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Effects of preoperative Chlorhexidine Gluconate (CHG) cloths educational intervention for preoperative staff on CHG knowledge and surgical site infection rates: a quality improvement initiative.

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Effects of Preoperative Chlorhexidine Gluconate (CHG) Cloths Educational Intervention for Preoperative Staff on CHG Knowledge and Surgical Site Infection Rates: A Quality Improvement Initiative

by

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Dedication Page

This project is dedicated to my son, Emmett for being my biggest supporter and best friend!

Acknowledgement Page

I would like to thank my family for pushing me through any bumpy road that has led to this beautiful destination of obtaining my Doctor of Nursing Practice. They reminded me to stay focused and achieve my dreams. I have so much appreciation for my father Keith Torstrick who has stood by my side cheering me on every step of the way and making sure I keep my faith every day. I am thankful for Steven Leffler, who lets me know that quitting is never an option and that good things are achieved through hard work. I will never be able to say enough about all the support that I have been given from all my family and friends! They all made sure that Emmett was taken care of so that I could work and focus on school! I will never be able to thank them all for their love, kindness, and patience.

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Table of Contents

Abstract

Background: Surgical site infections (SSIs) are the most common cause of a surgical complication and account for 38% of all hospital acquired infections (HAI). The cost of caring for SSIs in the United States can range from $3.5-$10 billion annually.

Purpose: The purpose of this DNP Quality Improvement (QI) initiative was to improve preoperative staff's knowledge and application of the Food and Drug Administration (FDA) approved 3-minute application scrub time for the 2% CHG cloths and reduce SSIs for an acute care hospital located in Louisville, Kentucky.

Methods: Quality improvement was initiated using the Plan, Do, Study, Act (PDSA) model to provide preoperational 2% CHG cloth education to preoperative staff. Participants included 11 varying preoperative staff members made up of nurses and nursing assistants.

Intervention: The intervention was an education program on 2% CHG cloths.

Measures and Data Analysis: A 6-item 2% CHG cloth application knowledge questionnaire was used to evaluate participants' knowledge pre-and post-intervention. Paired t-tests were applied to analyze the differences between the total pre-test and post-test mean scores. Rates of SSIs before and after the intervention were compared using percentage change.

Results: Using paired t-test, results showed that participants (n=11) had a significantly lower pre-test mean score (4.45± 0.82) of 2% CHG cloth knowledge than post-test mean score (5.45± 0.52) ($t=4.28$, $p<0.001$).

Conclusion: This 2% CHG cloth education initiative helped to increase preoperative staff knowledge and led to a decrease in the organization's SSIs.

Key Words: Preoperative, chlorhexidine gluconate, CHG, cloth, wipes, application time, antisepsis, skin prep, surgery, surgical site infection, SSI prevention

Effects of Preoperative Chlorhexidine Gluconate (CHG) Cloths Educational Intervention for Preoperative Staff on CHG Knowledge and Surgical Site Infection Rates: A Quality Improvement Initiative

Introduction

Problem Statement

Surgical site infections (SSIs) are the invasions of bacteria in the incisional area causing damage to the body tissues where surgery took place and usually happen within 30 days after surgery (Anderson et al., 2022; National Healthcare Safety Network, 2022). SSIs account for 38% of hospital acquired infections and are estimated to develop in 2-5% of the more than 30 million patients (1 in 24 patients) who undergo surgery in the United States (Anderson et al., 2022).

Significance of the Problem

SSIs are one of the most common causes of surgical complications leading to extended hospital length of stay for 7-11 days, 2-11 times higher risk of morbidity and mortality, and additional healthcare expenses from $400 to $30,000 per case or collectively cost the healthcare system $3.5-$10 billion annually depending on the SSIs depth (Anderson et al., 2014; Franker et al., 2021; Noorani et al., 2010; Park et al., 2017; Privitera et al., 2017; Urban, 2006).

The consequences of SSIs can be serious and life threatening and prevention is the best preventative measure (Carvajal et al., 2018). Kapadia et al. (2016) found the surgical population's age to be rapidly increasing, and the need to reduce the native skin flora via preoperative skin antisepsis is recommended to reduce the risk of any SSIs. Chlorhexidine gluconate (CHG) exhibits a prolonged antiseptic activity, preferred in surgery where timing is vital (Privitera et al., 2017).

Team Kentucky (2022), a long-term partner of the healthcare acquired infection/antimicrobial resistant (HAI/AR) Prevention Program, Kentucky Hospital Association is working on addressing issues of infection prevention and control in acute care within critical access hospitals to provide education to infection preventionists in Kentucky. With the surgical services team operating on tight timelines, patient safety remains a priority throughout their entire surgery experience. Team Kentucky (2022) presented that The Louisville-Metropolitan Antimicrobial Resistance/Antibiotic Stewardship Collaborative team has a goal of reinforcing inter-facility communication and improving uniformity of response to antimicrobial resistance risks. Improving communication and education helps to reduce long term SSIs rate in the acute care hospital.

Literature Review

A literature search was performed using four of the University of Louisville's Kornhauser library's top health databases (PubMed, CINAHL, Medline via Ovid, and Embase). A Boolean search consisted of the string: (Preoperative OR before surgery) AND (Chlorhexidine Gluconate OR Cleansing OR Skin antisepsis) AND (Education OR Infection Prevention). Preoperative, chlorhexidine gluconate, antisepsis, and surgery were keywords that facilitated the narrowing of articles.

A database search with PubMed produced 896 article CINHAL located 82, Ovid located 54, and Embase located 156. A total of 194 duplicated articles were removed. Publications were filtered for the following: 2016 to present, adults 18+ years, English language, United States of America, randomized control trial, comparative study, systematic review, in press, meta-analysis, controlled clinical trial, and keywords such as chlorohexidine gluconate. Based on these criteria,

968 articles were reviewed and filtered for eligibility. The final publications included in this review were 26 (Appendix A).

Problem

CHG is one of the most utilized skin antiseptics prior to surgery due to its prolonged antiseptic activity (Carvajal et al., 2018; Park et al., 2017; Privitera et al., 2017; Stone et al., 2020). CHG is a broad-spectrum biocide that can destroy both gram-positive and gram-negative bacteria that may be found on the skin's native flora (Franker et al., 2021; Kapadia et al., 2016; Noorani et al., 2010). The clinical preparation of showering or bathing before surgery has been demonstrated to effectively ensure bacteria is reduced on the skin (WHO, 2018). The American College of Surgeons and Surgical Infections Society found that cleansing with 4% CHG significantly reduces bacterial concentration on the skin surface however, a recommendation could not be made for 2% CHG cloths due to the lack of high-quality studies (Ban et al., 2017). More recently, the Food and Drug Administration (FDA) has approved the preoperative 3-minute scrub time for the 2% CHG cloths after reviewing pivotal trials that led to a decrease in bacterial skin colonization (2018).

Literature reveals an inconsistency with patient home adherence and home hygiene practices. Edmiston et al. (2016) found that several trials with inconsistent patient adherence led to weak evidence. Similarly, the World Health Organization [WHO] (2018) concluded that they were unable to make any formal recommendations on the use of CHG by patients at home prior to surgery as some participants did not adhere with home instructions for CHG use.

CHG has demonstrated superiority compared to other antiseptics to prevent SSIs. For example, A meta-analysis of 19 studies were in favor of chlorhexidine over iodophor for both SSIs occurrence and bacterial skin colonization (risk ratio [RR], 0.70; 95% confidence interval

[CI], 0.52-0.92) and bacterial skin colonization (RR 0.45; 95% CI, 0.36-0.55) (Privitera et al., 2017).

Darouiche et al. (2010) utilized a fisher's exact test to calculate the relative risk of infection and 95% CIs among 849 adults undergoing surgery in six hospitals (409 in the chlorhexidine group and 440 in the iodine group) and a Breslow–Day test for homogeneity across the participating hospitals to find that chlorhexidine is more significant than iodine at protecting against both superficial SSIs (4.2% vs. 8.6%, p=0.008) and deep SSIs (1% vs. 3%, p=0.05). John Hopkins Medicine (2021a) supports cleansing with CHG as most effective solution to reduce infections when the risk is high.

Intervention

Berríos-Torres et al. (2017) patients benefit from a full body shower or bath with soap that is either antimicrobial, non-antimicrobial, or an antiseptic formulation. To reduce bacteria on the skin, it is good clinical practice for a person to shower or bathe prior to surgery (WHO, 2018). Additionally, Ban et al. (2017) found that cleansing with chlorhexidine significantly reduces bacterial concentration on the skin surface. However, Harris et al. (2020) found that patients rarely look over the material given to them before and after surgery.

Home CHG bathing is an important part of a surgical preparation bundle, but there could be a bias in the different application techniques, rituals, and linens patients have available at home. The Centers for Disease Control and Prevention (2020) stresses the importance of healthcare workers, patients, and their families being able to work together to prevent SSIs. Educating preoperative staff on the importance of the FDA approved 3-minute 2% CHG cloth cleanse in the preoperative unit could combat a potential break in patient compliance.

Summary/Justification

Educating preoperative staff on the FDA recommended 3-minute CHG scrub will help bridge a gap in patient understanding and the healthcare workers attempt to decrease SSIs. Park et al. (2017) found that CHG applications were performed inconsistently. Specifically, CHG scrub time was shortened by patting the skin dry rather than leaving the skin to dry per protocol to allow maximal bactericidal effects (Park et al., 2017). Studies found CHG to be superior to other soaps and antiseptics in reducing bacteria on the skin (Carvajal et al., 2018; Noorani et al., 2010; Privitera et al., 2017; Rhee et al., 2018). A meta-analysis of available literature (Privitera et al., 2017) revealed that there is inconsistent staff technique and applications which can contribute to increased number of SSIs. Adhering to a 3-minute scrub time recommended by the FDA is recommended as a consistent teaching that provides evidence on best practice to reduce SSIs.

Rationale

Needs Assessment

The organization has a care bundle in place consisting of 4% CHG bath night before surgery, 4% CHG bath morning of surgery, and patient surgical site wiped with 2% CHG cloths in the preoperative unit the day of surgery in place to prevent SSIs. Yet, a personal meeting (September 2021) with the preoperative manager at the organization concluded that CHG applications would benefit from improvement due to inconsistency of use among staff members.

The National Healthcare Safety Network (2022) provides a standardized infection ratio (SIR) to measure different HAI categories in hospitals. SIR compares actual numbers to predicted numbers of HAIs. Any measured HAI category with a score less than one indicates that fewer HAIs were observed than predicted, but any number greater than one indicates that more HAIs were observed than predicted (National Healthcare Safety Network, 2022). The NHSN

score for the organization in 2022 was predicted to be 1.56. However, the actual score was summarized to be 2.29. The organization's 2022 SSIs reduction plan highlights preoperative skincare. While it is beneficial that the organization's surgical patients are receiving written instructions prior to surgery about home CHG bathing, inconsistencies can occur with tasks performed by patients outside of the hospital where technique cannot be verified. The controlled environment of the organization's preoperative unit allowed for the 2% CHG cloth portion of the bundle to be the focus in adherence to preoperative skincare prior to surgery.

A yearly competency at the organization was held August 28th, 2022. Staff from the preoperative unit went room-to-room learning material on the most up to date information provided for daily tasks that were targeted for their specific role. The 2% CHG cloth training portion educated staff on independent patient cleansing. Staff were informed to hand patients the cloths and ask them to scrub the surgical site for at least 30 seconds. Training for the 2% CHG cloths was noted to be inconsistently handed down amongst staff. Medline Industries is a healthcare company that supplies the cloths to this organization, and after several trials they found the 3-minute time frame to be the most effective and that became FDA approved (Appendix B). A quality improvement initiative was a feasible strategy that would impact the staff's knowledge on the 3-minute recommended timeframe for 2% CHG cloths and help to decrease SSIs.

Conceptual Framework

The quality improvement model is a framework that is not meant to completely change a process, but to fast-track improvement. The model's small Plan-Do-Study-Act (PDSA) cycles helped guide the DNP student throughout the process to ensure there were no missed steps

(Appendix C). The framework was integrated into this project to fast-track improvement for the use of 2% CHG cloths prior to surgery.

The planning portion consisted of identifying the problem at the facility and getting started with an approach to the issue of 2% CHG cloth knowledge and a higher SSIs score than predicted. The "do" portion of the cycle helped implement teachings and gather data that helped achieve a change. Analyzing data and assessing staff knowledge is part of the "study" portion of the PDSA cycle. The "act" portion of the PDSA cycle helped implementation adjustments throughout the process to determine if the intervention was meeting objectives.

Purpose and Aims

The purpose of this DNP Quality Improvement Project was to improve nurse application of FDA approved 3-minute application scrub time for the 2% CHG cloths to reduce SSIs. The specific aims were to improve preoperative staff knowledge of the 3-minute FDA approved application time for 2% CHG cloths and have a 25% reduction in the organization's SSIs.

This project followed the project site's (2023) mission to provide quality health care to all, to meet community needs and honor its tradition of faith. Along with the mission of the organization, the organization's vision is comprehensive and a preferred healthcare organization with setting the standard for quality and caring.

Methods

Design

The DNP Quality Improvement Project was aimed to improve care. The project used a pre-and post-test design. Preoperative staff knowledge and SSI rates were measured. The initiative provided an educational intervention to update staff on the practice guidelines for applying the 2% CHG cloths used in the preoperative area. The organization's preoperative skin

care bundle consists of three parts, and two of those parts are for the patient to perform at home. The part that this initiative controlled was the in-hospital mechanism of scrubbing the surgical site for three minutes with the hospital provided Medline 2% CHG cloths.

Setting

The organization is a 197-bed acute care hospital that resides in an urban city in Kentucky. The intervention took place in the organization's adult preoperative unit that is split between the main hospital's 24-bed unit and a 13-bed day surgery unit. This site serves inpatient, outpatient, and emergent adult surgeries. On any given day, there could be 1 to 20 surgeons and up to 70 surgeries performed.

Sample

The split preoperative unit employs 51 staff members consisting of registered nurses (RN), and patient care associates (PCA). Inclusion criteria was all preoperative RNs and PCAs employed at the organization. The RNs and PCAs pulled from another unit as well as travel RNs were excluded from this project.

Context

The educational intervention on the recommended 3-minute technique of scrubbing the surgical site with 2% CHG clothes in the preoperative unit addressed the root cause of inconsistent 2% CHG cloth application. The opportunity to shadow preoperative nurses for the day prior to the intervention gave insight into strengths, weaknesses, facilitators, opportunities, and barriers to the project's implementation.

Staff is overseen by key stakeholders consisting of a chief nursing officer who oversees projects within the units; a director of surgical services who reports audit data; a pre-operative/post-operative manager who reviews data not meeting targets; two infection prevention

members whose objectives are to prevent HAIs; and a surgical services educator who updates and informs staff on the most up to date processes that will help the team to follow the organization's value of succeeding with integrity. Following the organization's values helped ensure safe and effective care for the patients.

This DNP Quality Improvement Project benefitted from the organization already providing the 2% CHG cloths, staff having CHG skin prep as part of their checklist, and preoperative skin prep being part of the organization's 2022 SSI reduction plan. Facilitators with this project included engaged staff and an SSI audit system already in place at the organization. Opportunities included decreased SSIs, shorter length of hospital stay, less funding needed for healthcare acquired infections related to SSIs, increased staff knowledge, and enhanced patient experience surrounding their surgery.

Barriers included outside factors leading to a patient's SSI, staff turnover, staff pulled from other units, patients with allergy to CHG, education time that is not manageable for staff to complete without accruing overtime, and changes with yearly hospital goals not encompassing implementation of the improvement project. To overcome these barriers, feedback from staff during planned educational meetings was immediately considered and the project was adjusted as needed using the Model of Improvement framework.

To address the inconsistency of accessible information, flyers and pictures offered by the hospital provided CHG cloth company (Appendix D) were evaluated by infection prevention and preoperative educator and placed on the unit to help staff adhere to the initiative and refer to for continued guidance. Visualizations, weekly personal guidance from the DNP student, and reading materials from evidence-based literature strengthened the limitations for multiple staff learning styles on the unit.

Ethical Consideration

This proposal received approval from the organization's manager (Appendix E). It also was approved by the University of Louisville institutional review board (IRB), and the organization's Research Office.

Confidentiality, anonymity, and absences of coercion was maintained. The organization's information technology department helped to ensure Health Insurance Portability and Accountability Act (HIPAA) and individual security were not breeched when providing the surgical site infection rate data. No patient charts needed to be accessed for this intervention.

Intervention Implementation

The DNP project starts with forming a team. The DNP student included the organization's infection prevention team, surgical services educator, the director of surgical services, the preoperative manager, assistant nurse managers (ANM), registered nurses (RN), patient care associates (PCA), and all stakeholders needing to approve of the project. This quality improvement framework helped to guide the approach to ensure the DNP student was not using any extra organization funds, time, or supplies that could cost the stakeholders money. An intervention budget is outlined, and no upfront costs were needed for the intervention, but time was needed to educate staff and that allotted time is outlined (Appendix F). The DNP student paid for time, travel, and educational materials. A project timeline is outlined in a GANTT chart (Appendix G).

The first day of project implementation started with collecting the baseline data before the intervention. The DNP student also met with staff during a monthly huddle to inform the project's objectives and related information, provide time for questions from staff, administer the pre-test questionnaire, email a follow up educational flyer to the preoperative educator to

distribute to staff, and handout and hang the facility approved instructional diagram in common nursing areas above the 2% CHG cloth stock and in meeting rooms. All preoperative RNs and PCAs were informed of this quality improvement project.

The project's specific, measurable, achievable, relevant, time-bound (SMART) objective was to have participants increase knowledge of the FDA approved 3-minute application for 2% CHG cloths after one month of educational intervention as seen in the pre-and post-test analysis. Using the PDSA cycle, the DNP student started by informing the preoperative educator on the intervention and gathering data from them to achieve the objective. The preoperative educator rounds on the unit daily and helped oversee the project when the DNP student was not on site. The DNP student requested expert opinion to ensure face validity of the pre-and post-tests. Questionnaires were matched by ID numbers to ensure same individual has completed both pre-and post-test. The staff placed their completed questionnaires in a stakeholder approved folder. Throughout the intervention, the staff could refer to the visual aids and evidence-based practice references posted around the preoperative unit as needed. The quality improvement initiative lasted four weeks, and consisted of weekly educational check-ins from the DNP student. The DNP student project lead and/or preoperative educator was present to answer questions and provide reminders and assistance throughout the implementation period. Using the Model for Improvement framework was beneficial to ensure success long term. The Model for Improvement and established objectives helped hard-wire information into all stakeholders to ensure patients were provided with the safest environment to have a successful surgery.

At the completion of the 4-week quality improvement initiative a post-test questionnaire was administered. To assess data accuracy, the questionnaires were matched by their ID numbers to ensure same individual has completed both pre-and post-test questionnaires. Evaluation of

SSIs were reviewed with the organization's information technology specialist to review SSI percentage change over the 4- week implementation period.

Measures

CHG Application Knowledge

CHG application knowledge, defined as the state of being aware of how to apply CHG to prevent SSIs, was measured by a six-item questionnaire (Appendix H) developed by the DNP student based on Medline's instruction and the American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines (Ban et al., 2017). Content validity was established through review of the questionnaire with the DNP student's project chair and committee member. The questionnaire included multiple choice items with one correct answer. The correct answer was assigned 1 while the wrong answer was assigned 0. Total scores range from 0-6; the higher the score the more knowledge the participant had on CHG application. The questionnaire was administered at the beginning and end of the 4-week educational intervention.

Surgical Site Infection

SSI is defined as infections in the surgical site up to 30 days after a surgery (Anderson et al., 2022; National Healthcare Safety Network, 2022). Percentage of SSIs after surgery calculated by the number of infections divided by the number of surgeries multiplied by 100. SSI data for the four weeks prior to and four weeks of the intervention implementation was received from the organization's information technology department following all approved procedures to safeguard HIPAA and individual security.

Data Analysis

Pretest and posttest items and total scores on CHG application knowledge were compared using a paired t-test. A p value of < 0.05 determined significance. SSI data at pre-intervention

and post-intervention were compared and analyzed by using the percentage change. A percentage change in the SSI rate was calculated with the formula $\frac{v2-v1}{v1} x\ 100$ for the month prior to the intervention and the month of the intervention. The percentage change helps to quantify the change from one month to the next where value (v)1= the original value/baseline month and value (v)2= the new value/ intervention month.

Results

Between March 2023 and April 2023, the varying staff from the organization's preoperative unit participated in a quality improvement project to determine if a 4-week educational intervention could improve staff knowledge of the FDA approved 3-minute application of 2% CHG cloths and lead to >25% decrease in SSIs for the organization.

There were 11 staff members that participated in the 2% CHG cloth questionnaire. Missing participant data consisted of staff members who did not participate in both questionnaires. The pre-test questionnaire demonstrated a pre-intervention mean score of 4.45 ($SD = 0.82$) which improved to 5.45($SD = 0.52$) post-intervention (p <0.001). This improvement was statistically significant (Table 1). The higher post-test score shows the positive improvement in 2% CHG application knowledge for the staff members.

Table 1

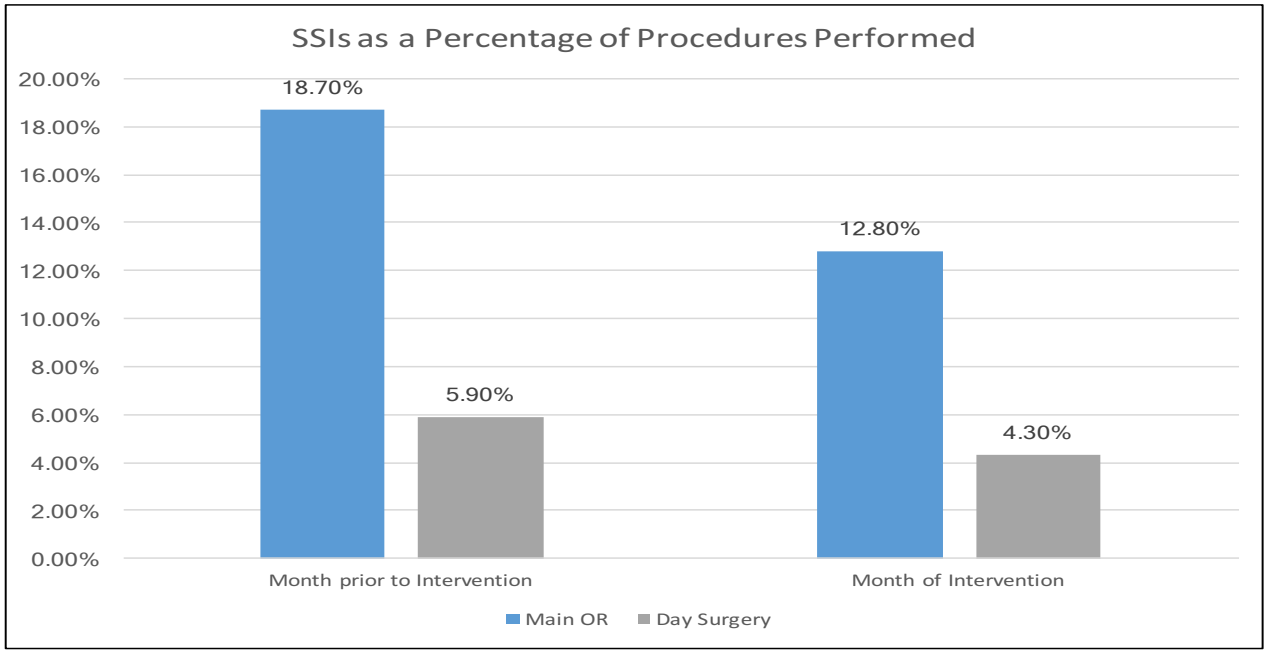
Mean Difference Between Pre-Test and Post-Test 2% CHG *Knowledge Scores Using Paired t-test (n=11)*

2% CHG Knowledge	Mean/SD	Std. Error of Mean	Mean Difference	Paired-t	*p*-value	95%CI
Pretest Score	4.45±0.82	0.25	1	4.28	<0.001	0.47 to 1.52
Posttest Score	5.45±0.52	0.16				

When examining SSI rates for the educational intervention, the organization showed a rate of 18.7% for the main hospital and a rate of 5.9% for the day surgery unit. The SSI rates post education showed that during the 4-week educational intervention the SSIs in the main hospital's preoperative unit was 12.8% and the day surgery unit was 4.3% (Figure 1).

Figure 1

Percentage of SSIs Pre-Education vs. Post-Education



The percentage change for the organization was a 31.6% decrease in rate of SSIs occurrence for the main hospital unit and a 27.1% decrease for the organization's day surgery unit. The anticipative outcome of a 25% improvement in SSIs decreased significantly, yielding an outcome that contributes to the organization's plan for SSI reduction.

Discussion

Summary

SSIs remain a critical problem for surgeries, and without proper Infection Prevention protocols they can lead to significant complications for both the patient and the organization they

arise from. This organization had a higher rate of SSIs prior to intervention. With aims to combat this and aide in the organization's 2022 SSI reduction plan for preoperative skincare, this quality improvement initiative focused on outcomes that improved staff knowledge of the FDA approved 3-minute application for 2% CHG cloths prior to surgery to achieve a decrease of more than 25% for their SSI rate.

Interpretation

After the completion of this QI initiative, it was discovered that having a consistent and up to date knowledge and practice protocol for preoperative skincare showed a significant improvement in SSIs. The organizational SSI rate reduction of over 27% in this project is substantial and met the organization's expectation of 25% SSI rate reduction. This educational intervention can be scalable and sustainable when using Medline's most effective and FDA approved 3-minute time frame of applying 2% CHG cloths in the preoperative area.

It has been increasingly common for preoperative areas to utilize a skincare measure to attempt to reduce SSIs. While past studies have addressed the use of skincare bundles and antisepsis prior to surgery, the delivery of each of the study's interventions have had noteworthy differences. Privitera et al. (2017) found CHG to be statistically significant in reducing SSIs, but mentioned how difficult it was to draw conclusions when several other studies were testing so many methods, formulations, applications, and surgeries. In this intervention, formulations, methods, and applications are cut down by following Medline's FDA approved 2% CHG cloth instructions that are already in use at the organization.

This QI project demonstrated use of the FDA approved 3-minute application education that improved staff knowledge. This repeatable and maintainable education can significantly reduce patient morbidity and mortality, decrease hospital length of stay for patients, and cut

down significantly on healthcare system costs related to a decrease in SSIs. Future studies in other units within the organization and across organizations are necessary to evaluate a causal relationship between the intervention and the outcomes.

Limitations

Several limitations are present in this quality improvement project. The single center site and smaller than anticipated completion of both pre-and posttest questionnaires were specific to the organization's need in one defined hospital unit which may not be applicable to all units within the organization. Participation in the project showed that attrition and retention were a challenge. Consideration for incentives or presentation of the CHG content may be suited best in a mandatory setting to improve attrition in participation.

The DNP student lead not being available to be present on the unit daily made for a more difficult time ensuring all staff had all their questions and concerns answered. An effort to minimize education limitations was achieved with the help from stakeholders. The preoperative educator helped answer staff questions when the DNP student was not directly available in the preoperative unit.

Conclusion

This QI initiative suggests that a more consistent and FDA approved approach to surgical skin preparation positively affects staff knowledge and can decrease SSIs. The improved staff knowledge will help further training remain consistent and aide in staff adherence to skin preparation administration. Additionally, reduced SSIs have contributed to the organization's 2022 SSI reduction plan. This project can be scalable and sustainable for the organization.

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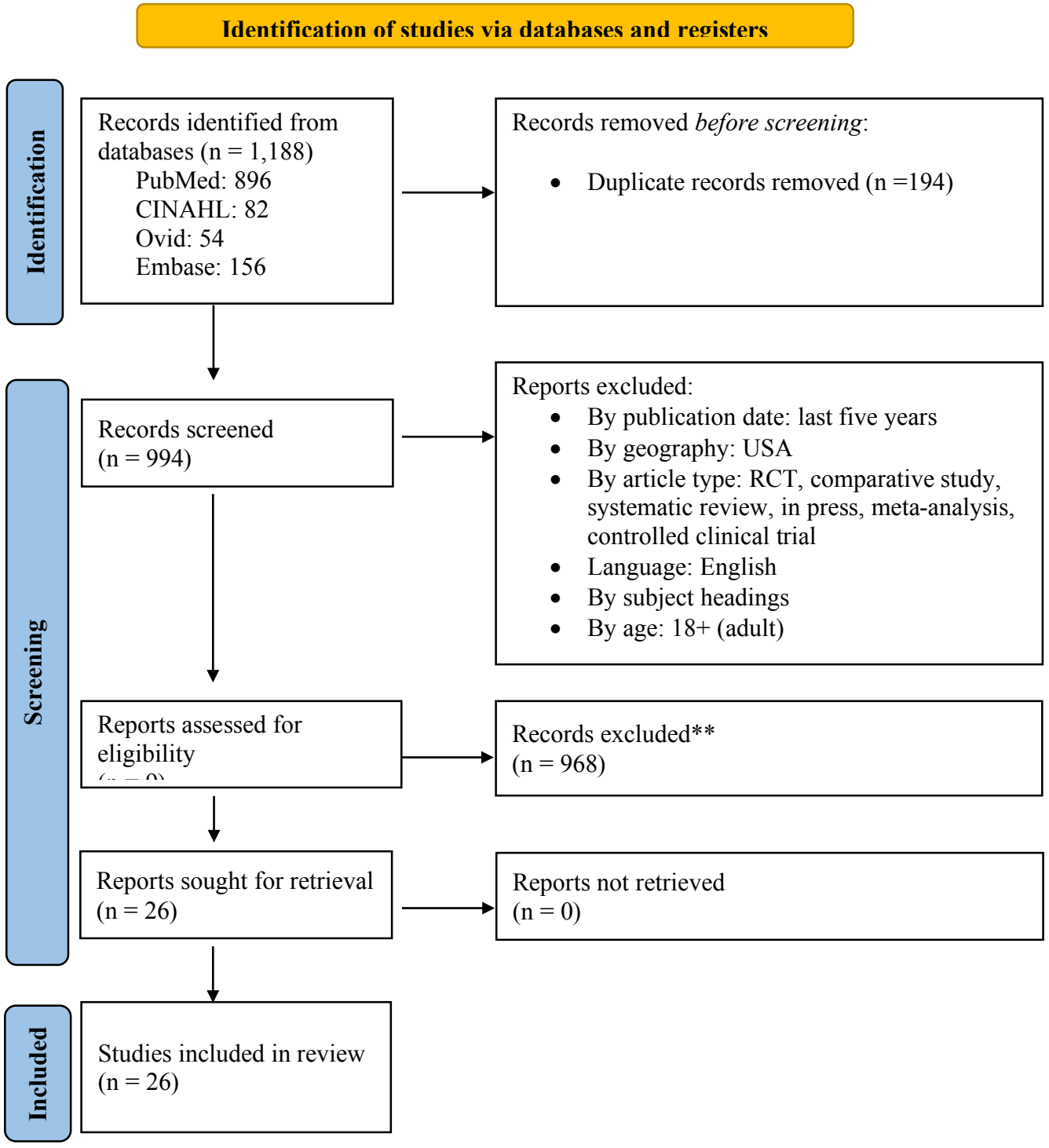
Appendix A

PRISMA

PRISMA 2020 flow diagram searches of databases only



Appendix B

FDA Approval for 3-Minute Application Time

Medline Industries, LP
Three Lakes Drive, Northfield, IL 60093

October 12, 2022

To Whom It May Concern,

This letter is to clarify the testing conducted on the ReadyPrep CHG® (Chlorhexidine Gluconate 2%) Cloths (MSC096CHG and MSC098CHG) to determine the three minute application time.

Pilot trial tests were conducted to measure efficacy with various application times, and three minutes was found to be most effective. A three minute application time was then used for pivotal safety and efficacy studies which were submitted to the FDA to support the product approval.

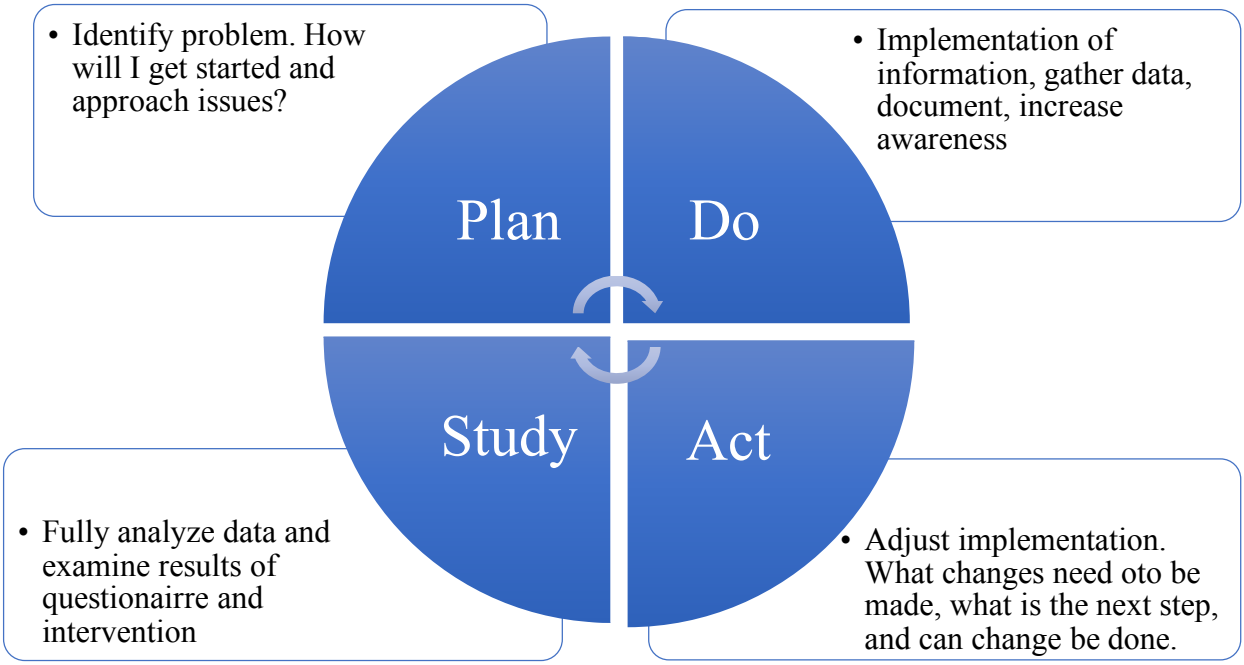
Should you have any additional questions, please contact your Medline representative, our Quality Assurance Department at 1 (800) 950-0128, or myself directly at the contact information below.

Sincerely,

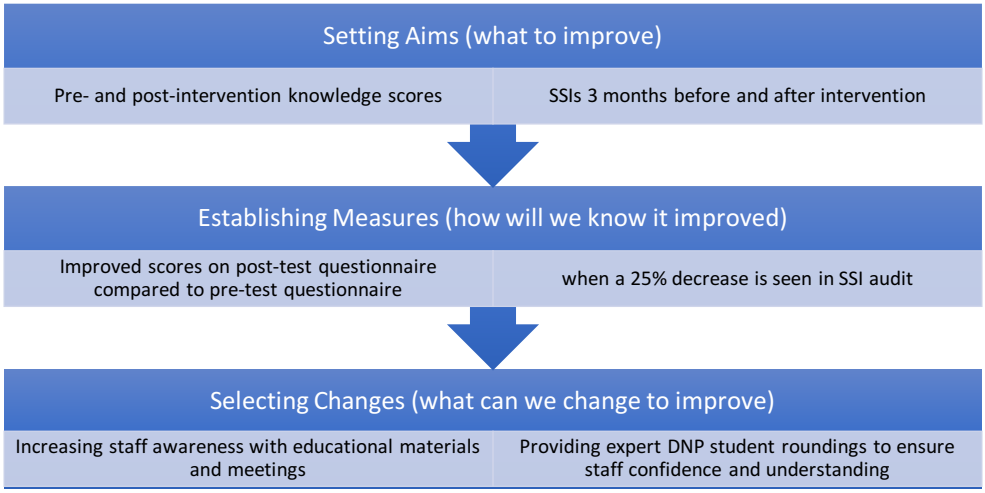
Gia Nardini
Associate Quality Engineer
GNardini@medline.com

Appendix C

IHI Quality Improvement Model: Plan, Do, Study, Act (PDSA)



Note. This figure was modeled after Dr. W. Edward Deming's PDSA cycle pictured in (Institute for Healthcare Improvement, 2022).



Appendix D

Organization Approved Cloths with Manufacturer's Instructions

MEDLINE

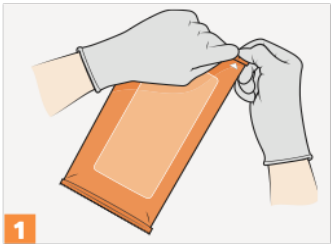
CHG

HOW TO USE:

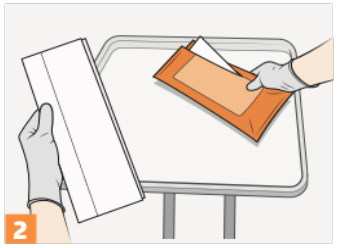
READYPREP™ CHG
PRE-SATURATED 2% CHG CLOTHS

For additional information, refer to product label.

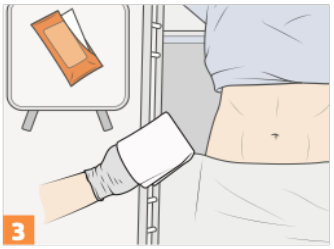
Directions



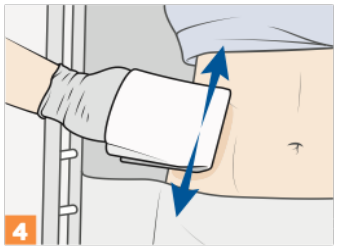
To open package: identify the tear notch labeled on the front of the package. Grasp with hands on both sides of the tear notch and tear to expose cloth.



Transfer contents onto prep table, avoiding contact between cloth and outside of package to reduce risk of cloth contamination.



Use first cloth to prepare the skin area indicated for a moist or dry site, making certain to keep the second cloth where it will not be contaminated. Use second cloth to prepare larger areas.



Dry surgical sites (such as abdomen or arm): use one cloth to cleanse each 161 cm^2 area (approximately 5 x 5 inches) of skin to be prepared. Vigorously scrub skin back and forth for 3 minutes, completely wetting treatment area, then discard. Allow area to dry for one (1) minute. Do not rinse.

Moist surgical sites (such as inguinal fold): use one cloth to cleanse each 65 cm^2 area (approximately 2 x 5 inches) of skin to be prepared. Vigorously scrub skin back and forth for 3 minutes, completely wetting treatment area, then discard. Allow area to dry for one (1) minute. Do not rinse.

Medline Industries, Inc. Three Lakes Drive, Northfield, IL 60093 | 1-800-MEDLINE (633-5463)

Appendix E

Approval Letter from Unit Manager for Project

September 8, 2022

To whom it may concern:

As the Pre-Operative Services Nurse Manager at Norton Brownsboro Hospital, I am in full support of the Doctor of Nursing Practice (DNP) project entitled Chlorhexidine Gluconate Wipes Reeducation for the Reduction of Surgical Site Infections that will be completed at Norton Brownsboro Hospital in the Preoperative Unit by University of Louisville School of Nursing DNP student Deven Leffler, RN, BSN. This letter is to provide permission for Ms. Leffler to complete her DNP project, analyze the data, and present the findings using deidentified data. I understand that the DNP project proposal will be reviewed as a quality improvement project by the University of Louisville Institutional Review Board (IRB) prior to data collection.

Sincerely,

Jessica Gordon

Nurse Manager, Perioperative Services

Norton Brownsboro Hospital

502-446-8742

Jessica.Gordon@nortonhealthcare.org

Appendix F

Intervention Budget

Activity	Expense
Computer need for creating handouts and surveys	$0 (surveyor provided)
Copied handouts x 3	$75 : 150 copies ($0.50/sheet of paper and copy ink)
Meeting room for presentations	$0 Facility Provided
Food for employee engagement during presentations	$120 ($30 x 4 presentations)
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation - 29 Registered Nurses (RN)	$986: ($34/hour) x 29 RNs
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation -14 Patient Care Associates (PCA)	$238 ($17/hour) x 14 PCAs
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation- 4 Assistant Nurse Managers (ANM)	$156 ($39/hour) x 4 ANMs
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation- 1 Nurse Manager	$0 (educational meetings factored into salary)
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation- 1 Director of Surgical Services	$0 (educational meetings factored into salary)
Time (1 hour) 15 minute presentations x4: paid for staff attendance of presentation- 4 High Power/ Low Level Stakeholders	$0 (educational meetings factored into salary)
Time Time (1 hour) 15 minute presentations x4: paid for surveyor time to present	$50 ($50/hour)
Time (4 hours) Surveyor gas for 8 round trip visits to site	$80 ($5.00/gallon; 2 gallons of gas x 8 visits)
Time taken by APRN to present, collect, and anaylze initiative	$2,000 ($50/hour x 40 hours)
Total	$3,705

Appendix G

GANTT Chart

	Aug 22	Sept 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	July 23
Proposal Development												
Proposal Defense												
UofL Project Approval												
IRB Approval												
Institutional Approval												
Education Period												
Intervention Period												
Data Evaluation												
Draft Manuscript												
Develop Poster												
Complete Manuscript												

Appendix H

Preoperative 2% CHG Cloth Questionnaire

ID #_____ Circle the best answer for each question below.

1. What is most effective CHG application according to recent evidence-based practice literature?
    a. 4% CHG solution
    b. 2% CHG cloths
    c. 4% CHG solution with added 2% CHG cloths to the surgical area
2. Which patients should perform a pre-surgical scrub with the 2% CHG cloths?
    a. SCIP patients
    b. every patient (without an allergy to product's ingredients)
    c. patients who did not complete their at home 4% CHG protocol
3. How should the surgical site area be scrubbed?
    a. Gently in a circular motion
    b. Vigorously back and forth
    c. It does not matter how you scrub the site, as long as it is cleansed
4. What is the recommended scrub time for 2% CHG cloths?
    a. 30 seconds
    b. 1 minute
    c. 3 minutes
5. How long should the surgical site be allowed to dry after performing the 2% CHG preoperative scrub?
    a. 30 seconds

   b. 1 minute

   c. 5 minutes

6. What location in the EMR do you chart your patient's CHG?

   a. Preoperative flow sheet

   b. Notes

   c. Another part of chart not mentioned (please elaborate)

      _____