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STRATEGIES FOR PREVENTING SURGICAL SITE INFECTIONS

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Strategies for Preventing Surgical Site Infections Benchmark Study

A Paper Submitted in Partial Fulfillment of the Requirements

For NURS 5382: Capstone

In the School of Nursing

The University of Texas at Tyler

by

Dorathy Anderson

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every step of the way. Thank you for your love, unwavering support, and belief in me. I couldn't have done it without you all.

Executive Summary

Post-surgical site infection has continued to remain a significant public health concern. Amid the prominent hospital-acquired infection, surgical site infections contributed to a considerable rate of death, severe morbidity, increased cost of therapy, disability, prolonged hospital stay, higher insurance payment, complications in patient healing, an increase in healthcare cost as well as treatment expenses (Allaf & Navyashree, 2022). Although seemingly relatively low in occurrence, about 10% of the infections are related to healthcare-associated infections. (Allaf & Navyashree, 2022). Knee reconstructive procedures are most common among older patients, who have a higher risk of developing complications.

The current practice of scrubbing the morning prior to surgery seems not to be the best practice. In order to prevent a post-surgical site infection, training staff on the prevention of surgical site infection involves educating them on the best practices for infection control, including proper hand hygiene, surgical site preparation, and the use of sterile techniques. Staff members must also be trained in the proper use of personal protective equipment such as gloves, masks, and gowns, as well as the proper disposal of contaminated materials. Effective training programs should be comprehensive and ongoing, covering all aspects of infection prevention and control. Training should be provided to all staff members involved in the surgical process, including surgeons, nurses, anesthesiologists, and other support staff. Therefore, it is recommended that a pre-surgical wash be performed the night before the procedure and the day of the procedure could lower the risk of surgical site infection as well as other surgical site

infection prevention which could include antimicrobial prophylaxis like cefotaxime, ceftriaxone, and amikacin (Allaf & Navyashree, 2022).

1. Rationale for the Project

Surgical site infection prevention is crucial because proper care can prevent these infections. Surgical patients are typically at the highest risk of surgical site infection and other medical issues. A surgical site infection after a procedure can affect not only the healing process but could potentially cause another health-related issue or possibly be fatal. These patients that develop surgical site infections are twice as at risk of death and are five times more likely to return to a medical care facility. Since most sources of bacteria that cause surgical site infection arise from an external source, surgical antimicrobial prevention will decrease a load of intraoperative contamination, which is the most crucial part of preventing post-surgical site infection. If the evidence-based change is not implemented, approximately 500,000 surgical site infections will continue to occur annually in the United States, at an estimated cost of over \$7 billion to hospitals in treating them. Unfortunately, its prevalence is going up yearly, and about 60% of them will end up in the intensive care unit, some will end up dead, and many more will continue to get readmitted to the hospital (Berrios et al., 2017).

Surgical site infection occurs in up to 30% of surgeries. It accounts for up to 14% of hospital-acquired infections, representing a significant burden in terms of patient morbidity and mortality and costs to healthcare systems worldwide (Lin et al., 2018). Lin et al. (2018) also stated that surgical site infections cost an estimated \$3.5-10 billion annually in the United States, AU\$2,800 per patient with a total of AU\$53 million per year in Australia, and an additional €32,000 per patient in some European countries, more importantly, patients may be unable to return to work and earn an income, and experience reduced quality of life

as a result of having a surgical site infection. As a result of the increase in the number of surgical site procedures that takes place yearly, surgical site infection rates account from 1% to 5% in the month following the procedure; the costs of these surgical site infections can be considered in financial and social terms (Liu et al., 2018).

2 . Literature Synthesis.

The reviews of literature examined and observed the benefits of preoperative surgical site infection prevention implementation that benefits the patients, especially for recovery length, finances, and overall health. Topical antiseptics seemed to be the most convenient form of pre-op care. While antibiotics were also an option, there were more risks, such as eventual resistance (Navirian et al., 2021). Alcohol-based antiseptic agents, as well as proper nursing care performed by adequately trained nurses, are all useful in surgical site infection prevention (Lin et al., 2018).

All through the literature, there is some proof that antimicrobial scrub prior to surgery has a significant effect on preventing infection and has been effective against microorganisms that are most likely to contaminate surgical sites. The literature review has extreme evidence that gives conviction and purpose to initiate this antimicrobial scrub the night before and on the day of surgery. There was a randomized controlled trial (Level 2), an observational study (Level 3), a retrospective cohort study (Level 3), preclinical exploratory analysis (Level 3), two systematic reviews (Level 1), a qualitative study, and a campaign effectiveness study. In the study by Allaf, et al., (2022).

Antimicrobial drapes have a dual action, acting as a physical and antimicrobial barrier to counter bacterial contamination of the surgical wound. While Hesselvig et al., (2020). The study showed that surgical antimicrobial prophylaxis is essential for the prevention

of prosthetic joint infections and must be effective against the microorganisms most likely to contaminate the surgical site.

An article found that the use of chlorhexidine gluconate for preoperative skin preparation significantly reduced the incidence of SSIs. Boyce MD, (2019). found that the use of a combination of chlorhexidine and alcohol for preoperative skin preparation was more effective in reducing SSIs than either agent alone. However, the evidence regarding the use of these agents for bathing patients the night before and the day of their surgery is limited. According to Rivera et., al (2021). Surgical antimicrobial prophylaxis is important for the prevention of joint infections and must be effective against the microorganisms most likely to contaminate the surgical site, especially in patients undergoing total knee (TKA) and hip (THA) arthroplasty.

3. Project Stakeholders

I will not fail to include all those who with interests in this project, their participation in this project will help in the project's growth, planning, implementation, and evaluation of the project. The project stakeholders for this benchmark study will include an infection the DNO, the CNO, and the infection control nurse/specialist. She will help implement the surgical site infection prevention, they are considered as the administrators, then the stakeholders for the actual evidence-based structured training will include the unit supervisor, surgical patients, the quality control specialist, the medical surgical unit staff, health professionals, the Pre-op unit, OR unit, the Recovery unit, PACU nurses, physicians, practitioner, scrub nurse. In order to prevent confusion and misunderstanding, each department head will be involved in the development of this

plan in order to ensure that person does what they are supposed to do to make this plan successful.

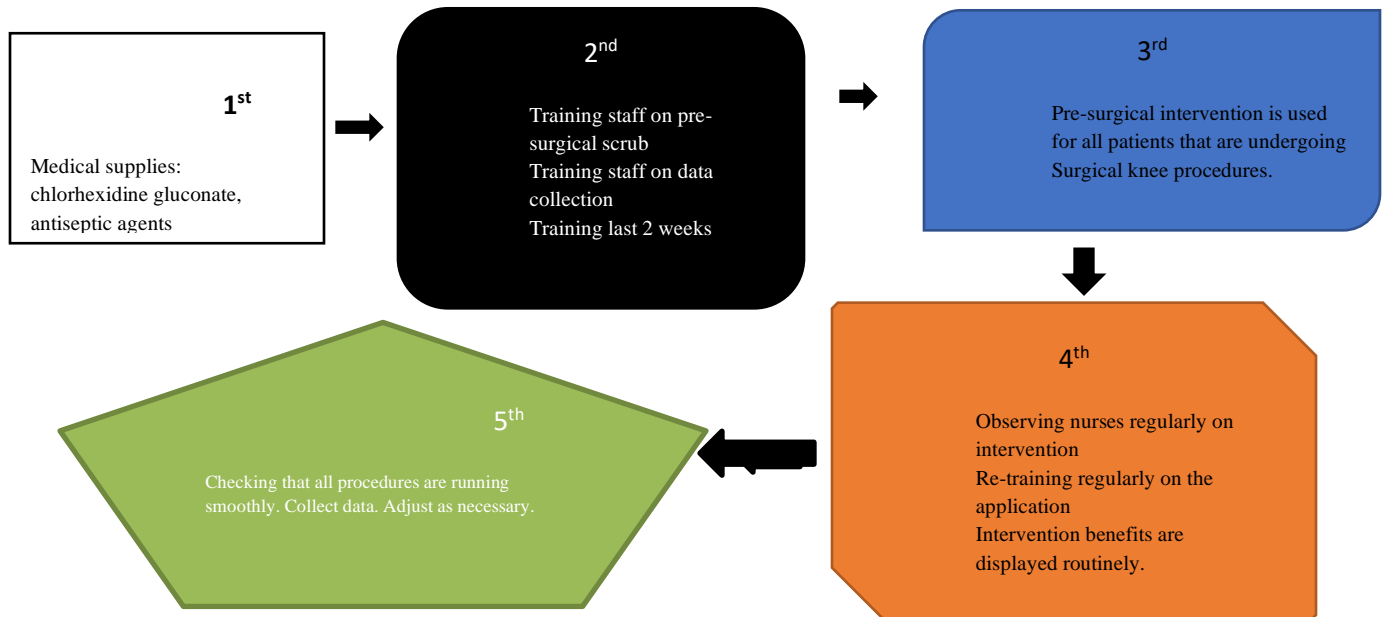
4. Implementation Plan

- First step: Resources (two weeks)
 - Medical supplies: chlorhexidine gluconate and antiseptic agents are gathered.
- Second step: Training (two weeks)
 - Training staff on pre-surgical scrub
 - Training staff on data collection
- Third step: Go Live (two weeks)
 - Pre-surgical intervention is used for all patients that are undergoing Surgical knee procedures.
- Fourth step: Maintenance (four weeks)
 - Observing nurses regularly on intervention
 - Re-training regularly on the application
 - Intervention benefits are displayed routinely.
- Fifth step: Checking in period (four weeks)
 - Checking that the project is running effectively.
 - Collect data. Adjust as necessary.

5. Timetable/Flowchart

PICO question was initiated during the second semester of the program. The PICO question was related to surgical site infection control which is bathing patients with antimicrobials the night before their surgical procedure and the morning of the procedure. The next semester, I thought of changing the PICO. but decided not to since I believed that it would make a difference. This was

later changed to a benchmark study that was supposed to be presented to Dallas Regional in April, but unfortunately, it was not possible due to covid restrictions.



6. Data Collection Methods

Data collection for this benchmark study was through a manual review of medical records/ electronic surveillance using data from laboratory results, and clinical documentation, as well as patient surveys were collected through questionnaires and online surveys. An evaluation will be conducted every four weeks as well as a post-test. First, nurses will be evaluated on their memory and adherence to the plan. This data will be gathered and compared to pre-implementation data. In this way, each department will communicate the progress to the change leaders. Secondly, the infection control team will have to meet every three months to evaluate if there is any risk associated with surgical site infection prevention. The risk data will include any skin reaction to the scrub and not

keeping inaccurate counts of the procedures performed. Finally, the administrative cost committee will meet annually to evaluate and analyze the cost estimates. Support from other units will be needed, and any data collected will be used to prove to the stakeholders that the change will benefit them.

7. Cost/Benefit Discussion

Many resources will be needed to accomplish this project and this cost was reviewed and are as follows; The number of supplies of antiseptic agents, chlorhexidine gluconate (CHG) averages \$150.00. Sponges average \$50.00 and gauze will need to be doubled for staff to have as much access to the wash as they need to bathe the patient the night before and the day of the surgical procedure and it averages \$200.00. The huddle coordinator will have to be on the unit for daily huddles and in-services and that might put her in overtime which will average \$40 hourly and will need at least an extra 12 hours per week for 4 weeks at an average of \$17280. An essential resource that must be in place prior to the Initiation of the plan. The other expenditures needed for this change will incorporate three classes: daily in-service training, maintenance, and daily huddles. This will require some snacks to be offered and an average of \$ 250.00. This addition will incur more than 30% of the unit's budget, which presents a risk cost and unexpected expenses. However, the goal of implementing surgical site infection prevention will bring a positive review of the unit as well as the hospital.

8. Discussion of Results

Though there is not an official evaluation of this benchmark study at this time. However, the use of these agents for preoperative skin preparation has been shown to be effective in

reducing the incidence of SSIs. Therefore, it is reasonable to assume that the use of these agents for preoperative skin preparation may also be effective when used for bathing patients the night before and the day of their surgery.

Conclusions/Recommendations

Preoperative skin preparation carried out the night prior to and the day of surgery is crucial in reducing the risk of surgical site infections. The use of antimicrobial or antiseptic agents for preoperative skin preparation has been shown to be effective in reducing the incidence of surgical site infections. It is reasonable to assume that this strategy may also be effective in reducing the risk of surgical site infection. While preventing surgical site infections is a general hindrance to patients and health facilities, their development lengthens recovery time and can even complicate the integrity of the surgery. Knee surgeries being prevalent among older patients makes their prevention even more of a priority primarily due to the higher risk factors that exist with their health and recovery. An excellent pre-operative project plan to prevent Surgical site infections will be a great way to avoid further issues and allow the patient and health professionals to focus on other factors, such as getting home.

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Appendix A

Synthesis Table

PICOT Question: In patients that had reconstructive knee surgery, (P) how does bathing with antimicrobial or antiseptic agents the night prior to their surgery, (I) compared to a patient who did not want a bath with antimicrobial or antiseptic, (C) reduce the incidence of surgical site infection, (O) within 3 months of surgery (T).

Evidence Synthesis Table

Studies	Design	Sample	Intervention	Outcome
A	A Retrospective Observational Study	N=180	OS, RSSI	BWA-TKS-SP (RSSI incidence when antimicrobial prophylaxis (was used
B	A Meta-analysis of existing literature	N=170	RSSI	BWA-TKS-SP (the overall rate of RSSI was 6.6%)
C	A prospective, randomized, double-blind clinical trial.	N=109	SP, BWA, RSSI, TKS	BWA-KS-OS- (with 4% chlorhexidine gluconate was the most effective and least irritating for skin antiseptis)
D	A retrospective cohort Study	N=1052	SP, TKS, DNB, SSI	SP-DNB (had an increased risk of SSI)
E	A randomized controlled trial	N=1187	SP, RSSI, NS	SP-BWA (SSI rate was significantly low)
F	A qualitative study that employed a descriptive exploratory design.	N=22	SP, BWA	SP (adherence to clinical practice guidelines RSSI)

Legend: A = Allaf Navirian H, Navyashree GA. 2022, B = Berros et. al 2017, C = Boyce, John M. 2019, D = Chung, HK., Wen, SH., *et al.* 2021, E = Hesselvig, et. al.,2020, F = Lin, et.al.,2018. SP= surgical patients, BWA= bath with antimicrobial, RSSI= reduce surgical site

infection, NC = no change, NA = not assessed, NRP = no results provided, TKS= Total knee surgery, OS- other types of surgery, LR= length of recovery, DNB=did not bath with antimicrobial, SSI=surgical site infection

Outcomes Table: Effect of bathing with antimicrobial the night prior and the day of surgery to reduce SSI

	A◆	B	C◆	D◆	E	F
TKS	↓*	↓*	↓*	↓*	↓*	NE
BWA	↓*	↓*	↓*	↓*	↓*	NE
RSSI	↓*	↓*	↓*	↓*	↓*	NE
SP	↓*	↓*	↓*	↓*	↓*	↓

Legend: A = Allaf Navirian H, Navyashree GA. 2022, B = Berros et. al 2017, C = Boyce, John M. 2019, D = Chung, HK., Wen, SH., *et al.* 2021, E = Hesselvig, et. al.,2020, F = Lin, et.al.,2018. SP= surgical patients, BWA= bath with antimicrobial, RSSI= reduce surgical site infection, NC = no change, NA = not assessed, NRP = no results provided, NS= knee surgery, OS- other types of surgery, LR= length of recovery, DNB=did not bath with antimicrobial, SSI=surgical site infection.

* = statistically significant findings

◆ = higher level evidence

Appendix B

Evaluation Tool

1. The educational resources provided for training were sufficient.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. The objectives of the training provided were clear and concise.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. The content provided was organized, structured, and understandable.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. The training experience will be very useful in my career.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. The roles and responsibilities of the trainer and the trainee were made very clear.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. The time provided to complete the training was sufficient.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. The trainer was well-prepared and knowledgeable.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. I felt comfortable asking questions.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Training objectives were met.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Overall, the training was exemplary.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree.
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