Spring 4-15-2021

Decreasing CLABSI Among Cancer Patients: Daily Observed Chlorhexidine Gluconate Baths

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Date of Submission: April 15, 2021

Table of Contents

Abstract

Background: Research suggests that daily bathing with chlorhexidine gluconate (CHG) among cancer patients can decrease rates of central line-associated bloodstream infections (CLABSI). Literature supports the premise that the highest rates of patient compliance using CHG baths occurs with direct RN assistance or observation of the bath. ***Methods:*** Nurses employed on a hematology/oncology unit in Middle Tennessee were surveyed about their perception of how many CHG bath were not occurring on a given day and then educated via an online module, on the efficacy of daily CHG baths. Approximately two months after the preliminary survey and educational module, RNs were surveyed again to measure whether RN perception of bath occurrences had changed. Nurses were also surveyed about barriers they felt inhibited them from assisting with or observing patients perform daily CHG baths. ***Results:*** 13 participants responded to the preliminary survey and 11 participants responded to the post-educational survey. A Mann-Whitney test indicated there was no significant change in the nurses' perception of bath occurrences among the patients on the unit ($U = 70.5$, $p = .0955$). Barriers identified by the participants included RN workload and patient perception in over 50% of the nurses' responses. ***Conclusion:*** The findings of this study support the concept that education, specifically virtual education, may be ineffective in decreasing CLABSI among cancer patients through daily observed CHG baths. Additional research may be performed to further impact CLABSI rates among cancer patients based on barriers identified in the literature which were reinforced by this study.

Keywords: cancer patient, central line-associated bloodstream infection, CLABSI, chlorhexidine-gluconate, CHG bath, immunocompromised

Introduction and Background

There is a clinical problem with healthcare-associated infections among adult chemotherapy-induced immunocompromised patients on hematology/oncology units in the United States. This scholarly project was performed to identify and address a specific clinical issue, called central line-associated bloodstream infections, in an effort to potentially increase the rates of daily registered nurse observed chlorhexidine gluconate baths in hematology/oncology patients on a hospital unit in Middle Tennessee.

A healthcare-associated-infection, or HAI, affects more than 1 out of every 31 hospital patients (Centers for Disease Control and Prevention, 2018). HAIs lead to increased mortality rates, longer hospital stays, and higher costs of care (Premier Safety Institute, 2019). In 2011, HAIs cost the United States over 10 billion dollars (Corsi-Vasquez & Ostrosky-Zeichner, 2019). One of the most common HAIs is central line-associated blood stream infections, or CLABSI (Office of Disease Prevention and Health Promotion, 2019). Patients who are immunocompromised, such as cancer patients, are often dependent upon central lines for treatment and are at particular risk for developing a CLABSI (The Joint Commission, 2012).

Annually, more than 5 million long-term central venous catheters, or CVCs, are inserted into cancer patients (Haddadin et al., 2020). Of those CVC insertions, 200,000 – 400,000 result in episodes of CLABSI (Haddadin et al., 2020). In total, the Agency for Healthcare Research and Quality (AHRQ), (2019a) estimates that as many as 28,000 patients die each year from a CLABSI in the United States alone. CLABSI is also one of the costliest HAIs and can range from $25,000 – $46,000 per case (Haddadin et al., 2020). Further research and exploration of this phenomenon is needed to decrease mortality, morbidity, and costs for cancer patients.

Problem Statement

Central line-associated bloodstream infections among cancer patients are a potentially lethal, costly, and time-consuming issue that requires the integration of evidence-based interventions and compliance among healthcare professionals and patients to combat it. Although many studies have supported the value of evidence-based interventions, CLABSI is still a common HAI that hematology/oncology units report. Current studies have evaluated the delivery of daily chlorhexidine gluconate (CHG) baths, and some have identified the importance of directly observed baths as being a critical facet of infection prevention (Jusino-Leon et al., 2019; Vanhoozer et al., 2019). This scholarly project was designed to implement evidence-based practice on a hospital unit experiencing difficulties in decreasing CLABSI rates, which may have been linked to unobserved daily CHG baths. This study also identified current evidence-based barriers that exist to registered nurse (RN) observed daily CHG baths and further expanded on current research.

Purpose

The purpose of this project was to increase the degree to which CHG baths were accomplished, in an effort to improve one aspect of CLABSI reduction on the designated unit. Due to the allotted time to conduct this scholarly project, measuring RN perception of CHG bath compliance was deemed a more effective and accurate approach than measuring actual CLABSI rates, which vary slowly over time. If daily CHG baths are performed or supervised by the RN, CLABSI rates, mortality rates, and cost of care may decrease. Though not the focus of this project evaluation, the hope is that observed CHG baths, among other interventions, will eventually lead to a reduction in CLABSI. The outcomes of this project are useful for patients,

nurses, healthcare providers, and hospital administrators, due to the width and depth of the clinical issue.

Research Question

The following question was central to this project: When nurses are educated regarding the significance of daily CHG baths, will the RNs report an increase in daily CHG baths actually occurring through direct observation by the RN? The hope is that by providing an educational quality improvement educational module, RNs will report fewer baths being left undone.

Review of Evidence

Constructs

Constructs recognized within this study include CLABSI, infection prevention, hematology/oncology patients, RN to patient ratio, patient acuity, CHG baths, CLABSI bundle and evidence-based practice. CLABSI is defined as "a laboratory confirmed bloodstream infection where an eligible bloodstream infection organism is identified, and an eligible central line is present on the laboratory confirmed bloodstream infection date of event or the day before" (Centers for Disease Control and Prevention, 2020, p. 4-6). Infection prevention efforts generally involve a team of healthcare professionals who implement a "scientific approach and practical solutions designed to prevent harm caused by infection to patients and health workers" (World Health Organization, 2020). Hematology/oncology patients are defined as those who have a medical diagnosis of leukemia, lymphoma, multiple myeloma, anemia, hemophilia, and sickle cell disease (Shiel, 2018). For the purposes of this study, leukemia, multiple myeloma, and lymphoma hematology/oncology patients were the focus due to the population that the RNs of the unit care for.

RN to patient ratio is defined as the number of patients, and their care, that a nurse is responsible for throughout the course of a shift (American Nurses Association, 2020). Patient acuity is defined as a "measurement of intensity of nursing care needed by a patient" (Patient Safe Staffing, 2020). Daily CHG baths are defined as baths using chlorhexidine gluconate occurring at least once during a 24-hour period with a wipe being applied to each extremity and the entire trunk of the body (Johns Hopkins Medicine, 2020). A CLABSI bundle is defined as a "a group of evidence-based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually" (Institute for Healthcare Improvement, 2012, p. 8). Finally, evidence-based practice is defined as the integration of the best available evidence to guide care and improve patient outcomes (Academy of Medical Surgical Nurses, 2018).

Current Research

Overall, research suggests that a multidisciplinary team-based approach, combined with evidence-based interventions, is the most efficient way for healthcare professionals to decrease CLABSI rates, especially among cancer patients (Haddadin et al., 2020; Sagana & Hyzy, 2013; McMullan et al., 2013; Wallace et al., 2019). Major commonalities in the literature pertaining to CLABSI interventions include daily patient hygiene using chlorhexidine-gluconate (CHG), hand hygiene before manipulation of central venous catheter (CVC), aseptic technique, and skin scrub of CHG prior to CVC insertion (Chen et al., 2013; Conley, 2016; Denny & Munro, 2017; Dombecki et al., 2017; Marschall et al., 2014; Ohtake et al., 2018; Shah et al., 2016; Tien et al., 2019; Wilson et al., 2018; Zakhour et al., 2016). Even with multiple interventions supported by literature and large quantities of research, CLABSI is still an issue among cancer patients (AHRQ, 2019a).

One of the most common interventions found and supported in the literature are daily CHG baths (Chen et al., 2013; Denny & Munro, 2017; Dombecki et al., 2017; Marschall et al., 2014; Shah et al., 2016; Wilson et al., 2018). It is suggested that CHG baths are a common and feasible intervention in decreasing CLABSI. In fact, one study found that daily CHG baths decreased the CLABSI rate among over 7,000 patients by 23% (Climo et al., 2013). Current studies have analyzed the importance of daily CHG baths, proper education, facilitators, and barriers to performing the intervention, and some have evaluated the importance of daily RN supervised baths to decrease CLABSI rates (Jusino-Leon et al., 2019). The highest rates of CHG bath patient compliance are found among those who have direct assistance with the bath (Vanhoozer et al., 2019). Daily observed CHG baths have the potential to decrease CLABSI rates, abate costs, and lower mortality rates among cancer patients.

Interventions may be strongly evidence-based and supported by healthcare professionals, but still may not be carried out for various reasons. Another focus of the proposed study was to further expand on identified evidence-based barriers to daily observed CHG baths. Current literature identifies some common barriers to daily CHG baths as RN workload, patient stability, patient perception of bath, and patient refusal (Hines et al., 2015; Musuuza et al., 2017; Vanhoozer et al., 2019). Increased awareness of barriers may provide opportunities to develop interventions to increase daily CHG baths while contributing to existing literature.

Gaps

Current research supports the use of daily CHG baths to decrease CLABSI rates among cancer patients and the importance of staff assistance to increase patient adherence (Chen et al., 2013; Denny & Munro, 2017; Dombecki et al., 2017; Marschall et al., 2014; Shah et al., 2016; Wilson et al., 2018; Jusino-Leon et al., 2019; Vanhoozer et al., 2019). Nurses are often the

cornerstone of patient care and can become overwhelmed with the number of tasks to perform during each shift, which may be a cause for decreased adherence (AHRQ, 2019b). Direct observation of CHG baths may increase patient adherence and ensure the patient is performing the intervention correctly. Further identification of barriers to the intervention performed may contribute to current literature and assist future researchers in implementing new strategies to assist in increasing patient adherence of CHG baths.

Summary of Review of Evidence

Current literature supports a team-based, multi-interventional approach to decrease CLABSI rates among cancer patients (Hadaddin & Regunath, 2020). Daily CHG baths have shown to decrease CLABSI rates, and studies have identified the importance of direct RN observation or assistance of CHG baths to ensure appropriate methods and compliance (Chen et al., 2013; Climo et al., 2013; Denny & Munro, 2017; Dombecki et al., 2017; Jusino et al., 2019; Marschall et al., 2014; Shah et al., 2016; Wilson et al., 2018). The literature also identifies barriers that may prevent nurses from observing daily CHG baths such as RN workload, patient stability, patient perception of bath, and patient refusal (Musuuza et al., 2017; Vanhoozer et al., 2019; Hines et al., 2015). This scholarly project was aimed at increasing the rate of successful CHG baths by educating RNs and asking them to observe daily baths to decrease the perceived number of incomplete baths, which assisted the unit personnel in ensuring the use of evidence-base practice.

Theoretical Model

The theoretical model that underpinned this scholarly project and analysis was Donabedian's Structure, Process, & Outcome (SPO) Model. Donabedian's SPO Model is applicable to quality improvement initiatives and was used to frame the design of this quality

improvement scholarly project (Donabedian, 1965; Moran et al., 2020). Donabedian's model is used to recognize the characteristics of structure, process, & outcome measures to continue the initiative of quality improvement. Using the model, the researcher considered each measure to develop plans to advance quality improvement, and in this case, CLABSI reduction. The model also allowed for the identification of important components of the project that fit within the three main areas, to help frame the project and analyze results within each of the three areas (Figure 1).

In the context of CLABSI reduction, each measure of the SPO Model allows for further understanding of the phenomenon of CLABSI events on the unit where this scholarly project was performed. The structure measure was used to identify the setting's characteristics (National Healthcare Services, n.d.). Structure measures pertain to such things as "the adequacy of facilities and equipment, the qualifications of medical staff and their organization, the administrative structure, and operations of programs and institutions providing care" (Donabedian, 1965, p. 170).

For the purposes of this project, structure measures included CLABSI and its measurement via the National Healthcare Safety Network's standardized infection ratio, the infection prevention team, the hematology/oncology patients, evidence-based practice, nurse to patient ratios, and patient acuity. Each of the identified constructs, defined in the review of evidence, impact and make up the setting's attributes, which may be contributing to the current state of CLABSI events on the unit. After structure measures were considered, process measures were identified.

Process measures are those designed to achieve a specific set of goals and "reflect the way systems and processes work to deliver a desired outcome" (Donabedian, 1965; National

Healthcare Services, n.d., p.1). In the case of this scholarly project, process measures were used to identify the unit's current CLABSI protocol. Process measures included CLABSI intervention bundles and RN function. The unit's current CLABSI intervention bundles include, but are not limited to, hand hygiene and aseptic technique when manipulating a central line, CHG skin scrub prior to central line insertion, daily patient hygiene using CHG, levofloxacin prophylaxis, weekly and as needed RN central line dressing change, and proper cleaning of any central line hub prior to accessing it by scrubbing with CHG for 15 seconds. RN function included the task of daily patient CHG baths, which was already in unit protocol, but the methods of this scholarly project implemented the process of daily RN observed CHG baths. In the SPO Model, the combination of identified structure and process measures then impact outcome measures.

Outcome measures are the effects and outcomes of structure, process, along with other variables and are considered the "ultimate validator of the effectiveness and quality of medical care" (Donabedian, 1965, p. 169; National Healthcare Services, n.d.). Outcome measures, for the purposes of this project, included the primary outcome of increased rates of observed daily CHG baths as perceived by the RNs. A second outcome of this scholarly project was identification of barriers that the unit RNs recorded as pertaining to them. Hopefully these efforts will impact overall CLABSI rates in the future.

It is worth noting that each measure of Donabedian's SPO Model ultimately affects the others (Figure 1). For example, structure measures indirectly affect outcome measures, process measures indirectly affect structure measures, and outcome measures indirectly affect and are the results of both structure and process measures. Identification of each measure affecting the others facilitates and assists in the iterative process of quality improvement by acknowledging each measure's impact on the clinical issue. Donabedian's SPO Model was useful in developing the

framework of this scholarly project and allowed for further understanding of CLABSI on this particular unit.

Project Design

Quality improvement is defined as "systematic and continuous actions that lead to measurable improvement in healthcare services and the health status of targeted groups" (Health Resources and Services Administration, 2011, p. 1). The Institute for Healthcare Improvement has further expanded on quality improvement by identifying six aims for changing the healthcare system (Institute for Healthcare Improvement, 2020). One of these aims is effective care, which is defined as care that matches science (Institute for Healthcare Improvement, 2020). In other words, effective care is evidence-based care.

Through this scholarly project, the investigator strove to improve the quality of care being provided to cancer patients through questionnaires, education, and measures that ensured evidence-based care was rendered. The intention of the PI on this project was to increase observed daily CHG baths, which may potentially lower CLABSI rates on the designated unit. The project methods included two questionnaires with an educational module in between. The questionnaires were developed to measure RN perception of bath occurrences, and the educational video explained the significance and feasibility of CHG baths to RNs. This quality improvement scholarly project was granted approval from Belmont University's Institutional Review Board.

Clinical Setting

Data was collected from RNs on a local 25-bed hematology/oncology and bone marrow transplant unit serving Davidson County in Middle Tennessee. The patient population on this unit included those who have been diagnosed with a form of blood cancer, such as leukemia or

multiple myeloma, but most importantly, all patients on the unit were considered to be immunocompromised and susceptible to CLABSI. This particular unit's RNs care for hundreds of patients each year and the unit had a total of over 7,000 patient days in 2019. The nurses of the unit are also regarded as exceptional, as the RNs and staff have recently obtained a unit of distinction award from its parent organization, which is indicative of excellent nursing care. The nurses employed on this unit are highly motivated with regard to decreasing patient adverse events and they are invested in the care they perform, which made it a prime location to improve patient outcomes.

Accessible Project Population

The population of focus and project participants were the registered nurses who work on the hematology/oncology unit. Inclusion criteria for the nurses involved in the project were: being employed on that unit, and being aged 21-60. The exclusion criteria for participants were: RNs who chose not to participate, or those not meeting the inclusion criteria.

Purposive sampling was chosen for this project due to the setting, which consisted of nurses caring for immunocompromised hematology/oncology and bone marrow transplant patients. Once inclusion criteria were met, informed consent for participation was obtained through an initial survey question (Appendix A).

Sources of Data/Data Collection Instruments

The preliminary questionnaire, educational video, and post-educational questionnaire used in this scholarly project were created by the primary investigator in an effort to increase the rates of CHG baths that actually occurred. Each construct of Donabedian's SPO Model played an important role in the generation of these tools through taking into consideration the unit's qualities, a process to implement, and the potential outcome this process may cause.

The anonymous preliminary questionnaire consisted of two questions. The first question on the preliminary survey read, “Are you willing to participate in this study based on the letter of invitation criteria?” This resulted in nominal variable data of either yes or no, and the choice of no closed the survey. The second question on the preliminary survey read, “What percent of patients are not receiving CHG baths on the unit?” This question resulted in ordinal variable data ranging in percentages of 10 points each. For example, the participants had a choice between 0%, 1% - 10%, 11% - 20%, 21% - 30%, 31% - 40%, 41% - 50%, 51% - 60%, 61% - 70%, 71% - 80%, 81% - 90%, and 91% - 100% (Appendix A).

After completion of the preliminary survey, participants were linked to a two-minute digital educational video created by the primary investigator, which was based on best evidence. The video described the significance and efficacy of daily CHG baths, and then explained the methods of RN observation of CHG baths for this scholarly project. RNs were asked to, at a minimum, observe the CHG package opening and the start of the bath in that the patient laid the CHG wipe on their skin. However, RNs were encouraged to observe the entire bath. Approximately six weeks after the initial questionnaire, educational video, and implementation of daily observed CHG baths, the post-educational questionnaire was dispersed.

The first question of the anonymous post-educational questionnaire contained the same question from the initial survey regarding how many CHG baths were not actually occurring. This, again, resulted in ordinal variable data in ranges of 10%. The second question asked RNs to choose from barriers, identified in the literature, they felt applied to them in providing daily observed CHG baths. These barriers included RN workload, patient stability, patient perception, patient refusal, and included an “other” choice, which allowed RNs to write in any barriers that were not listed (Appendix B).

Data Collection Process and Procedures

The course of this project involved the implementation of an initial anonymous digital survey, an educational video, and a post-educational survey dispersed approximately six weeks after the initial survey and educational video. Participants were recruited via email using purposive sampling from a local hematology/oncology unit serving Davidson County in Middle Tennessee. The potential nurse participants were emailed by the unit manager on behalf of the primary investigator beginning in late September of 2020.

The preliminary email dispersed to RNs consisted of the letter of invitation, scholarly project information, and steps for RNs to begin participating in the scholarly project. Within the letter of invitation, participants were informed of the overall purpose of the project, inclusion criteria, exclusion criteria, and guaranteed anonymity (Appendix C). After reading through the letter of invitation, RNs were directed to step one. Step one included filling out the preliminary questionnaire. After completion of step one, RNs were directed to step two, which involved viewing the educational video via a link embedded within the email. The final step of the preliminary email directed the RNs to wait for further information in the coming weeks regarding the next steps of the project after the implementation of daily observed CHG baths.

Approximately six weeks after the preliminary questionnaire, educational video, and implementation of daily observed CHG baths, the post-educational questionnaire was dispersed. RNs who completed the preliminary survey were asked to complete the post-educational survey and those who did not participate in the preliminary survey were asked to not complete the post-educational survey. After completion of the post-educational survey in December 2020, RNs were thanked for their participation in the scholarly project and informed of its completion (Appendix D).

Results

The sample of this scholarly project included 24 total responses with 13 participant responses to the preliminary survey and 11 participant responses to the post-educational survey. Of the 38 RNs employed on the unit, the total participation rate of nurses completing the preliminary survey and educational video was 13 (34%) and 11 (29%) of the unit nurses completing the post-educational survey. The collection of aggregate and anonymous data prohibited the identification of specific demographic information of participants. A Mann-Whitney test was used to analyze sample medians due to the unpaired responses of nurses to the preliminary and post-educational survey, and an alpha level of less than .05 was deemed significant. All data collected from the participants was included in this analysis.

The Mann-Whitney test indicated that there was no significant difference in the nurses' perception of the number of baths that were not being completed between the pre-educational (*Mdn* = 1) and post-educational surveys (*Mdn* = 1), $U = 70.5$, $p = .0955$, though one outlier was present in the post-educational survey data (91%-100%).

Of the 11 post-educational survey responses regarding barriers to daily observed CHG baths, RN workload was reported by eight participants (73%), patient perception was reported by six participants (55%), patient refusal was reported by five participants (45%), and patient stability was reported by two participants (18%) (Table 1). One RN utilized the "other" option and provided a written response (9%). This response reported that an allergy/skin condition was a barrier in observing daily CHG baths.

Discussion

Daily CHG baths are a supported, feasible, and effective intervention in the fight to decrease CLABSI among cancer patients (Chen et al., 2013; Climo et al., 2013; Denny & Munro,

2017; Dombecki et al., 2017; Jusino et al., 2019; Marschall et al., 2014; Shah et al., 2016; Wilson et al., 2018). This scholarly project measured RN perception of daily CHG bath occurrences before and two months after an educational module regarding daily CHG baths and their efficacy in decreasing CLABSI among cancer patients. RN perception was used as a measurement of the number of baths that did not occur on a daily basis, which was expected to decrease during the study. It was hoped that nurses would perceive that fewer baths were left undone, and over time reduce CLABSI on the unit. Barriers, identified in the literature, were also recognized by RNs in the post-educational survey as reasons why daily observed CHG baths sometimes do not occur.

During the course of this scholarly project, a digital educational module about the efficacy of daily CHG baths, and asking RNs to observe them, did not produce a significant change in the nurses' perception of how many baths that did not occur. Among five barriers that participants could select from as barriers in the post-educational survey as to why daily observed CHG baths do not take place, RN workload and patient perception were chosen in over 50% of the participants' answers. It was expected that, with the educational video and requesting RNs to directly observe the entire bath or beginning of the bath, RN perception of baths that did not occur would decrease, though this did not take place during the study.

The results of this scholarly project did not produce significant findings upon statistical analysis; therefore, it can be assumed that the problem statement was not directly impacted during the course of the project. Though significant changes were not found during the course of this scholarly project, several barriers to daily RN observed CHG baths were identified, which may further research and expand on barriers recognized in the literature.

Donabedian's SPO Model was used as the framework for this initiative, and the barriers identified by project participants may give insight into characteristics of the unit where this study took place, that may be contributing to CLABSI events. Structure measures, for the purposes of this project, included RN to patient ratio and patient acuity, which both presented as major variables as to why RNs are unable to observe or assist with daily CHG baths. Structure measures impact process measures, such as the implementation of daily RN observed CHG baths. Identification and acknowledgement of these measures facilitates the process of quality improvement.

In reference to current research, the findings of this scholarly project contradicted the overall themes of the literature, though the barriers identified by the participants in this study supported current evidence. Literature supports the concept that the highest rates of CHG bath compliance among patients is with direct observation or assistance with the bath by an RN (Jusino-Leon et al., 2019; Vanhoozer et al., 2019). The findings of this project did not support this concept as RN perceptions of bath occurrences did not significantly change after an educational module and requesting them to observe the bath. Barriers identified by project participants did support the findings in the review of evidence as RN workload and patient perception of the bath were frequent answers as to why RNs were unable to observe or assist with daily CHG baths.

Several characteristics of the population sample and clinical setting may have impacted the clinical issue. For example, the staffing of the unit and those who perform patient care consists primarily of RNs. A secretary is also employed on the unit and contributes to patient care in ways such as food tray delivery and blood glucose monitoring. Nurses of the unit are primarily responsible for direct patient care. On average, RNs are assigned four patients per shift.

Patient load may contribute to the clinical issue in both a positive and negative way. If RNs have identified workload as a barrier to daily observed CHG baths, are the patient assignments too heavy for nurses to perform all patient care in a way that evidence recommends? Nurses being the primary caregiver may positively impact the clinical issue though, as RNs perform the majority of care for their patients, allowing them to be directly involved.

It may be constructive to conduct further research that takes into account specific patient assignments to determine if RN workload is correlated with the number of patients that RNs are assigned throughout the course of a shift, or if they are not correlated and RNs feel overworked regardless. Other researchers may also conduct a similar study, but not during a global pandemic. With the stressors of COVID-19 and its impact on healthcare as a whole, it may be worth seeking further information on whether the findings of this study can be replicated. During the pandemic, cancer patients were not allowed to have family members on the unit. The patients' family members are often essential components in patient care and can assist nursing staff in performing daily activities. Without this support system, patients may have required more assistance by RNs, which may have led to nurses feeling the weight of an increased workload.

Implications for Practice

This scholarly project's findings reinforced the premise that multiple interventions and a team-based approach should be utilized in order to decrease CLABSI among cancer patients. Although this study did not produce substantial changes in RN perception of bath occurrences, other evidence-based interventions are in place in unit protocol to potentially impact CLABSI and protect patients. It is acknowledged that CHG baths are one component of CLABSI prevention among cancer patients and that other interventions should be utilized in combination with CHG baths to decrease CLABSI rates. Findings of this scholarly project support continued

use of evidence-based practices as a major facet of CLABSI reduction and the combination of identified interventions may have a synergistic effect to decrease CLABSI.

Further implications for practice include determining additional strategies and interventions to increase RN observed CHG baths and patient compliance. New methods should be based on identified barriers to CHG baths. For example, if patient perception continues to be a barrier to CHG baths being performed, patients may need to be continually educated on the efficacy of CHG baths, proper methods of performing the bath, and how often the baths should occur. Continued use of multiple evidence-based interventions, coupled with a multi-disciplinary approach and accountability may prove to be important variables in continuing the fight against CLABSI among cancer patients.

Strengths, Limitations, and Future Directions

Several potential strengths of this scholarly project were identified after completion. One strength of this scholarly project was that evidence supports the methods used in this study to increase RN and patient compliance of daily CHG baths. Research suggests that rates of RN observed CHG baths may increase after education on the efficacy of the intervention and that the highest rates of CHG bath compliance among patients is with direct observation or assistance (Jusino-Leon et al., 2019; Vanhoozer et al., 2019). Another strength of this project was the unit itself. The unit RNs were struggling with decreasing CLABSI among patients, which made it a prime location for a quality improvement scholarly project. The patients of the unit are diagnosed with a form of blood cancer and are considered to be immunocompromised, which allowed for a specific focus of research.

Another strength that was identified, though not originally planned, was the use of digital anonymous surveys. This may have allowed for RNs to be completely transparent in their

answers regarding their perception of CHG bath occurrences. The study participants were also informed that no facility management would be included in the study, which may have permitted them to feel no obligation to answer a certain way or be reluctant in sharing their views about barriers to the intervention.

Several limitations were identified after the completion of this scholarly project. The first limitation identified was the use of self-report in data collection. The use of RNs reporting their perceptions of bath occurrence may be skewed due to a self-report bias that may motivate participants to answer in a way that does not portray them as a poor nurse or employee. Another potential limitation was the use of a digital survey and online educational module. The use of in-person surveys and an educational session, which was originally planned, but cancelled due to COVID-19, may have allowed more participants to have been recruited. The participation rate in the study was also identified as a potential limitation as the actual participation rate was much lower than the expected participation rate.

The measure of RN perception of CHG baths that did not occur was deemed another potential limitation of this study due to the results and findings. Literature strongly supports the use of daily CHG baths as an intervention in decreasing CLABSI among cancer patients, but future research plans could include other ways to measure CHG bath compliance among cancer patients in short durations of study (Chen et al., 2013; Climo et al., 2013; Denny & Munro, 2017; Dombecki et al., 2017; Jusino et al., 2019; Marschall et al., 2014; Shah et al., 2016; Wilson et al., 2018). Time is also a potential limitation of this scholarly project. RN perception of CHG bath occurrence was used as the primary measurement of CHG baths due to the time allowed for the study and the variable nature of CLABSI occurrences. The final limitation recognized in this study was the existence of personal relationships between the primary investigator and

participants. Though no direct contact was made, these relationships may have resulted in skewed data due to participants answering the survey in ways they feel may please the primary investigator or vice versa.

Several challenges were encountered during the project's course that may have impacted the study's results. The first challenge was COVID-19. COVID-19 potentially produced an increase in rates of societal, life, and employment stressors, which may have resulted in a decreased participation rate of nurses in the study. A second challenge that was identified throughout the course of the project was RN participation. This, as stated above, may be related to COVID-19, but it may also be due to the use of digital surveys and an online educational module. Participants may be more engaged in a setting where they are asked to fill out surveys by hand and attend an in-person educational session.

One potential unintended consequence identified during the scholarly project was with the use of regularly distributed emails to encourage RN participation, which may have led to email fatigue. Frequent emails could have caused a vexation to the RNs of the unit, which was unintended. This may have resulted in less engagement and participation, which was counter to the intent.

Future direction for further research and impact on the clinical issue should include scholarly projects that are designed to decrease CLABSI among cancer patients. Even with multiple interventions and large volumes of research, CLABSI is still an issue that cancer units report across the globe (AHRQ, 2019a). Continued research will be instrumental in learning more and designing interventions to impact the clinical problem. Future researchers should also consider barriers identified in the literature, and reinforced by this scholarly project, when designing methods to decrease CLABSI among cancer patients.

Conclusion

CLABSI increases mortality and morbidity among cancer patients and is expensive to the health care system. An educational presentation about the importance of CHG baths failed to produce a reduction in the number for perceived baths left undone among RN participants. The findings of this scholarly project support the idea that education, specifically digital education, may be ineffective to increase RN observed CHG baths. Additional interventions may need to be considered, such as an accountability system within the unit nurses, to further impact CHG bath compliance among cancer patients. More studies are needed to impact the clinical issue and should be designed around barriers identified in the literature and further expanded on within this study. It is acknowledged, however, that daily CHG baths are only one component of CLABSI prevention and other interventions should be explored further as well.

Specific recommendations can be made for the facility where this scholarly project was performed. The first intervention to further impact daily CHG baths is to implement an accountability system that is checked and rounded on by individuals in nursing leadership, such as the charge nurse. This may help RNs to ensure the baths occur daily. A second way facility leadership may impact this issue is to have a nursing aid, if available, or unit secretary observe or assist with the CHG bath to ensure the bath takes place. The unit leaders may also consider further exploration of other evidence-based interventions that already exist in unit protocol to evaluate current methods to ensure interventions are being performed as directed. Continual efforts made by unit leadership to improve the quality of care being provided to cancer patients especially by impacting CLABSI, may eventually lead to better patient outcomes and lower costs of care.

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Figure 1: *Graphic depiction of Donabedian's SPO Model*

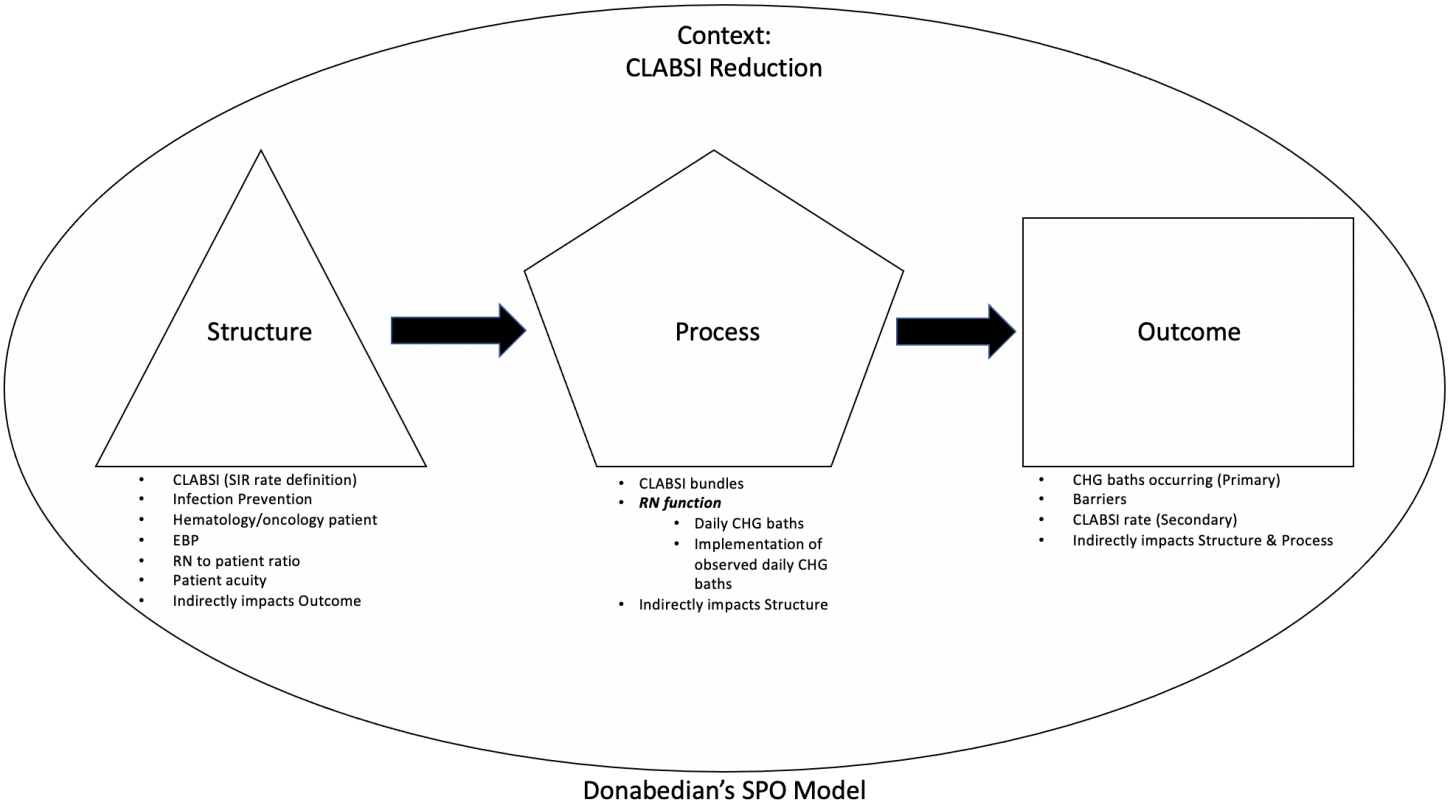

Table 1: *Barriers Identified by Unit RNs in the Post-Educational Survey*

Barrier	*n*	%	Comment
RN Workload	8	73	
Patient Perception	6	55	
Patient Refusal	6	55	
Patient Stability	2	18	
Other	1	9	Allergy/Skin Condition

Appendix A

Preliminary Questionnaire:

Are you willing to participate in this study based on the letter of invitation criteria?

Yes or No

What percent of patients are ***not*** receiving CHG baths on the unit? Please circle one.

- ☐ 0%
- ☐ 1% - 10%
- ☐ 11% - 20%
- ☐ 21% - 30%
- ☐ 31% - 40%
- ☐ 41% - 50%
- ☐ 51% - 60%
- ☐ 61% - 70%
- ☐ 71% - 80%
- ☐ 81% - 90%
- ☐ 91% - 100%

Appendix B

Post-educational Survey:

What percent of patients are ***not*** receiving CHG baths on the unit? Please circle one.

- ☐ 0%
- ☐ 1% - 10%
- ☐ 11% - 20%
- ☐ 21% - 30%
- ☐ 31% - 40%
- ☐ 41% - 50%
- ☐ 51% - 60%
- ☐ 61% - 70%
- ☐ 71% - 80%
- ☐ 81% - 90%
- ☐ 91% - 100%

Of the listed factors, please check next to the ones you feel are the largest barriers to CHG baths being performed.

- ☐ RN Workload
- ☐ Patient stability
- ☐ Patient Perception
- ☐ Patient Refusal
- ☐ Other
  - (Write-in text box)

Appendix C

Preliminary Email: Letter of Invitation:

Belmont University Institutional Review Board

Letter of Invitation to Participate in Research

Decreasing CLABSI among Cancer Patients:
Daily Observed CHG Baths

Dear Nurses of 3 North,

We invite you to participate in a research study conducted by Cody Tripp, student in the Belmont University Doctor of Nursing Practice program. The faculty advisor is Dr. Steven Busby Faculty-Sponsor, Associate Professor, School of Nursing.

The purposes of this study are to decrease CLABSI rates by implementing RN observed daily CHG baths and identify barriers to RN oversight compliance with CHG baths. You are eligible to participate in this study if you are a registered nurse currently working on 3 North in Sarah Cannon Cancer Center and are aged 21-60. We will ask you to complete a survey that will be linked in each of the two emails regarding the study. These surveys should take approximately 2 minutes. This survey contains questions about nursing compliance with oversight of patient CHG baths. After completion of the first survey, we invite you to view a 2-minute educational video about important features of patient compliance followed by a second survey. Your responses to the surveys will be anonymous and confidential. Please do not write any identifying information (your name, address, etc.) on your survey.

Your participation in this study is completely voluntary. If you choose to participate you may choose to discontinue participation at any time and you may choose not to answer any questions. Your completion of the survey and returning it to the investigators indicates your consent to participate in this study. Feel free to contact me at Cody.Tripp@pop.belmont.edu if you have questions.

Sincerely,

Cody Tripp

Appendix D

Post-educational Email: Letter of Invitation

Belmont University Institutional Review Board

Decreasing CLABSI among Cancer Patients: Daily Observed CHG Baths

Dear Nurses of 3 North,

Thank you for your input and participation in this research study! I hope the results of this study will make a positive impact on the patients of 3 North for the months to come.

I ask those who completed the preliminary survey during the past few weeks to please complete the second survey attached in this email. If you did not complete the preliminary survey, please do not complete the second survey attached to this email.

Again, thank you for your participation and I'm looking forward to the outcomes of this initiative!

Sincerely,

Cody Tripp