Preoperative Nasal Decolonization: Impact on Surgical Site Infections in Patients Undergoing Total Joint Arthroplasty

David C. Ault, DNP, RN, CNOR

Chamberlain College of Nursing

Abstract

Background: *Staphylococcus aureus* is the common agent causing surgical site infections, which can lead to increased postoperative mortality and costs. *S. aureus* is the most common organism in total joint replacement infections.

Local Problem: The problem identified was the increase in deep/joint space surgical site infections caused by methicillin-resistant *S. aureus* (MRSA), and methicillin-sensitive *S. aureus (*MSSA). Though the infection rates for total joint replacements are low, one infection can impact the patient's quality of life significantly and can create a financial burden to the 84-bed acute care hospital in northern California, so the goal is to have zero infections.

Methods: This project was conducted over a 10-week period and included 117 patients. Preoperative nasal decolonization with povidone-iodine intervention was performed on all primary total joint replacement patients who met the inclusion criteria.

Interventions: Preoperative nasal decolonization has been shown to reduce postoperative SSIs. A universal approach was used instead of a test-and-treat method. Povidone-iodine was used due to its suppression of MRSA/MSSA, more positive patient experience, and promotion of antimicrobial stewardship.

Results: No SSIs were reported on patients who underwent the preoperative nasal decolonization (n=117, 0%). A Fisher's Exact Test determined there was no significant difference between the pre-and post-intervention groups on the number of post-operative infections that occurred

Conclusions: All patients who underwent preoperative nasal decolonization with povidone-iodine immediately before surgery did not experience a deep/organ space SSI.

Keywords: *surgical site infections, nasal decolonization, povidone-iodine, MRSA, S. aureus, total joint replacements*

Dedication

To my mother, Jeanette Ault, RN, and my niece, Elizabeth Thach, RN.

You are my nursing past, present, and future.

I love you both.

To Mike Kiraly

If I had not met you, I would have never taken this scholarly journey.

I'm forever grateful.

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Preoperative Nasal Decolonization: Impact on Surgical Site Infection in Patients Undergoing Total Joint Arthroplasty

Surgical site infections (SSIs) are costly to a patients' quality of life and a hospital's finances and reputation (Torres et al., 2016). Hospital-acquired infections (HAIs) contribute to an increased length of stay, patient dissatisfaction, and increased mortality. SSIs contribute to a 3% mortality rate, with 75% of these deaths directly attributed to the SSI (CDC, 2020). SSIs are the most expensive of all HAIs that reportedly costs $10,000 to $25,000 per infection and over $90,000 if the infection involves a resistant organism or a joint implant (Torres et al., 2016). Romero-Palacios et al. (2019) state that surgical site infections following total joint replacement cost the United States (U.S) $1.62 billion annually. Preventing HAIs is critical to prevent financial strain for the hospitals since the Centers for Medicare and Medicaid Services (CMS, 2020) has stopped reimbursing hospital-acquired events, such as SSIs.

Methicillin-resistant *Staphylococcus aureus* (MRSA), and methicillin-sensitive *Staphylococcus aureus* (MSSA) has been attributed to SSIs following total joint arthroplasty (Pelfort et al., 2019; Peng et al., 2018). A considerable portion of the population harbors different *S. aureus* forms, including 20%-36% with MSSA and 6% with MRSA (Peng et al., 2018; Septimus, 2016). Decolonization is an evidence-based intervention in reducing HAIs. Eliminating colonized bacteria with nasal decolonization has been shown in preventing *S. aureus* infections and using povidone-iodine statistically reduces SSIs (Urias et al., 2018). The guidelines for targeted decolonization require all patients to be tested for MRSA and then recommends treatment of those who test positive; while universal decolonization is treatment for all patients regardless of MRSA status. Both methods have been shown to decrease infections (Hayden et al., 2016). The purpose of this DNP project is to implement a universal preoperative

nasal decolonizing procedure with povidone-iodine for adult patients undergoing elective total joint arthroplasty procedures to reduce surgical site infections (SSIs) caused by MRSA, and MSSA.

Problem

The Centers for Disease Control [CDC] (2020) defines SSI as an infection occurring within 30 days and 90 days of total joint replacements. Diagnosis of infection includes the presence of purulent drainage or organisms from sterile cultures and demonstration of pain, tenderness, localized swelling, redness, and heat and are categorized as superficial, deep incisional, or organ/space infections (CDC, 2020). According to the CDC, in 2014, approximately 14 million surgical procedures resulted in over 110,000 (0.78%) surgical site infections in the U.S. According to the Agency for Healthcare Research and Quality (AHRQ), more than 450,000 total hips replacements and 790,000 total knee replacements are performed annually in the U.S. (American Academy of Orthopedic Surgeons, 2020), with an infection rate of 2% to 4% (Franklin, 2020). In California, during 2018-2019, there were 211,417 total joint procedures performed, which resulted in 963 infections (0.46%) (U.S. Department of Health, 2020).

S. aureus is one of the most common organisms that causes SSIs, which can lead to increased patient mortality, length of hospitalization, and healthcare costs (Hayden et al., 2016; Septimus & Schweizer, 2016, Zhu et al., 2020). *S. aureus* is the most common organism in total joint replacement infections (Pelfort et al., 2019; Peng et al., 2018). The anterior nares are a significant source for colonization, and the majority of *S. aureus* infections are from the patient's nasal flora (Hayden et al., 2016; Pelfort et al., 2019; Peng et al., 2018; Septimus & Schweizer,

2016; Zhu et al., 2020). Rezapoor et al. (2017) state that 84.6% of MRSA strains detected in SSIs match those from the nares.

Eliminating colonized bacteria with nasal decolonization has been shown in preventing postoperative MRSA infections (Urias et al., 2018). The current "gold standard" for MRSA prevention is to test all patients prior to surgery, and those who are positive for MRSA are given mupirocin ointment to be applied to the anterior nares twice a day for five days before surgery (Septimus & Schweizer, 2016). Though a gold standard, testing for and prescribing mupirocin is not a panacea for MRSA/MSSA infections. Polymerase Chain Reaction (PCR) testing only test for MRSA and not MSSA, which can also cause SSIs (Torres, et al., 2016). There has been an increase in mupirocin resistance, which renders the treatment ineffective. (Septimus & Schweizer, 2016; Rieser & Moskal, 2018). Noncompliance with using the mupirocin after a positive MRSA occurs up to 11% of all patients (Rieser & Moskal, 2018); patients may have difficulty adhering to the protocol or forego the medication altogether due to the out-of-pocket expense (Hutzler & Williams, 2017).

The facility where the project was implemented is an 84-bed acute care facility located in Northern California. The leaders and staff had to manage financial blows by the cancellation of surgical procedures due to the pandemic, plus the evacuation of the hospital twice in the last four years, due to wildfires. During 2018-2019, 1,202 primary total joint procedures were performed that resulted in 6 infections (0.5%). Though the infection rates for total joint replacements are low, patients with an infection creates a financial burden to the hospital, so the goal is to have zero infections. The average cost of a deep/organ space SSI for total joint procedures was $36,000. Discussions were held with the Infection Control Coordinator, Infectious Disease MD, Chief of Orthopedics, Chief Nursing Executive, Chief Medical Officer, and Director of Surgical

Services, and it was determined that an added evidenced-based intervention was needed to align with the current process to reduce these SSIs. Authorization was given to proceed with the project (Appendix C). The current practice provides patients with chlorhexidine bath wipes to be used daily for two days before surgery to reduce *S. aureus* from their skin, axilla, and groin. Povidone-iodine has been studied, and it has been found effective in significantly decreasing MRSA/MSSA in the patient's anterior nares (Septimus, 2016; Urias et al., 2018). Povidone-iodine oxidizes pathogen structures such as amino acids, nucleic acids, and membrane components with no reports of resistance (Eggers, 2019). Ghaddara et al. (2020) state that a single-dose application of povidone-iodine caused a statistically significant reduction in MRSA during the hospitalization.

Practice Question

The PICOT question that guided this project was, "For adult patients undergoing elective total joint replacements, will implementing preoperative nasal decolonization, compared to current practice, impact postoperative SSIs caused by MRSA/MSSA in 10 weeks?"

Literature Synthesis

A literature search was conducted utilizing Chamberlain University's Library, including the CINAHL, ProQuest Nursing, Access Medicine, Cochrane Library, and PubMed databases. Search terms used included MRSA, nasal decolonization, povidone-iodine, surgical site infections, total joint replacements. Boolean operators were employed to both expand and limit the results. The search was limited by choosing only articles from peer-reviewed journals and limited from 2015 to 2020. The initial search utilizing the terms nasal decolonization and surgical site infections produced 305 articles; when the search was narrowed to articles from

peer-reviewed journals, 151 were listed. The term povidone-iodine was added to the other terms and further narrowed the articles to 55.

Three randomized clinical trials (RCTs) were selected for this project. All three RCTs focused on povidone-iodine for nasal decolonization. Studies by Ghaddara et al. (2020) and Rezapoor et al. (2017) were performed to determine the effectiveness of povidone-iodine in reducing nasal *S. aureus*. Both articles found that povidone-iodine did reduce both MRSA/MSSA loads significantly. Rezapoor et al. (2017) did not look at nasal decolonization and SSIs. Ghaddara et al. (2020) concluded that a single application of povidone-iodine preoperatively is effective for short-term suppression of MRSA/MSSA. The trial by Maslow et al. (2014) focused on the patient experience with receiving nasal decolonization. The study concluded that patients who received povidone-iodine nasal decolonization experienced significantly less unpleasant side effects (3.4%) than those who received mupirocin ointment (38.8%). All three studies randomized the participants, but none of the studies performed blinding of participants and providers. The studies by Maslow et al. (2014), and Rezapoor et al. (2017), were conducted at a single institution, while Ghaddara et al. (2020) conducted their trial at a hospital and long-term care facility.

Three systematic reviews with meta-analysis were selected for this change project. The systematic reviews by Sadigursky et al. (2016), Tang et al. (2020), and Zhu et al. (2020), were made up of studies trying to determine if preoperative nasal decolonization was effective with reducing SSIs. The studies performed preoperative testing and treated those who were positive for MRSA before surgery. All three reviews did a test-and-treat approach for MRSA rather than a universal approach to decolonization. The studies used different agents for the decolonization intervention, but the systematic reviews did not examine the individual

decolonizing agents' results. All three reviews concluded that nasal decolonization assists with the reduction of SSIs.

All three systematic reviews had low p-values which indicates low heterogeneity: Sadigursky et al. ($p = 0.004$); Zhu et al. ($p = < 0.001$); and Tang et al ($p = 0.000$). However, the review by Tang et al. (2020) had an I^2 of 75.8%, which shows higher heterogeneity, whereas, Zhu et al. and Sadigursky et al. had similar *p*-values and I^2 statistics. Each of the studies used funnel plots to measure heterogeneity, and no publication bias was found.

A total of five quasi-experimental articles were reviewed. Three of the studies focused on using povidone-iodine for nasal decolonization, and two were focused on preoperative nasal decolonization and reduction of prosthetic joint infections. The studies by Peng et al. (2018) and Urias et al. (2018) both utilized povidone-iodine nasal decolonization preoperatively. Urias et al. (2018) found the significant reduction of SSI from 1.1% to 0.2% ($p = 0.03$) after implementation of povidone-iodine nasal decolonization. Peng et al.'s (2018) study was to determine the prevalence of MSSA/MRSA in Northern China and secondly to determine the effectiveness of nasal decolonization of MSSA/MRSA. Peng et al. found a 100% ($p = < 0.001$) successful decolonization of MRSA and a 92.6% ($p = < 0.001$) reduction of MSSA. Peng et al. (2018) did not study the infection rates following nasal decolonization; however, they stated that nasal decolonization could reduce SSIs. Rieser and Moskal (2018) studied the cost-effectiveness of a universal preoperative nasal decolonization with povidone-iodine compared to test-and-treat with mupirocin. These researchers found that universal decolonization saved their institution over $100,000 annually over the test-and-treat approach.

Pelfort et al. (2019) and Romero-Palacios et al. (2019) studied the effect of preoperative nasal decolonization on prosthetic joint infections. Both studies utilized a similar test-and-treat

approach to those patients who tested positive. Pelfort et al. (2019) found 17 SSIs in 400 cases in the control group for an infection rate of 4.25% (95% CI 2.27% - 6.23%), while in the intervention group SSIs were noted in 5 of 403 cases in the intervention group for an infection rate of 1.24% (95% CI 0.16% - 2.32%). Romero-Palacios et al. (2019) found similar SSI results between the control group and intervention group; 42 of 8,505 (0.5%) cases in the control group and 7 of 1,883 (0.4%) in the intervention group (OR 0.75; CI 95%, 0.34-1.67; $p = 0.58$) while prosthetic joint infections were significantly reduced from 29 in 8,505 (0.05%) cases in the control group to 1 in 1,883 (0.05%) in the intervention group (OR 0.15; CI 95%, 0.004-0.94; $p = 0.039$).

The evidence shows that preoperative nasal decolonization effectively reduces MRSA/MSSA colonization and reduces the incidence of SSIs in patients undergoing total joint replacements. All of the RCTs, and quasi-experimental studies were performed at single institutions and would be considered underpowered. Historically, all nasal decolonization research was conducted at single institutions, which could be regarded as underpowered. Historically, research for nasal decolonization has been underpowered, so nasal decolonization has not been widely endorsed nor utilized. The methods used in Urias et al.'s (2018) study are the most similar to the proposed intervention. Urias et al. focused on patients undergoing urgent surgical cases; for this project, cases only involved elective primary surgical cases.

The research provides compelling evidence that utilizing a universal preoperative nasal decolonization with povidone-iodine can (a) reduce the number of SSIs, (b) is more cost-effective than the test-and-treat positive MRSA patients with mupirocin, (c) is better tolerated by patients, and (d) promotes antibiotic stewardship. Due to the evidence review, preoperative nasal

decolonization with povidone-iodine was utilized for patients undergoing primary total joint replacement.

Purpose

The purpose of the DNP project was to implement a preoperative nasal decolonizing procedure for adult patients undergoing primary total joint replacement procedures to reduce surgical site infections (SSIs) caused by methicillin-resistant *S aureus* (MRS(A) and methicillin-sensitive *S aureus* (MSSA). This project takes a fiscally pragmatic approach to reducing SSI. The project's focus was not to produce income but to prevent the loss of revenue due to the non-reimbursement of a SSI. Cost savings by providing universal nasal decolonization treatment with a povidone-iodine solution to all patients occurred because it does not require preoperative testing and does not lead to resistance, making decolonization ineffective (Peng et al., 2018). The universal application of a povidone-iodine solution is less expensive than mupirocin and promotes antibiotic stewardship (Septimus & Schweizer, 2016).

This project's goals included no deep/organ space SSIs due to MRSA/MSSA in patients who have undergone a primary total joint replacement. Secondary goals included (a) 100% compliance of physician order entry, (b) 100% compliance of nasal decolonization within one hour before entering the operating room, and (c) 100% documentation of the decolonization intervention's completion. The DNP Project Manager utilized reports from the electronic health record to the number of cases performed during the pre-and post-intervention time frame for SSIs for primary total joint procedures before and after implementing the nasal decolonization protocol.

Evidence-Based Intervention

The proposed intervention was implemented in the Outpatient Care Unit (OCU), where all surgical patients are admitted before entering the operating room. The DNP project

population was all adult males and females, age18 years and older, who underwent an elective primary total joint replacement. The sample size was 117 patients over 10 weeks.

The decision was to use povidone-iodine over mupirocin due to its effectiveness against MRSA/MSSA. This method does not require testing, does not develop resistance, and yields more positive patient experiences with its application (Maslow, 2014). Nasal decolonization with povidone-iodine intervention began on all primary total joint replacement patients who met the inclusion criteria. After the patient was admitted to the unit, the OCU nurse procured the nasal antiseptic through the medication dispensing unit, scanned the patient's identification band, opened the disposable povidone-iodine nasal decolonization package, and used the applicator to apply the solution to the anterior nares. The nurse repeated the process on the opposite nare. After completing the intervention, the OCU nurse documented that intervention was completed in the Preoperative Checklist.

The proposed project was completed in an 11-week timeframe. Prior to implementation, activities included (a) procurement of the nasal antiseptic, (b) completion of written decolonization protocols, and (c) education of nursing staff. Due to the project timeline constraints, each patient who underwent nasal decolonization before a total joint replacement procedure was followed for 30-days postoperatively.

Translational Science Model

For this change project, the Knowledge-To-Action (KTA) model was used for its implementation. The KTA model, created by Graham et al., was created to respond to the need for current research to be implemented into clinical practice at a swifter pace than it has been (Graham et al., 2006). According to Lynch et al. (2018), the KTA models allow for individualization through tailoring to adapt new knowledge for a system change and promote

sustained use. The use of the KTA model has positively influenced patient outcomes (Xu et al., 2020).

The KTA model comprises two separate actions, (a) knowledge creation and (b) knowledge action (Graham et al., 2006). Knowledge creation is when three different types of knowledge can be used to improve patient care. Graham et al. (2006) equate knowledge creation as a filter and, through knowledge inquiry, knowledge synthesis, and knowledge transfer, takes raw knowledge and refines it to the knowledge that clinicians can use. The second part of the KTA model is knowledge action, which synthesizes knowledge and applies it to clinical practice. Knowledge action consists of seven phases, (a) problem identification, (b) adapting knowledge to the local context, (c) assessing barriers, (d) implementation, (e) monitoring, (f) evaluation, and (g) sustaining knowledge use (Xu et al., 2020).

Problem Identification

The problem identified was the increase in surgical site infections caused by MRSA, and MSSA. Though the infection rate is below the national average, the financial impact of surgical site infections, especially those involving a prosthetic, can significantly increase non-reimbursable costs (Berrios-Torres et al., 2017).

Adapting Knowledge to Local Context

When reviewing the literature for interventions that reduce SSIs, mupirocin has been shown to decrease infections. Yet, patient noncompliance and increased mupirocin resistance can lead to decolonization failure (Septimus & Schweizer, 2016). The use of mupirocin requires testing for MRSA and the prescribing of mupirocin. The universal application of mupirocin to all patients undergoing total joint replacement does not comply with antibiotic stewardship (Zhu et al., 2020). The use of povidone-iodine effectively reduces SSIs, does not require testing, and

does not lead to resistance. Universal decolonization with povidone-iodine, regardless of MRSA status, increased the intervention's effectiveness due to increased compliance and proper application of the povidone-iodine antiseptic.

Barriers

A significant barrier could be surgeon resistance to the new protocol. It was decided to have the Pre-Anesthesia Testing Nursing enter the order for the new protocol to prevent surgeon resistance and promote satisfaction. Having the povidone-iodine antiseptic solution added to the medication dispensing system ensured the documentation of the decolonization intervention.

Implementation

Graham et al. (2006) state that implementation is the phase where clinical evidence is applied to clinical practice, effectively improving patient outcomes. The nasal decolonization intervention was performed when patients are admitted to the OCU on the day of surgery. Documentation occurred on the medication administration record (MAR) as well as the Preoperative Checklist.

Monitoring

The DNP Project Manager built reports within the EHR that monitor the placement of the nasal decolonization order and completion of the nasal decolonization intervention completion. If documentation has not been completed on the Preoperative Checklist, the DNP Project Manager called the nurse caring for the patient to remind them to complete and document the intervention in the EHR.

Evaluation

Project evaluation is a critical step to ensure that goals have been met. Data collection for the project occurred through auditing patient charts pre-and post-intervention. Patient data

included gender, age on the date of the procedure, American Society of Anesthesiologist (ASA) score, any current comorbidities. The DNP project manager designed reports in the EHR to record the number of cases performed and SSIs during the pre-and post-intervention time frame. The DNP project manager compared data on how many SSIs primary total joint patients experienced before and after the project implementation. The DNP project manager used chart audits to measure the percentage of compliance with documentation of the intervention.

Sustaining Use

Though the implementation is completed and outcomes have shown improvement, it does not equate to the staff continuing to utilize the intervention and practice change. Ament et al. (2015) state that sustainability can vary between areas of the organization, and adherence must be monitored; otherwise, healthcare workers can become pessimistic regarding EBP practices. The preoperative nasal decolonization intervention will be included in the policy entitled "Surgical Patient: Admission, Preoperative and Postoperative Care of Adult Patients." The nasal decolonization procedure will be included in the annual competencies for OCU nurses and new employee orientation.

The DNP project manager will continue to run reports from EHR and review data to identify lapses in performing the nasal decolonization. The DNP project manager will talk to individual clinicians where sustainability has been an issue and provide educational activities and reminders in each unit can help increase sustainability and promote permanent change.

Organizational Setting

The project took place at an 84-bed acute care facility located in Northern California, that performs over 600 total joint replacements per year. A SWOT analysis is a qualitative evaluation for identifying the strategic position of an organization by identifying four specific areas, (a)

strengths, (b) weaknesses, (c) opportunities, and (d) threats (Pochobradska, 2019). Strengths for the hospital include establishing itself as a high-reliability organization, a high level of professional staff, and a new facility that is strategically located. Weaknesses would be that quality improvement changes are not consistently based on new evidence. Opportunity is the organization's desire to achieve the Joint Commission's certification as an Advanced Total Hip and Total Knee Replacement center. Threats include economic insecurity due to the pandemic and non-reimbursement for SSIs and the loss of revenue due to the hospital's closure, twice due to wildfires in the county. The mission of this project aligned itself with the hospital's mission and values. The hospital believes in providing quality care while maintaining high safety levels, seeking new ways of delivering value to customers, using resources responsibly, and using team efforts to improve patient outcomes (Sutter Health, 2020).

During 2018-2019 the average age of the patients was 67.5 yrs. Females accounted for 59.2%, while males represent 40.8% of the cases performed. The ethnicity of these cases is: (a) 87.4% is white; (b) 6.4% Latino; (c) 1.0% black; (d) 1.6% Asian; (e) American Indian 0.7% and (d) 2.9%. Unknown/Other. The vast majority of cases were diagnosed with unilateral/bilateral osteoarthritis, and other diagnoses include rheumatoid arthritis, idiopathic necrosis, and fractures.

Population Description

The population for the DNP project was all adult males and females, age 18 years and older, who were undergoing an elective primary total joint replacement procedure. The sample size for the project was 117 patients. Inclusion criteria were all patients scheduled to undergo elective primary total joint replacement 18 years or older. Exclusion criteria included (a) allergy to povidone-iodine, (b) undergoing non-elective total joint surgery, (c) patients undergoing

revision or conversion total joint replacements, (d) patients who have tested positive for MRSA, (e) patients who were treated with mupirocin, and (f) patients who have active infections.

Considerations and Challenges for Implementation

Potential barriers to the implementation included orthopedic surgeons' acceptance and adherence to the new intervention. Much of the literature surrounding preoperative nasal decolonization includes preoperative testing of patients and treatment for five days prior to surgery. Surgeons may not want to burden their patients with this before surgery. An organizational change that deviates from current processes can create dissatisfaction for healthcare workers (Kuzhda, 2016). The decision was made to have the pre-anesthesia testing nurses enter the order for nasal decolonization instead of requiring the surgeon to place the order to prevent physician dissatisfaction or resistance. The potential barrier of surgeon resistance never transpired.

Another potential barrier that was identified but did not transpire was resistance by the OCU nurses. There was a concern due to the frequent patient care changes related to the pandemic, resistance by nurses could be caused by "change fatigue" (Lumbers, 2018). It was felt that nurses might think that more work had been added to their already demanding process of admitting and preparing patients for surgery. The nurses were educated that this intervention is an additional layer of protection on top of the already implemented chlorohexidine gluconate (CHG) preoperative wipes. The nurses consistently applied the decolonization intervention to all patients for whom the nasal decolonization was ordered.

Outcomes

Evaluation of the project included the number of SSIs and causative organisms that occurred within 30-days postoperatively. Measurements of SSI would be based on CDC's

National Health Safety Network (NHSN) definitions for deep and organ/space surgical site infections. Outcome measurements of SSI would include signs and symptoms of SSI: redness, heat, tenderness, purulence, fever, and elevated WBCs requiring a prescription for antibiotics or diagnosis by a provider (CDC, 2020). Additional data points that could affect postoperative outcomes were collected. The data points included sex, ethnicity, age, duration of surgery, and any comorbidities. Urias et al. (2018) studied the NHSN definitions for SSI and the discrete data points as previously described.

Post-intervention data were collected through data mining of the EHR pre-and post-intervention. The DNP project manager built and ran reports that abstracted data from the EHR to compare hospital data on how many SSIs the hospital had before and after the implementation. If postoperative outcomes could not be obtained through the EHR, a request for information was sent to the surgeon's office, and if outcomes could still not be obtained, the patient was contacted by phone.

Chart audits were completed to measure the percentage of documentation compliance of the intervention. For physician order entry compliance, a report was built that included (a) medical record number (MRN), (b) date of surgery (DOS), and (c) a yes/no for completion of the physician order entry. For the nasal decolonization intervention, the report included (a) MRN, (b) DOS, (c) documentation in the medicine administration record (MAR) of completion, and (d) and yes/no documentation of intervention completion in the preoperative checklist.

Data Management Plan

The abstracted data from the EHR was used to determine the change project's efficacy is considered nominal and ordinal data. Nominal data included (a) positive for surgical site infection (yes/no), (b) nasal decolonization performed (yes/no), (c) gender, (d) race, (e) age (< 65

years or ≥ 65), and (e) comorbidities. Only patients undergoing a primary total joint replacement were included for the project to prevent any extraneous variables. Collected data was scrubbed to exclude duplicated data, errors, or did not meet the inclusion criteria.

Due to the current low infection rate, a chi-square test measured the intervention's effectiveness. The chi-square was used to determine if there were any statistically significant proportions between variables. The chi-square test calculated the difference between observed and expected frequencies by utilizing a 2x2 contingency table created using the nominal data from above for columns and the pre-intervention and post-intervention groups for rows. Since one of the numbers in the contingency table cells was less than 5, a Fisher's Exact Test was used to determine the significance (Polit & Beck, 2017).

Logistic regression was used to determine the relationships between variables, such as age, race, and comorbidities and a SSI. Logistic regression converts the probability of events into odds. The odds ratio is an estimate that an event will occur (Polit & Beck, 2017).

Project Management Plan and Gantt Chart

During the initiation phase, project requirements, goals, and milestones were developed (Friere et al., 2016). To increase the project's sustainability, authorization was obtained from the administration, stakeholders were identified, and a charter was created. Activities in the planning phase included defining the project's scope, objectives were made, and sequencing activities to meet milestones (Project Management Institute, 2017). The executing phase implemented the changes that have been agreed upon to achieve the project's goals. Monitoring the project's progress included collecting data to determine if performance measures had been met, identifying activities that required revision, and initiating any changes necessary. Closing occurred when the work performed was completed and the objectives had been met. After the

verification of work done has been completed, a meeting was called to close the project formally (Friere et al., 2016). The weekly schedule for a 32-week overview was created in a Gantt chart (Appendix B).

Prior to starting the project, the choice for a nasal antiseptic was decided upon and procured through Materials Management. The nasal antiseptic was placed in the medication dispensing system by Pharmacy. The order for nasal decolonization had already been built in the EHR but had not been released to be used at the practicum site. The inclusion was remedied quickly by working with the EHR Orders Team. A place for documenting the nasal prep was created on the Preoperative Checklist by the EHR's OpTime team. A change was made to have the pre-anesthesia nurses enter the order for the nasal decolonization instead of having the surgeon responsible for placing the order.

Week One of Implementation

During the first week, the DNP project manager educated the pre-anesthesia nurses to place the order during their scheduled pre-anesthesia phone call with all total joint replacement patients. The OCU nurses were educated about the purpose and benefits of the intervention, location of decolonization supplies, completing the decolonization intervention, and documentation on the preoperative checklist. The DNP Project Manager educated the operating room nurses (OR RN) who circulate total joint replacement cases on the intervention's purpose. Educating the OR RN ensured that the intervention had occurred before entering the operating room.

Weeks Two through Ten of Implementation

During these weeks, the nasal decolonization intervention began on all total joint replacement patients who met the inclusion criteria. After admitting the patient to the unit,

verifying that inclusion criteria have been met, the nurse procured and opened the disposable nasal decolonization package and used the applicator to apply the solution to the anterior nares. The nurse then repeated the process on the opposite nares. After completing the intervention, the preoperative nurse documented the intervention was completed in the EHR. During these weeks, the DNP project manager monitored the progress, completed formative evaluation with feedback from participants, and answered any questions. The DNP project manager attended OCU morning huddles to provide reminders about the new intervention. Reports were built in the EHR to ensure that documentation of the order and the intervention were completed.

Final Week Eleven of Implementation

The DNP project manager answered any final questions from staff and leadership. Pre-implementation and post-implementation data were compiled and statistical analysis was completed with a statistician.

Proposed Budget

The DNP project manager designed the project with a fiscally pragmatic approach to reducing SSI (Table 1). The project's focus was not to produce income but to prevent revenue loss due to non-reimbursement. Cost savings occur because universal nasal decolonization does not require preoperative testing, does not require 5-day treatment compliance, and does not lead to resistance, which could make decolonization ineffective (Peng et al., 2018).

The procurement of resources required the assistance of Materials Management. The nasal antiseptic decision was based on evidence regarding the antiseptic's effectiveness, but the choice also depended on the hospital's contractual agreements with the supplier. Once the nasal antiseptic had been procured, it required working with the Director of Pharmacy, Director of

Surgical Services, and the Outpatient Care Unit (OCU) manager to determine where the nasal antiseptic was to be stored so staff can access it when required.

At the beginning of the implementation, OCU nurses requested a letter written in English and Spanish for the patients to explain the purpose of the decolonization. A patient letter was penned and approved. The patient letter was sent to a service to be interpreted into Spanish. There was a charge to have the letter interpreted. This information was then incorporated into the preoperative education curriculum.

Ethical Issues and Considerations

The purpose of the Institutional Review Board (IRB) review is to ensure the protection of human research subjects' rights and welfare. The DNP project was discussed with the Chief Medical Officer, the head of the IRB Committee. The DNP project manager reviewed with CMO that (a) the project is not intended to generate new knowledge or expand a theory,(b) the intervention is evidence-based, (c) that the proposed protocol is similar to those in the literature,(d) does not replicate or extend a previous research study, and (e) does not involve the collection of biospecimens. After the discussion, the DNP project manager was informed that this project does not require IRB review (Appendix D). A proposal for the change project to implement nasal decolonization for patients undergoing primary total joint replacements was submitted to Chamberlain University's IRB pre-determination process, and the project was approved (Appendix E).

Any potentially identifiable data collected during the study were placed in a confidential, separate, locked file, with access only to the DNP project manager. No collected information was shared with the staff. All data was de-identified and reported in aggregate. Data for the project will be stored for seven years then destroyed.

Results

No SSIs were reported on patients who underwent the preoperative nasal decolonization (n=117, 0%). A chi-square test calculated the difference between observed and expected frequencies using the pre-intervention and post-intervention groups. A Fisher's Exact Test determined there was no significant difference between the pre-and post-intervention groups on the number of post-operative infections that occurred (p = 1.000) (Table 2).

The pre-and post-intervention sample included all adult patients undergoing primary total joint replacement. The total number of procedures between the pre-intervention and post-intervention group was similar. Demographic data included the average age that was 67.5 (p=0.19) in the pre-intervention group and 66.3 (p=0.19) in the post-intervention group (Table 3). The average procedure time for the pre-intervention group was 87.1 minutes (p=0.86) and 87.6 minutes (p=0.86) in the post-intervention group (Table 2). Demographic data demonstrated that females comprised the majority of both the pre-intervention 58.6% (p=0.06) and post-intervention group 58.1% (p=0.92). Regarding race, white/Caucasian comprised the majority of the pre-intervention 93.7% (p=0.06) and post-intervention group 90.6% (p=0.06) (Table 3).

The nasal decolonization intervention order was placed on all patients who met the inclusion criteria (n=117, 100%), and the nasal decolonization intervention was completed on all patients (n=117, 100%). Documentation on the Preoperative checklist was completed on 104 patients (n=117, 88.9%).

Logistic regression was performed to determine if the independent variables, like age, gender, smoking status, and comorbidities, could have contributed to an SSI. The logistic regression did not show any statical significance between the variables and SSI (Table 4).

Discussion

All patients who underwent the preoperative nasal decolonization intervention did not acquire an SSI; though the analysis did not show a statistical significance. The results of this project are similar but not identical to the reviewed evidence. In their meta-analysis, Tang et al. (2020) found no statistical significance in SSIs in patients receiving nasal decolonization before orthopedic surgery. Urias et al. (2018), with a much larger patient population, found a statistically significant reduction in SSIs. This intervention has added an additional layer of protection for patients undergoing a primary total joint replacement. Nurses in the Outpatient Care Unit and Operating Room understand how the preoperative nasal decolonization is an essential element to prevent SSIs that can impact the patient's quality of life. Organizational leaders valued how this new intervention ensured a positive patient experience and maintained the organization's reputation in the community.

Strengths of the project include the simplicity of the process and the low cost of implementation. The nasal decolonization intervention was added to the already implemented skin decolonization with CHG wipes. Nursing education for the intervention was built on the nurses' previous knowledge of skin decolonization with CHG wipes. The intervention had minimal impact on nursing care, and the intervention added approximately 3-4 minutes to the admitting nurse's workflow. Changing the workflow process to have the pre-anesthesia nurses enter the preoperative nasal decolonization order in the EHR instead of the surgeons ensured that physician orders had been placed before the patient's admission. The unit cost of the nasal antiseptic is $16.22 and is negligible compared to the cost of one SSI. The use of nursing administered nasal povidone-iodine (a) does not require costly preoperative testing, (b) can be

universally applied, (c) does not lead to resistance, and (d) ensures the correct application of the nasal antiseptic.

A significant limitation of the project is that it was underpowered. This project only focused on primary total joint replacements; conversion and revision total joint replacements were excluded. The nasal decolonization intervention was administered to 117 patients, which may not demonstrate a statistically significant reduction of SSI. A power analysis needs to be performed to determine how many patients are required to determine a statistical significance.

Recommendations

The primary outcome of this project is that preoperative nasal decolonization with povidone-iodine prevents SSIs caused by MRSA/MSSA. Also, nursing's universal application of the nasal antiseptic is less costly with improved compliance when compared to a test-and-treat protocol with mupirocin ointment. The outcomes of this project are similar to other clinical studies and the recommendation that other surgical services could benefit from preoperative nasal decolonization. It is also recommended to expand this decolonization protocol to spinal procedures. Mallet et al. (2018) found that preoperative nasal decolonization reduces SSIs in patients undergoing spinal surgery.

There is an opportunity for further research on nasal decolonization and the reduction of SSIs. Potential areas of research include (a) examination of specific effectiveness of povidone-iodine on MRSA/MSSA, (b) exploration of the need for multiple applications of povidone-iodine nasal antiseptic during hospitalization, and (c) examination of whether nurse-administered nasal decolonization is more effective than patient-administered nursing decolonization.

The number of clinical studies on the effective utilization of povidone-iodine on MRSA/MSSA was few and underpowered. High-powered studies are needed to measure the

effectiveness of povidone-iodine against MRSA/MSSA. Current research states the effect of povidone-iodine against MRSA/MSSA lasts for four hours (Rezapoor et al., 2017). More research is needed to determine how many applications of the povidone-iodine nasal antiseptic are required to maintain MRSA/MSSA suppression during hospitalization. Research is also necessary to determine if patients can perform this intervention as effectively as nurses. More research should be conducted regarding patient satisfaction with the nasal decolonization intervention.

Recommendations for replicating this project include expanding the time frame to 90 days to monitor patients for SSIs to align with the CDC and NHSN definitions of Deep Incisional and Organ/Space infections. Due to the underpowered nature of this project, a power analysis is needed to determine the number of patients to show the statistical significance of the nasal decolonization intervention. The project could be expanded to include patients undergoing total joint revisions or converting from other types of joint surgery to a total joint replacement.

Conclusions and Implications for Nursing Practice

This project was based on using an evidence-based protocol to decrease SSIs, improve health outcomes, reduce costs, and improve the patient experience. In their systematic review, Zhu et al. (2020) preoperative nasal decolonization significantly decreased SSI risk. Urias et al. (2018) utilized povidone-iodine instead of mupirocin ointment for emergency surgeries for lower extremity fractures and found that povidone-iodine was effective in reducing SSIs by MRSA/MSSA. For this project, all patients who underwent preoperative nasal decolonization with povidone-iodine immediately before surgery did not experience a deep/organ space SSI. Based on Franklin's (2020) study, a universal approach with povidone-iodine was utilized

instead of a test-and-treat with mupirocin ointment due to its ease of implementation and improved cost-savings. This project aligns with Franklin's results.

This project implies that adding nasal decolonization to the current skin decolonization with CHG wipes leads to prevention of postoperative SSIs and a trending reduction of SSIs for patients who meet the inclusion criteria. The results of this project align with Urias et al. (2018) however, their study focused on emergency extremity fractures and not elective surgeries. A universal application ensured all patients were provided the same protection against MRSA/MSSA, rather than a test-and-treat protocol. For nursing leadership, the time spent by nurses administering the nasal antiseptic does not add a significant amount of time to the admitting nurses' preoperative workflow.

Plans for Sustainability

Monitoring will continue to ensure that the new nasal decolonization intervention is being performed. Reports have been built in the EHR that will be monitored monthly to track (a) placement of physician orders and (b) adherence to nasal decolonization procedure, and (c) compliance with documentation on the Preoperative Checklist. These reports will run monthly and shared with perioperative leadership and nursing staff during their monthly staff meeting.

The decolonization procedure will be presented to the monthly Surgery/Anesthesia Department meeting to be approved in July 2021. This intervention will be included in the policy regarding the care of preoperative patients. New employee orientation and annual competencies for the OCU will include nasal decolonization, viewing a video on how to perform the decolonization procedure, followed by a return demonstration.

To validate the long-term effect of this intervention at the organization, ongoing sustainability of the intervention over the next year will be supported and implemented to

achieve the required number for an adequate power-analysis to show statistical significance. After one year of data collection, the data on SSIs will be compiled and sent to the statistician for analysis. When completed, this follow-up information will be shared with staff, surgeons, and leadership in a proceeding forum to disseminate the results At that time, all stakeholders will discuss next steps and broadening the scope of the intervention to improve health outcomes related to SSIs in surgical patients.

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Appendices, Tables, and Figures

Appendix A

Article #	Author & Date	Evidence Type	Sample, Sample Size & Setting	Study findings that help answer the EBP question	Limitations	Evidence Level & Quality
1	Ghaddara et al. (2020)	Randomized, nonblinded, placebo-controlled trial	N=22 Control group=11 Intervention group=11 Single medical center with one hospital and one Long-term care facility	The results suggest that single preoperative applications of povidone iodine may be effective for short-term suppression of S aureus during the perioperative period.	Single medical center with mostly adult male population.	LEVEL: I QUALITY: High
2	Maslow et al. (2014)	RCT	N=1679 Mupirocin group=868 Povidone-iodine=811 Patients undergoing total joint replacement or spinal fusion.	The PI nasal swab has an improved side effect profile compared with nasal mupirocin ointment. Although it was expected to be at least comparable with nasal mupirocin ointment regarding the potential for adverse reactions, nasal povidone-iodine demonstrated significantly fewer reported adverse events in several parameters of this study can be considered better-tolerated alternative to nasal mupirocin ointment.	One of the limitations of the study in that a qualitative method for identification of S aureus was used, exposing the study to potential microbiological variations. Another limitation of this study is that the observed efficacy of the various agents was not pursued to determine if decolonization led to a reduction in the rate of SSI.	LEVEL: I QUALITY: High
3	Pelfort et al. (2019)	Retrospective Study Pretest/Post test	N=803 Control group (historical) = 400 Intervention group = 403 Patients undergoing TJR Medium size hospital	There was a reduction in SSI rates after applying a protocol to detect S. aureus nasal carriers before surgery and subsequent preoperative decolonization.	Additional measures were added in addition to the nasal decolonization to reduce the SSI rate. They did not determine the proportion of patients successfully decolonized.	LEVEL: 2 QUALITY: Good
4	Peng et al. (2018)	Prospective cross-sectional study	N=545 Patients undergoing TJR University hospital, China	MRSA incidence in elective orthopedic surgery was lower than reported incidence in other surgeries. The results of our study also demonstrated that less expensive povidone-iodine decolonization protocol significantly reduced the colonization of MSSA/MRSA in nasal carriers.	Potential underestimation of the S. aureus carrier rate since only focused on the anterior nares and. Positive patients were treated with handmade nasal povidone iodine swab.	LEVEL: 2 QUALITY: Good

Article #	Author & Date	Evidence Type	Sample, Sample Size & Setting	Study findings that help answer the EBP question	Limitations	Evidence Level & Quality
5	Reiser & Moskal (2018)	Retrospective study	N=5584 Patients undergoing TJR Single medical center	Utilizing intranasal PI for a global decolonization protocol has the potential to reduce costs, increase patient compliance, and increase patient satisfaction, while eliminating the risk of mupirocin resistance and maintaining otherwise equivalent infection rates as compared to the current standard of screening and treating with intranasal mupirocin ointment. We conclude that intranasal PI antiseptic use is cost-effective.	This study is a retrospective study at a single institution. There was no comparison of the efficacy of the povidone-iodine.	LEVEL: 2 QUALITY: Good
6	Rezapoor et al. (2017)	Randomized, placebo-controlled trial	N=429 10% PI Group=143 5% SNA Group=143 Saline Group=143 Patients undergoing TJR Single medical center	PI solutions contain oxidizing agents and have fast bactericidal effects by inhibiting DNA synthesis and striking amino acids, nucleotides, and fatty acids. A skin & nasal antiseptic PI solution contains excipients that protect the solution again deactivation by nasal secretions and organic polymers and increase mucoadhesion. This solution is more effective than off-the-shelf povidone-iodine swabs. The product is only effective within 4 hours and not 24 hours post-application. Another limitation is that SNA does not provide absolute decolonization, as nearly one-third of S aureus carriers could not be decolonized.	One of the limitations of the study in that a qualitative method for identification of S aureus was used, exposing the study to potential microbiological variations. The observed efficacy of the various agents was not pursued to determine if decolonization led to a reduction in the rate of SSI.	LEVEL: I QUALITY: High
7	Romero-Palacios et al. (2019)	A quasi-experimental quality improvement study	N=10388 Control = 8505 Intervention = 1883 One high volume teaching hospital	There was no significant reduction in SSI in both pre- and post-intervention. The rates of PJI due to S aureus to only 1 case in the intervention period (0.05%) as compared with 20 cases (0.3%) in historical control (OR, 0.15, 95% CI ooo.4-0.94; p=0.39).	Five-year gap between the control and intervention cohort. Quasi-experimental design.	LEVEL: 2 QUALITY: High
8	Sadigursky et al. (2016)	Systematic review w/meta-analysis	N=10,179 Control group=4,788 Intervention group=5,391	This study demonstrated that prophylaxis with ND is a protective factor. This model accounted for a 39% reduction in the incidence of SSI; their rate decreased from 1.79% in the control group to 1.09% in the group in which the intervention was performed.	This meta-analysis was based on secondary data; it does not allow the assessment of all the data necessary for multivariate analysis and is subject to possible biases.	LEVEL: 1 QUALITY: High
9	Tang et al. (2020)	Systematic review w/meta-analysis	N=10,526	The results from 20 studies accounting of 10,526 patients showed that nasal decolonization is associated with significantly decreased risk of overall SSI in patients after surgery.	Small number of studies included in the review. Some studies have high heterogeneity which might result in bias.	LEVEL: 1 QUALITY: Good

Article #	Author & Date	Evidence Type	Sample, Sample Size & Setting	Study findings that help answer the EBP question	Limitations	Evidence Level & Quality
10	Urias et al. (2018)	Retrospective study	N=1892 Control group= 862 Intervention group=884 Single institution. Rural community-based hospital.	With the addition of povidone-iodine nasal decolonization helped decrease SSIs from 1.1% to 0.2%. The decrease in SSI rate among our trauma patients requiring lower extremity fracture repairs can be attributed to the use of povidone-iodine for nasal decolonization.	Generalizability of results may be limited due to retrospective design.	LEVEL: 2 QUALITY: Good
11	Zhu et al. (2020)	Systematic Review with meta-analysis	N=36,041 Control group=9,815 Intervention group=26,226	The systematic review demonstrated that S. aureus screening and decolonization reduced the SSI. There was no difference in SSI caused by other bacteria.	Most studies included in the analyses were retrospective in nature which may not have captured late SSI and peri-joint infections.	LEVEL: 1 QUALITY: Good

Appendix B

Gantt Chart

	NR 702								NR 705								NR 707								NR 709							
Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Meet with preceptor	☒	☒	☒	☒	☐	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☐
Determine nasal antiseptic	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Request order for EHR	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Add nasal decolonization to checklist in EHR	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Educate OCU/OR RNs	☐	☐	☐	☐	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Implement project	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Attend morning huddles in OCU & OR	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Monitor documentation compliance	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Share preliminary data	☐	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Answer any questions to staff, surgeons, and administration	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Data analysis with statistician	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☐
Present data to surgeons, nurses, and administration	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒

Appendix C

09/10/2020

To Whom It May Concern,

David Ault and I have discussed his proposed DNP project focusing on the implementation of an evidence-based practice of preoperative nasal decolonization for total joint patients. Note I am providing full authorization for David Ault to implement his project at Sutter Santa Rosa Regional Hospital. Additionally, David Ault is authorized to access electronic/physical medical records in order to collect primary and secondary data relevant to his DNP project. does not require internal IRB approval prior to project implementation.

Please let me know if you have any questions and contact me at (707) 576-4206.

Sincerely,

Wendy Colgan MSN, RN

Wendy Colgan, MSN RN
Chief Nursing Executive

Appendix D

December 2, 2020

To Whom It May Concern,

I am the Chief Medical Executive at In this capacity I had a discussion with David Ault, DNP student, regarding his planned change project for preoperative nasal decolonization at our institution. During the discussion he informed me that (a) the project is not intended to generate new knowledge or expand a theory; (b) the intervention is evidence-based; (c) the proposed protocol is similar to those in the literature; (d) the project does not replicate or extend a previous research study; and (e) it does not involve the collection of bio-specimens. After the discussion, I believe this project does not require IRB review.

Sincerely,

William Carroll, MD, FACP

Chief Medical Executive

Appendix E

CHAMBERLAIN UNIVERSITY

Chamberlain University
Institutional Review Board (IRB)
3005 Highland Parkway
Downers Grove, IL 60515

Federal Registration: IRB00011037/ IORG0008174
Federal Wide Assurance: FWA00021986

1/15/2021

David Ault

Dear **David Ault**:

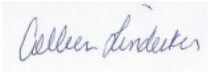
This letter is to inform you that your academic program, under the authority of the Chamberlain University Institutional Review Board (IRB) for the Protection of Human Subjects has, received and screened your request for review of your proposed study or project titled **"For adult patients undergoing elective total joint replacements at Sutter Santa Rosa Regional Hospital, how will the implementation of povidone-iodine to decolonize MRSA/MSSA, compared to current practice, impact postoperative surgical site infection rates in 8 to 10 weeks?"**

Through this process, your program has determined that your proposed study or project does not meet the criteria for human subjects' research, and therefore, does not require review or oversight from the IRB.

You are expected, however, to implement your study or project in a manner congruent with accepted professional standards and ethical guidelines as described in the Belmont Report (http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html).

The IRB wishes you success with your proposed study or project. If you have any questions, do not hesitate to the IRB.

Sincerely,



Colleen Lindecker, Ph.D.
IRB Administrator

Appendix F

Plan for Educational Offering

OBJECTIVES	CONTENT (Topics)	TEACHING METHODS	TIMEFRAME	EVALUATION METHOD
The learner will be able to describe the purpose of the EBP project.	Current practice uses CHG wipes Purpose for nasal decolonization: The majority of SSI in TJRs are caused by MSSA/MRSA. Povidone-iodine has been proven to suppress MSSA/MRSA.	PowerPoint with lecture PowerPoint with lecture	2 minutes 3 minutes	List current way to reduce MRSA/MSSA. Have learner explain the purpose of nasal decolonization.
The learner will be able to describe the details of the EBP intervention	Identify patients who will receive the EBP intervention List what supplies are required	PowerPoint with lecture Handout	3 minutes	List which patients will receive nasal decolonization before surgery.
Demonstrate how to perform nasal decolonization	Locate nasal antiseptic in unit Scan armband Swab both nares with antiseptic and repeat. Document on preoperative checklist	Demonstration & Return Demonstration	5 minutes	Learner able to return demonstrate nasal decolonization intervention & documentation.

Table 1

Budget

EXPENSES		**REVENUE**	
Direct		Billing	
Salary and benefits	0	Grants	0
Supplies Nasal antiseptic $16.22 x 1118 for project	1914	Institutional funding	1914
Services Letter interpreted in Spanish Statistician	100 700	Institutional funding DNP student funding	100 700
Indirect Education (30 minutes) 20 Pre-op nurses at $50/hr. 20 Surgical nurses at $50/hr.	500 500	Institutional funding	1000
Total Expenses	3714	**Total Revenue**	3714

Table 2

Postoperative Infection by Intervention Group

Group		Infection Status	
		No	Yes
Intervention	Pre (n=1202)	1196 (99.5%)	6 (0.50%)
	Post (n=117)	117 (100%)	0 (0.00%)

Note. A Fisher's Exact Test determined that there was no significant difference between the pre and post intervention groups on the number of post-operative infections that occurred ($p = 1.000$).

Table 3

Descriptive Statistics for Patient Age, Procedure Duration, Gender, Race, and Ethnicity

Variable	Intervention Period		p-value
	Pre	Post	
	(N=1202)	(N=117)	
Age Mean (std)	67.5 (9.1)	66.3 (9.6)	0.19
Length of Stay Mean (std)	1.5 (0.7)	1.6 (1.1)	0.19
Procedure Duration Mean (std)	87.1 (27.8)	87.6 (30.2)	0.86
Gender			0.92
Female	704 (58.6%)	68 (58.1%)	
Race			0.06
White	1126 (93.7%)	106 (90.6%)	
African American	12 (1.0%)	0 (0%)	
Asian	18 (1.5%)	1 (0.8%)	
Other	46 (3.8%)	10 (8.6%)	
Ethnicity			0.01
Non-Hispanic	1076 (89.5%)	97 (82.9%)	
Hispanic	77 (6.4%)	16 (13.7%)	
Unknown	49 (4.1%)	4 (3.4%)	

Table 4

Odds ratio and 95% confidence interval (95%CI) of fully adjusted logistic regression model

Variable	Odds ratio (OR) and 95% CI		p-value
	OR	95% CI	
Age	0.97	0.91-1.04	0.47
LOS	1.46	0.67-3.19	0.35
Procedure Duration	0.97	0.94-1.01	0.21
Gender			
Female vs. Male	1.06	0.29-3.83	0.92
Race			
Others vs. White	1.67	0.20-13.92	0.64
Ethnicity			
Others vs. Non-Hispanic	0.83	0.10-6.76	0.86
Smoking Status			
Others vs. Never	0.94	0.28-3.15	0.92
Discharge Place			
Others vs. Home	0.47	0.13-1.72	0.25
Hypertension Yes vs. No	0.73	0.21-2.58	0.63
Diabetes Yes vs. No	1.17	0.13-10.11	0.89