit, emotional/psychological stress, newly hired nurses not familiar with the protocol) and their concerns about the dire consequences if they were not in compliance with the CLABSI Prevention Protocol; and, (e) Self-Efficacy: The confidence that nurses are able to experience when they acknowledge that they are in compliance with the CLABSI Prevention Protocol.

CHAPTER 4: METHODOLOGY

This capstone project followed a descriptive quantitative research design. The project used a combination of three sources including (1) Retrospective Chart Review, (2) Online Knowledge/Attitudinal Survey, and (3) Direct Observation of the Integrity of the Central Line. The three data sources were analyzed to examine practices and adherence to the CLASBI prevention bundle after exposure to an educational session and information on the importance of using the modified bundle. Data were analyzed using descriptive (frequencies, percentages, and means), t-tests, Analysis of Variance (ANOVA), and graphic display where appropriate.

The study was conducted to determine the degree to which hygiene components of the central line associated blood stream infection (CLABSI) prevention bundle is followed by nurses in the pediatric oncology unit. Outcomes will be used to determine if further educational needs of staff using the CLASBI bundle is needed. Central lines care was documented and evaluated by conducting a retrospective chart review and an observational audit after implementation of the educational workshop.

The Health Belief Model was utilized to frame the sources of assessment, surveys, and approaches to identify the practices, beliefs, and knowledge gaps associated with non-adherence to the CABSI bundle. Effort was made in order to determine ways in which adherence to the protocol could be improved.

Setting

The setting for this quality improvement study was the general pediatric ward (24 beds) and pediatric intensive care unit (8 beds) at a small community medical center in Santa Clara, California. Children who have various oncological diagnoses are admitted onto these

two units. The nurses on these units underwent extensive staff education regarding the revised version of the CLABSI protocol during the fall of 2016 with additional sessions during fall 2017. All new hires and traveler RNs undergo an intensive educational program related to the units' CLABSI protocol. In order to pass the course, each nurse had to demonstrate competency of the CLABSI protocol by return demonstration of a central dressing and cap change on a doll manikin. The parents of children with central lines are also educated regarding the revised CLABSI protocol (Appendix E).

Sample

Chart Review. According to Gearing, Mian, Barber, and Ickowicz (2016), when researchers conduct retrospective chart reviews as part of the evaluation process of their study, the reviewed patient records are considered the research sample. This quality improvement study used a non-random (purposeful) sampling method because the research protocol addressed chart inclusion and exclusion related to the study. The research questions were developed and the protocols and study variables were established. Inclusion criteria for charts reviewed were restricted to (1) pediatric oncology patients who had a central line (Broviac, Medport, PICC line) and (2) treated between December 27, 2017 and Feb 3, 2018. The results of the chart review were used to determine the educational needs of the nursing staff. The data were collected by auditing the patients' chart for evidence of additional educational needs related to CLASBI prevention nursing care (care bundles) and having the nurses answer the questions on the survey via the computer using Survey Monkey. The age group of patients ranged from newborns to young adults under 21 years of age. All patients were diagnosed with an oncological condition.

Pediatric Nurses. The sampling of nurses followed a purposive non-probability approach. All participants were registered nurses working in one pediatric oncology unit at one hospital. A total of N=47 nurses were on duty on the pediatric units during the study period between December 27, 2017 to February 3, 2018). All working members of the nursing staff were invited to participate in this quality improvement project. To be eligible to participate, staff members were required to be employed by the organization and provide direct patient care at a minimum of one day per week. A total of 23 nurses consented to participate in the study. Nearly half (49%) of these invitees consented to participate. On average, internal surveys receive a 30-40% response rate. Therefore, the 49% response rate can be regarded as excellent, transferable, and reflective of the nursing staff. Each participant completed the survey online through Survey Monkey.

Ethical Considerations

This quality improvement project has been approved by the Internal Review Board Committee at Kaiser Permanente and the nursing department at California State University, Fresno (Appendices A and B). Both IRBs determined this study to be of minimal risk. An introductory message outlining the nurses' rights was presented with the pediatric nurse survey. In order to prevent bias, the survey was voluntary and all data were aggregated and analyzed by the primary researcher. In addition, the nurses were reminded that responses to the survey were for informational and educational purposes only. The survey did not reveal any identifiable information about the nurses who participated.

Instrumentation

Two different audit forms and a brief survey developed by the primary researcher were utilized in this project. The two audit forms consisted of (a) Chart Audit Form

reflecting CLABSI bundle protocol components documented in the patients' charts; and (b) Observation Audit to assess the integrity of the central line dressing and labeling of intravenous (IV) lines IV fluid bags per practical adherence with the CLABSI bundle protocol. The nurse survey asked demographics and a series of questions related to CLABSI knowledge, attitudes, and opinions related to the CLABSI protocol as well as their thoughts on ways to improve adherence. Finally, respondents were asked if they were interested in becoming a CLABSI champion.

Data Collection

Data were collected through three sources including a retrospective review of N=77 existing medical records obtained through the administration, N=23 surveys completed on by respondents on survey monkey, and 36 observations conducted in the medical site. Data collected from the three sources were input into an excel database for further analysis.

Chart and Observation Audits Review

The retrospective chart review was conducted on patients treated in the pediatric oncology clinic between December 27, 2017 and January 3, 2018. Chart review data of nursing documentation flow sheets within the Health Connect electronic medical record. One of my research questions is focusing on determining whether nurses are adhering to the newly revised CLABSI prevention protocol while caring for central line of oncology patients by auditing charts and observing (audit) the status of the children's central line dressings. The audit form was comprised of several quality process components that need to be monitored for assessing the nurses' adherence to the CLABSI prevention bundle. The process of auditing outcome variables is crucial in that it evaluates the care implemented

(Poortaghi, Salsali, Ebadi, Rahnavard, & Maleki1, 2010).

Data were analyzed using descriptive and inferential statistics to determine which factors are beneficial for promoting compliance in this hospital setting. Explicit instructions and all operational definitions associated with the project were presented in this form in order to avoid any subjectivity or bias by the auditors (Gearing et al., 2016). Chart audits were performed by two health providers (pediatric nurse and project researcher). The audit form was used during the auditing process and then the data were transferred onto an Excel electronic spreadsheet in a computer at the medical center. Data did not contain identifiable patient information and were held in a locked file in an office in the pediatric ward.

Nurse Survey

The pediatric nurse survey was available online via Survey Monkey between January 30, 2018 and March 5, 2018. The study could be accessed and completed through a work or personal web browser. The questionnaire was based on the five components of the Health Belief Model: Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy (Jones, Jensen, Scherr, Brown, Christy, & Weaver, 2015). Only the clinical nurse specialist (CNS) and the author had access to data obtained. The online survey was configured so that all responses remained anonymous and could not be traced through an email address or internet protocol. The nurses were not asked any identifying information. Nurses were asked to complete an online questionnaire informed by the Health Belief Model (Appendix C).

Nurses' perception of the various barriers that may be contributing being noncompliant with the CLABSI Prevention Bundle Protocol. Finally, an open-ended question

asked the respondent to list suggestions for improving adherence to the protocol.

Data Analysis

Data were collected from their respective sources, input into an Excel database and transferred to SPSS (version 24) for analysis. Each data source will be analyzed using descriptive statistics in the form of frequencies, percentages, and mean values when appropriate. A t-test was used to compare (1) compliance rates from medical records versus compliance rates from observational audits, and (2) scores achieved in the nurse survey between show (yes/no) of interest in becoming a champion. An analysis of Variance (ANOVA) was conducted to measure differences in compliance between the patients treated. Comparative scores were reported in tables and illustrated as plot graphs. One open-ended question asked at the end of the survey was analyzed using a thematic analysis.

CHAPTER 5: RESULTS

This DNP quality improvement project followed a descriptive quantitative research design. The project used a combination of three sources including (1) Retrospective Chart Review, (2) Online Knowledge/Attitudinal Survey, and (3) observation. The three data sources were analyzed to examine practices and adherence to the CLASBI prevention bundle after exposure to an educational session and information on the importance of using the modified bundle. Data were analyzed using descriptive (frequencies, percentages, and means), t-tests, Analysis of Variance (ANOVA), and graphic display where appropriate. Data were collected, input into excel databases, transferred and analyzed using SPSS version 24.

Demographics

A total of 23 nurses participated in the study. The majority (91.3%) of respondents were female. Sixty-nine percent of the respondents completed a BSN as the highest degree earned in nursing with fewer (26%) reporting an associates and a small number (4.3%) holding a Master of Science in Nursing Degree or a higher post-graduate degree. The number of years practicing in pediatric nursing was reported as less than five years (30.5%), between 6 to 10 years (39.1%) and over ten years (30.6%). Likewise, the number of years experience working with pediatric central lines was variable, with the largest number reporting 6 to 10 years experience (43.3%), 34.8% reporting less than five years experience, and approximately one-fifth (21.8%) reporting over ten year experience with pediatric central lines (Table 1.).

Table 1.
Demographic Description of Respondents (N=23)

Descriptor	N	Percent
Gender		
Male	2	8.7
Female	21	91.3
Highest Academic Degree		
Associates	6	26.1
Bachelors	16	69.6
Masters	1	4.3
Years Pediatric Nursing		
Less than 5	7	30.6
6-10	9	39.1
Over 10	7	30.6
Years Pediatric Central Lines		
Less than 5	8	34.8
6-10	10	43.4
Over 10	5	21.8

Medical Chart Audits

A total of 77 medical charts were reviewed. The charts documented adherence to the protocol while caring for 8 pediatric oncology patients with central lines over a discreet period of time. Results of compliance with the CLASBI bundle were estimated as follows: (a) Daily Bath (57.5%); (b) Daily Oral Care (65.4%); (c) Teaching (51.3%); (d) Reminder for Next Dressing Change Date (84.6%); (e) Chlorhexidine (CHG) Mouth Wash Ordered by the MD (85.9%); (f) Oral Care with CHG (53.8%); (g) Daily Linen Change (52.6%); and, (h) Daily Line Assessment (75.6%). The overall average compliance was estimated at 65.96%, suggesting that one in three criteria for CLASBI Prevention Bundle was not complied with after the educational intervention. The rates of compliance were lowest for daily bath, teaching, oral care with CHG and daily linen change. Understanding differences in

compliance with the various CLABSI bundle components can be used as a starting point for overall compliance reinforcement efforts (Table 2).

Table 2.

Medical Chart Review of Compliance with CLASBI Prevention Bundle (N=77)

Component	N	Percent
Daily Bath	44	57.5
Daily Oral Care	50	65.4
Teaching	39	51.3
Reminder for Next Dressing Change Date	65	84.6
Chlorhexidine (CHG) Mouth Wash Ordered	66	85.9
Oral Care with CHG	41	53.8
Daily Linen Change	40	52.6
Daily Line Assessment	58	75.6
All Components (Average)		66.0

Upon Review of the medical records, a substantial variation in compliance to the CLASBI Prevention was noted between patients. An Analysis of Variance (ANOVA) and a plot graph found that the average compliance with the CLASBI bundle between patients ranged between a low of 18.7% to a high of 80.3%. According to medical chart data, differences in adherence between patients was highly significant ($F=5.38$, $P=0.001$). Although beyond the scope of this study, the wide range in compliance observed between patients deserves further examination (Figure 3).

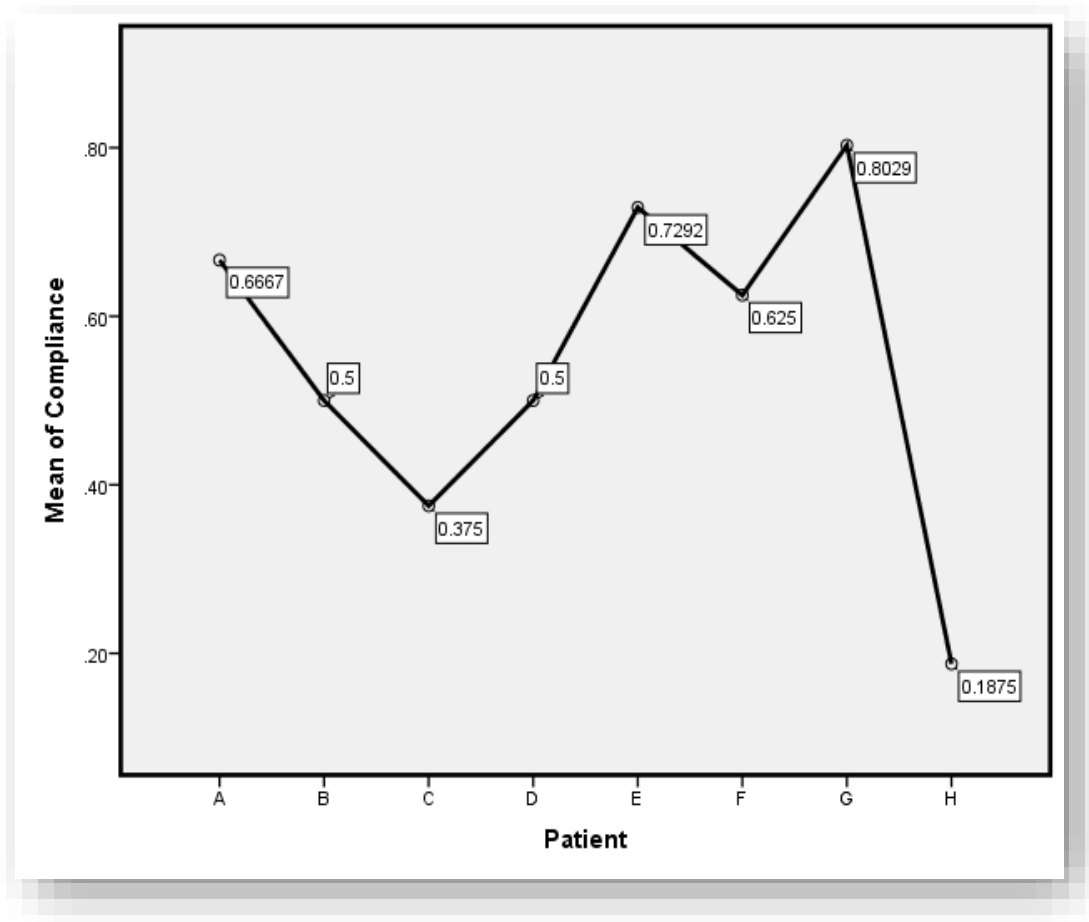


Figure 3. CLASBI Prevention Bundle Compliance (Medical Records) By Patient: Average Percents (N=77)

Observation Audits

A total of 36 observation sessions were conducted to measure adherence to the CLASBI bundle. The 36 audits reflected the care of 8 pediatric patients. The observed rates of adherence to the components of the CLASBI prevention bundle that were estimated as follow: (a) IV Fluid Tubing Properly Labeled (88.9%); (b) Dressing is Clean (100%); (c) Alcohol Capped on Unused Portion of IV Lines (97.2%); (d) Sorbaview Dressing (100%); (e) Biopatch present (100%); Dressing is clean, dry, and intact 100%); and, fluid bags have

been dated (77.8%) (Table 3).

Table 3.

Observed adherence to CLABSI Prevention Bundle Protocol by Component: (N=36)

Component	N	Percent
Label Dated & Initialed	32	88.9
Dressing (CDI)	36	100
Biopatch	36	100
Sorbaview	36	100
Alcohol Caps	35	97.2
IV Tube Labeled	26	72.2
Fluid Bags Dated	28	77.8
All Components	36	90.9

The observation audits resulted in an extremely high level of overall adherence to the components (90.9%). The lower levels of adherence were noted for dating fluid bags (77.8%) and labeling IV tubes 72.2%). In general, adherence to the CLABSI prevention protocol was very high when under observation. Although compliance during observation was high, it was noted that compliance was slightly different between patients. While these differences did not reach statistical significance ($F=1.29$, $P=0.291$), differences were noted in the means plot graph below (Figure 4).

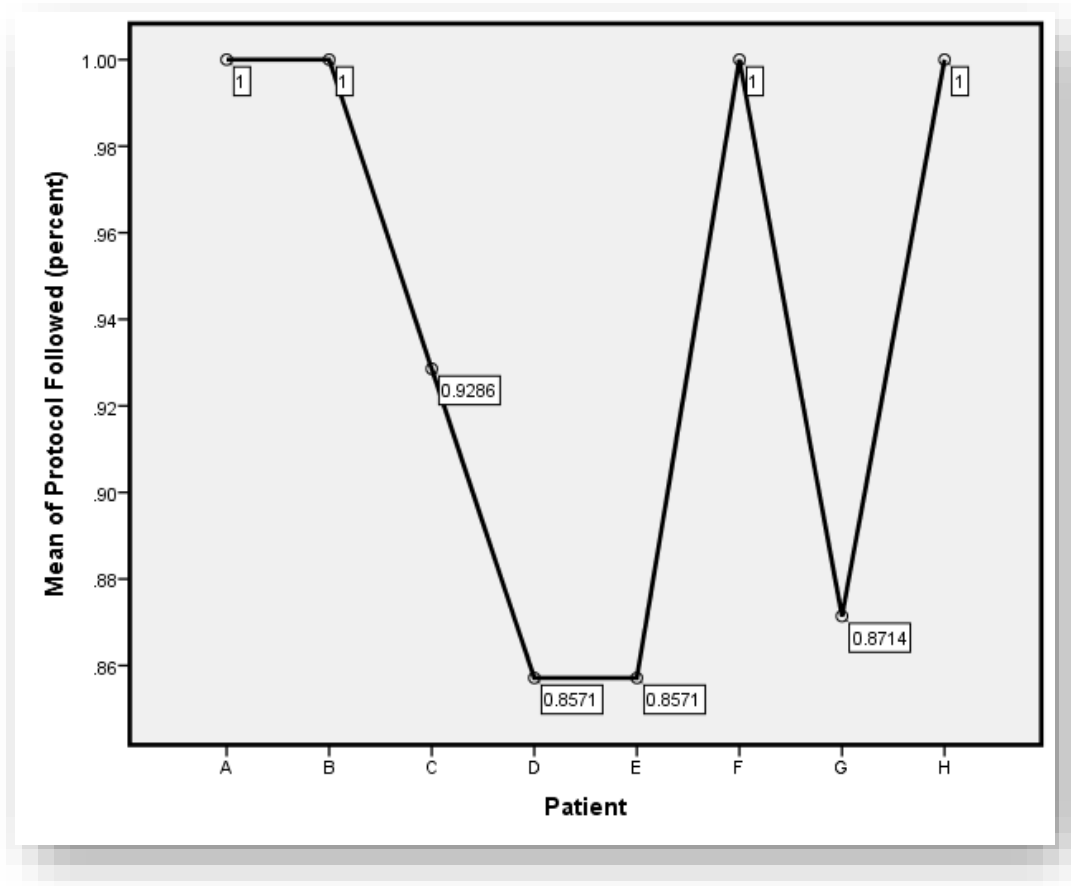


Figure 4. CLASBI Prevention Bundle Compliance (Observation) By Patient: Average Percents (N=36)

Nurse (Health Belief) Survey

A total of 23 nurses completed the 15 minute online survey. The survey was available online for a total of 5 weeks between January 30, 2018 and March 5, 2018.

Eight questions framed by the Health Belief Model received an average agreement score ranging from 4.6 to 7.0 based on a seven-point Likert response. The lowest agreement was that the workload was too heavy to follow the CLASBI prevention protocol estimated at $M=4.6$ points. Average agreement of 6.7-7.0 for the remaining questions suggests that Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers, and

Perceived Efficacy, may present as factors that challenge compliance with the CLABSI prevention bundle protocol (Table 4).

Table 4.

Average Level of Agreement with CLABSI Survey Questions (N=23)

Question	Mean
My consistent use of the CLABSI Bundle Protocol will positively impact patient.	6.7
When it comes to reducing infection in our pediatric patients with central lines, I want to comply with CLABSI prevention strategies put forth by our organization.	7.0
Parents are aware of our CLABSI Prevention Bundle and expect that I perform hand hygiene prior to each encounter.	6.9
Having the necessary supplies enables me to comply with infection prevention strategies.	6.9
Workloads impede my ability to comply with infection prevention strategies	4.6
I have the necessary knowledge on how to prevent a CLABSI infection	6.8
Our CLABSI Prevention Bundle Protocol is a valuable tool to abide by in order to prevent harm to those pediatric patients with a central line	6.9
My knowledge and willingness to utilize the CLABSI Prevention Bundle Protocol will reduce the transmission of infections to our young pediatric patients.	6.9

Respondents were also asked to identify components of the modified CLASBI prevention bundle. All respondents identified washing the patient with soap and water as a hygiene component, and the vast majority (91.3%) identified the use of a second nurse for

dressing change, daily linen change, and labeling IV lines as part of the modified protocol. Only two-thirds (69.6%) correctly stated that hand hygiene prior to the central line dressing change was mandatory, and was flagged as an issue which needs to be clarification among the nursing staff.

Table 5.

Components identified as part of CLABSI Prevention Bundle Protocol: (N=23)

Component	Percent
Hand hygiene prior to the start of a central line dressing change	69.6 ***
Daily baths with soap and water	100
A second nurse to assist with the dressing change is mandatory	91.3
Daily linen change is not necessary	91.3
Labeling all of the IV lines is not necessary	91.3

Literature has strongly purported that compliance with protocols increase when under observation. To test that assumption, medical records and observation audits were used to compare compliance with the components of the CLASBI Bundle. Review of the medical records revealed 67.2% compliance rate. By comparison, compliance during the observation audits was 91.0%. When a t-test was conducted using the 67.2% as the test value, the difference in compliance was 23.7% among observation. This difference was highly significant ($t=11.06$, $P < 0.001$) and clearly illustrates that compliance is less likely to occur when not under the watchful eye of a supervisor or administrator (Table 6).

Table 6.

Comparative compliance (percent) with the CLASBI Prevention Bundle Protocol (Chart Review versus Observation): One Sample T-Test (N=23)

Data Source	n	M	SD	Δ	t	p
Observation	23	91.0	.128	23.7	11.06	.000 ***
Medical Records (Test Value)	77	67.2				

*** Statistically Significant at the $p < .001$ level.

Improving Compliance

It is hypothesized that increased compliance can be achieved if the nursing staff is willing to become more engaged in the process. Two aspects of staff engagement were examined in this project.

Champions

Each respondent was asked if they were interested in becoming a Champion. Of the 23 respondents, nearly half (48%) expressed an interest in becoming a Champion. A t-test was conducted to compare scores achieved on the health belief questions between those interested and not interested in becoming a champion. While those who were interested in becoming champions were likely to score a bit higher on questions regarding current protocol (85%) than those who reported no interest (75%). The 10.4% difference, however, did not reach statistical significance in this small sample size ($t=1.77$, $p=0.090$). Scores achieved on online surveys were comparable, with those reporting interest in becoming a Champion achieving a mean score of 6.60 compared to 6.56 among those who did not report interest. These average scores suggest that a .04 mean difference in health beliefs regarding the

critical nature of CLASBI prevention was equal between both groups ($t= 0.267$, $p= 0.792$).

Neither of these differences was statistically significant (Table7).

Table 7.

Comparative scores achieved by interest in becoming a Champion (N=23)

Score	n	M	SD	Δ	t	p
Health Belief						
Yes	11	6.60	.284	.039	.267	.792 (NS)
No	12	6.56	.411			
CLASBI Bundle (knowledge)						
Yes	11	.85	.093	2.61	.104	.090 (NS)
No	12	.75	.173			

Suggested Modifications

Respondents were also asked to share their ideas for increasing adherence. Each respondent was asked to provide a suggestion for improving compliance with the CLASBI prevention bundle. Because the question was open-ended, the answers were analyzed for re-emerging or repeating themes. Of a total of 27 suggestions offered by the respondents, six themes emerged for proposing compliance increases including increasing the size of the nursing staff and lowering the nurse to patient ratio (29.6%), Offering more training to parents and nursing staff (14.8%), increasing family Involvement (14.8%), improving communication and information (14.8), limit/regulating the number IV use (14.8%) and assuring that all facilities have adequate masks and supplies for the staff, family & patient (11.1%) (Table 8).

Table 8.

Leading Suggestions for improving adherence to CLABSI Prevention Bundle Protocol: (N=23) *

Theme	N	Percent
Lower Nurse to Patient Ratio/More Nursing Support	8/27	29.6
More Training/Education	4/27	14.8
More Family Involvement	4/27	14.8
Better Communication/Information	4/27	14.8
Limit/Regulate IV use	4/27	14.8
Masks/Supplies (Staff, family & Patient)	3/27	11.1

* **Based on thematic analysis of open ended responses.**

CHAPTER 6: DISCUSSION

In this chapter, the author will discuss the project outcomes, limitations, recommendations, and the relative effects on healthcare improvement that could be further advanced related to the doctoral project goals.

Limitations

Limitations of this study were similar to those reported by Bundy, et al. (2014). The visibility of the auditors on the units inadvertently cued the staff to abide by the proper CL dressing protocol (Bundy et al., 2014). While it was first considered a “limitation” or confounder, it is actually a significant finding to frame the results and to inform future efforts to increase compliance and decreased the CLABSI rate. Positive confounding factors may also occur by an increased awareness (by the nurses) of the importance of reducing CLABSI rates in children with poor immune systems, emphasis on teamwork and a safe culture (Bundy et al., 2014). These potential confounding factors may be difficult to control (Bundy et al., 2014).

Potential Barriers

The challenges that may occur with this capstone project include parental refusal to participate due to the inconvenience of the required hygiene activity (severity of their child’s illness/too tired). This issue may be due to the fact that having a child in the hospital is very stressful. This may result in decreased control on the part of the parent. Consequently, parents may gain control by refusing certain care as a way to exert their independence during this stressful period in their lives. One solution is to reassure the parents that the nurses are here to provide quality care for their child and will be happy to do the hygiene component of the care while they rest. The parents will be educated on the importance of the strategies of

preventing central line associated bloodstream infections in their child (parent education component). It will be stressed that daily bathing and mouth care is required. If they still refuse, the physician will speak with them regarding the importance of this daily activity (parents tend to listen to physicians more than nurses since they believe they are the official “authority figure” and have more knowledge than nurses—even though the nurses present the same rationale/message to the parents as the physicians). The hygiene component may not get done on certain days due to missed documentation of completed activities (bathing and mouth care) as a result of an increased workload the nurses may be experiencing. The nature of the workload/activities on certain days on the pediatric unit/PICU is very unpredictable and uncontrollable.

The importance of charting carefully and completely of the various components of hygiene (linen change, medicated mouth wash, full bath, etc.) will be continued to be reinforced during huddles and in the annual pediatrics skills sessions. While it is anticipated that some changes in practice may difficult for some nurses to accept, it must be realized that it is natural to resist change as humans. Re-education of concepts related to the CLABSI prevention protocol is the best way to help with this issue.

Nursing Implications

The findings of this project demonstrate that the nurse’s health beliefs regarding the importance of CLABSI prevention are generally positive. However, the chart review suggests that full compliance is significantly lower when not being knowingly watched or evaluated. It is crucial to implement a culture of safety in pediatrics and among the pediatric staff to provide safe care for the children and their families (Barnstiener, 2011). Survey of patient safety culture is a quality improvement measure that hospital personnel use as a way to

assess the patient care environment to prevent patient harm (Barnstiener, 2011). In order to prevent harm and promote a culture of safety, best practices in nursing (abide by the evidence-based central line care bundles) are definitely required in addition to several other essential components which are the following: (a) efficient communication among the health providers; (b) understand the value of promoting a culture of safety (abiding by evidence based central line care bundles); and, (c) incorporate a network in which the nurse learn from potential errors (breach in central line care) and provide appropriate ways in which to prevent them from happening (education) (Michigan Medicine, ND).

A future plan for a follow-up study is to incorporate daily chlorhexidine bathing for all Children older than two months of age with central lines. We are currently implementing Chlorhexidine baths (with no side effects) in certain babies with central lines who suffer from chronic gastrointestinal infection/surgery as a result of necrotizing enterocolitis. They are in a very high-risk category in terms of developing CLABSIs or translocation of gut bacteria into their central line site. It is necessary to protect these vulnerable children from additional trauma in their young lives.

The pediatric staff nurses need to adhere to all infection prevention activities in order to implement and demonstrate safe care in the area of CLABSI prevention. Ways in which do this may require the nursing leaders (nurse educators and managers) to: (a) practice an authentic leadership style (nurse educators, manager, and assistant managers); (b) recruit several staff nurses to be “champions” in order to demonstrate to their peers that our evidenced-based CLABSI prevention protocol is extremely necessary for everyone to abide by infection prevention measures with no room for deviation; (c) implement an additional mandatory educational session to reinforce our already implemented evidence-based

CLABSI prevention protocol; (d) have the nurse managers/assistant managers (in addition to the educators) become actively involved with reminding nurses who need to properly adhere with the CLASBI prevention protocol; (e) praise and acknowledge those nurses who are consistently abiding by the CLABSI prevention protocol; (f) hire more nurses and hire/incorporate nurses' aides into the patient care load; (g) make the patient/nurse ratio to be 1:3 (relieve the nurses of the responsibility of caring for a fourth patient). In that way, they will be able to give quality/safe care to three patients); and, (h) the hygiene component may not get done on certain days due and missed documentation of completed activities (bathing and mouth care) due to the increased workload the nurses may be experiencing. The nature of the workload/activities on certain days on the pediatric unit/PICU is very unpredictable and uncontrollable.

In order to reduce the incidence of CLASBIs in pediatric oncology patients, the nurse educators, the pediatric nurses, and parents of children with central lines must work as a team. The pediatric nurse educator must develop protocols and strategies to avoid the spread of infection as a way to eliminate the incidence of CLABSI. This information must then be imparted to the nurses. In turn, the information acquired by the nurses will be taught to the parents. Importantly, all members of the team must be aware of the concept of the Epidemiological Triad and know when to break the chain of infection in order to avoid the potential harm of transmitting infectious microorganism to vulnerable pediatric patients (Pyrek, 2002). It should be emphasized to all staff that our eventual goals are to perform the processes correctly the first time and to aim for zero defect in our performance standards (i.e., CLABSI) (Bundy, 2014).

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APPENDICES

APPENDIX A: KAISER PERMANENTE MEDICAL CENTER IRB APPROVAL

November 21, 2017

Subject: RDO KPNC 17 - 104 **Title:** Reducing the Incidence of Central Line Blood Stream Infection in the Pediatric Patient by the Application of the Central Line Bundle and the Investigation of Factors that Influence Nursing Care of Central Venous Catheters

Dear Ms. McKenna:

As a Research Determination Official (RDO) for the Kaiser Permanente Northern California region, I have reviewed the documents submitted for the above referenced project. The project does not meet the regulatory definition of research involving human subjects as noted here:

Not Research: The activity does not meet the regulatory definition of research at 45 CFR 46.102(d):

Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

Not Human Subject The activity does not meet the regulatory definition of human subjects at 45 CFR 46.102(f): Human subject means a living individual about whom an investigator conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information.

Therefore, the project is not required to be reviewed by a KP Institutional Review Board (IRB). This determination is based on the information provided. If the scope or nature of the project changes in a manner that could impact this review, please resubmit for a new determination. Also, you are responsible for keeping a copy of this determination letter in your project files as it may be necessary to demonstrate that your project was properly reviewed.

Provide this approval letter to the Physician in Charge (PIC), your Area Manager, and Chief of Service, to determine whether additional approvals are needed.

Sincerely,

Victoria Clague, MD, MPH, Research Determination Officer
TPMG, KPNC The Permanente Medical Group, Inc.

Cc: Eric Garcia

APPENDIX B: CALIFORNIA STATE UNIVERSITY; IRB APPROVAL

California State University,
Fresno School of Nursing
IRB Approval

December 19, 2017

RE: DNP1722 Reducing the Incidence of Central Line Blood Stream Infections in the Pediatric Patient by the Application of the Central Line Bundle and the Investigation of Factors that Influence Nursing Care of Central Venous Catheters

Dear Susan McKenna,

As the Chair of the Department of Nursing Research Committee, serving as the Institutional Review Board for the Department of Nursing, I have reviewed and approved your review request for the above-referenced project for a period of 12 months. I have determined your study to meet the criteria for Minimal Risk IRB review.

Under the Policy and Procedures for Research with Human Subjects at California State University, Fresno, your proposal meets minimal risk criteria according to section 3.3.7: Research in which the risks of harm anticipated are not greater, probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

The Research Committee may periodically wish to assess the adequacy of research process. If, in the course of the study, you consider making any changes in the protocol or consent form, you must forward this information to the Research Committee prior to implementation unless the change is necessary to eliminate an apparent immediate hazard to the research participant(s).

This study expires: December 19, 2018

The Research Committee is authorized to periodically assess the adequacy of the consent and research process. All problems having to do with subject safety must be reported to the Research Committee. Please maintain proper data control and confidentiality.

If you have any questions, please contact me through the CSU, Fresno School of Nursing Research Committee at symiller@csufresno.edu.

Sincerely,

A handwritten signature in black ink that reads "Sylvia Miller".

Sylvia Miller EdD, RN, FNP-C
School of Nursing, Research Committee, Chair

APPENDIX C: CLABSI PREVENTION QUESTIONNAIRE

We would like to understand how you feel about the current CLABSI prevention bundle protocol which was implemented in June, 2016). The current protocol consists of daily bathing and linen changes, Chlorhexidine mouth care two times a day (for oncology patients only), oral care two times a day, and central dressing change as a 2-nurse procedure. Please assist us by sharing your opinions regarding the following questions. Your comments and answers to the following questions will be kept anonymous.

Thank you for your participation! Your input is valuable in improving ways in which we can provide the best quality care for our young patients with central venous catheters.

Part I. Demographics

1. What is your gender?
 - Male
 - Female

2. Number of years working as an RN in pediatrics:
 - Less than 1 year
 - 1 to 5 years
 - 6 to 10 years
 - 11 to 15 years
 - 16 to 20 years

3. Highest Academic Degree:
 - Associates Degree
 - Bachelor's Degree
 - Master's Degree
 - Doctorate Degree

4. Number of years working with pediatric oncology central lines:
 - Less than 1 year
 - 1 to 5 years
 - 6 to 10 years
 - 11 to 15 years
 - 16 to 20 years

Part II. CLABSI Bundle Protocol

On a Scale of 1 to 7, please circle the numerical value that best describes our level of Agreement with each question:

My consistent use of the CLABSI Bundle Protocol will positively impact patient outcomes.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

When it comes to reducing infection in our pediatric patients with central lines, I want to comply with CLABSI prevention strategies put forth by our organization.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

Parents are aware of our CLABSI Prevention Bundle and expect that I perform hand hygiene prior to each encounter.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

Having the necessary supplies enables me to comply with infection prevention strategies.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

Workloads impede my ability to comply with infection prevention strategies.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

I have the necessary knowledge on how to prevent a CLABSI infection.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

Our CLABSI Prevention Bundle Protocol is a valuable tool to abide by in order to prevent harm to those pediatric patients with a central line.
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

My knowledge and willingness to utilize the CLABSI Prevention Bundle Protocol will reduce the transmission of infections to our young pediatric patients
(Strongly Disagree) 1 2 3 4 5 6 7 (Strongly Agree)

Circle any of the components that are part of our CLABSI Prevention Bundle Protocol:

- a. Hand hygiene is optional prior to the start of a central line dressing change
- b. Daily baths with soap and water
- c. A second nurse to assist with the dressing change is mandatory
- d. Daily linen change is not necessary
- e. Labeling all of the iv lines is not necessary

What areas of improvement or suggestions do you have that will assist you with adhering to our CLABSI Prevention Bundle Protocol?

APPENDIX D: DEFINITIONS OF HBM COMPONENTS

Below is the guide to the various constructs of the **Health Belief Model** (HBM). The HBM was used when inform the questions for the questionnaire. The four aspects of the HBM were used to frame ten survey questions on adherence to the CLABSI Prevention Bundle. The four aspects of the HBM are defined as follow:

1. **Perceived Susceptibility:** Plan to examine the nurses' beliefs about the consequences of not abiding by the components of our CLABSI Prevention Bundle as part of their job description. Answers to this statement by the nurse will include increased susceptibility to CLASBIs in children with central including the serious consequences of the complications of CLABSI from which these vulnerable children will suffer.
2. **Perceived Severity:** Plan to examine at the nurses' beliefs about the severity of CLABSI in children as a health issue and severity of complications deriving from a CLABSI.
3. **Perceived Benefits:** Plan to examine the nurses' perception of how being in compliance to the CLABSI Prevention Bundle Protocol will benefit their young patients' overall health and well-being.
4. **Perceived Barriers:** Plan to examine the nurses' perception of the various barriers that may be contributing being noncompliant with the CLABSI Prevention Bundle Protocol (such as short staff, unexpected urgent activities on the unit, emotional/psychological stress, newly hired nurses not familiar with the protocol) and their concerns of the dire consequences if they were not in compliance with the CLABSI Prevention Protocol.
5. **Self-Efficacy:** The confidence the nurses are able to experience when they acknowledge that they are in compliance with the CLABSI Prevention Protocol.

**APPENDIX E: MODIFIED CENTRAL LINE MAINTENANCE BUNDLE
PROTOCOL**

1. Abide by the facility's strict hand hygiene protocol
2. Implement daily bathes
3. Aseptic technique for changing all central line dressings using a standardized procedure
4. Aseptic technique for accessing and changing needleless connector using a standardized procedure
5. Standardize tubing change
6. Daily evaluation of the necessity of the central line
7. Two nurse process to change any central line dressings
8. Incorporate dressing change reminders during nurse knowledge exchange

**APPENDIX F: PEDIATRIC STAFF RN CLABSI
PREVENTION QUESTIONS ASSOCIATED WITH THE COMPONENTS OF THE
HBM**

- 1. My consistent use of the CLABSI Bundle Protocol will positively impact patient outcomes? (Perceived Benefits)**
- 2. When it comes to reducing infection in our pediatric patients with central lines, I want to comply with CLABSI prevention strategies put forth by our organization? (Self Efficacy)**
- 3. Parents are aware of our CLABSI Prevention Bundle and expect that I perform hand hygiene prior to each encounter? (Perceived Benefit)**
- 4. Having the necessary supplies enables me to comply with infection prevention strategies. (Perceived Barrier)**
- 5. Workloads impede my ability to comply with infection prevention strategies? (Perceived Barrier)**
- 6. I have the necessary knowledge on how to prevent a CLABSI infection? (Perceived Efficacy)**
- 7. Our CLABSI Prevention Bundle Protocol is a valuable tool to abide by in order to prevent harm to those pediatric patients with a central line? (Perceived Susceptibility)**
- 8. My knowledge and willing to utilize the CLABSI Prevention Bundle Protocol will reduce the transmission of infections to our young pediatric patients? (Perceived Severity)**