ChloraPrep Application and Dry Time In The Operating Room - Change Paper

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N443: Leadership and Management

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November 9, 2020

Being a change agent is an essential role in nursing as it drives and supports the ability to provide high quality, competent care to patients. In this paper, the current literature is reviewed and introduced to inform the theory behind a planned organizational change. This process includes completing steps prescribed by change theory through data collection and analysis, planning, implementation, stabilization, and evaluation stages. Lewin's Change Theory is suited to linear processes, and those where anticipated driving and restraining forces are more predictable (Marquis & Huston, 2021). It includes three stages, unfreezing, movement, and refreezing, summarized as the problem being recognized by all affected parties, identifying and implementing corrective change, and sustaining the change, respectively (Marquis & Huston, 2021). With this theory of change and the proposed focus on allowing sufficient antiseptic agent dry time, the literature review and dissemination of this information rely on rational-empirical strategies (Marquis & Huston, 2021).

Implementing and incorporating change theories into nursing practice can reduce rates of infection and prevent improper technique. The proposed change in this paper will focus on the surgical preparation of patients and related procedures. Surgical site infections (SSIs) and operation room (OR) fires remain a serious concern in the healthcare industry and among providers. The Joint Commission, the Institute for Safe Medication Practices, and the FDA provide monitoring and guidance regarding the prevention of these sentinel events (Center for Devices and Radiological Health, 2018; Institute for Safe Medication Practices, 2018; Soule, 2018). Although rare, there are an estimated 200-240 (0.5 per 100,00 procedures) surgical fires each year in the U.S., occurring in operating rooms or during surgical activities (ISMP, 2018). Fires or thermal injuries to patients can occur due to surgical site preparation that involves solutions containing bactericidal agents and isopropyl alcohol, the flammable component.

Surgical site infection rates correlate with the agent used, improper application, and failure to allow appropriate contact and drying times. These nursing students identified antiseptic agent dry time to contribute to the increased risk for a surgical site infection or fire involving patients in operating rooms. This change project seeks to describe the problem's scope and identify evidence-based practices that can drive policy changes to reduce this risk.

Many research investigations construct to inform the decision to use either povidone-iodine or chlorhexidine gluconate containing products. Appropriate antiseptic action is related to the agent's penetration depth, chemical activity, and the total time of exposure to the agent. Other considerations include cost-effectiveness, whether the agent is alcohol or water-based, and the potential for adverse events in patients related to allergies or toxicity. The Centers for Disease Control and Prevention (CDC) publish guidelines without an explicit preference regarding the agent used; however, they recommend that the solution be alcohol-based (O'Hara et al., 2018). Charehibili et al. (2019) performed a randomized cluster trial utilizing both chlorhexidine-alcohol and iodine-alcohol solutions to find which antiseptic solutions effectively reduce SSIs. Of the five surgeries performed in this trial, researchers indicated that both chlorhexidine and iodine were similar in preventive measures to reduce surgical site infection. According to Charehibili et al. (2019), nearly 2.8 % of surgical site infections were decreased in response to a chlorhexidine-alcoholic solution versus iodine-alcohol. Another study trial to test the efficiency in preoperative prevention of SSI between chlorhexidine-alcohol and iodine-alcohol was proven to be similar (Charehibili et al., 2019). The choice of antiseptic agent did not make a difference, no matter how extensive or invasive the surgery was (Charehibili et al., 2019).

The change theory's implementation requires the organization to set goals and propose regulations to change surgical preparation protocols. Chlorhexidine gluconate applicators have a

maximal treatment area of 2.5in x 2.5in (Multum, 2019). Back and forth motions should be repeated for thirty seconds making sure the entire treatment area is wet with antiseptic. For wet surgical areas such as inguinal folds, employers should apply the antiseptic for approximately two minutes (Multum, 2019). Individuals should be careful to avoid pooling of the solution and allow the area to air dry for three minutes without blotting or wiping it away. Before using antiseptic, remove any hair from the client to reduce drying times and the potential for fine hairs remaining wet. If hair gets wet, allow for a full hour of drying, which is an essential step for fire prevention in the operating room. In a report by ISMP (2018), a recent fire occurred after the Chloraprep solution dried for a full 10 minutes as the provider was unaware that the client's hair was still wet. This client suffered 2nd and 3rd-degree burns on their ear, neck, chest, and upper extremities. To help prevent flames, avoid using or draping ignition sources such as cauteries or lasers.

As part of the unfreezing stage, data collection, education, and breaking the status quo regarding an identified issue are essential. A review of the OSF Healthcare surgical preparation policy (Appendix, Figure 1) shows that dry times are not consistently specified or make reference to the manufacturer's recommendations only. These nursing students' observations included a lack of consistency in completing procedural steps and how long agents were allowed to dry. Therefore, education for all providers within the department may need to precede the movement stage. Through a national survey, Shapiro et al. (2020) found that surgical residents are often the ones to either perform the surgical prep directly or supervise others' work to accomplish this task. However, little educational orientation or systematic measurement of comprehension assesses these individuals' knowledge regarding best practice (Shapiro et al.,

2020). Organizations can develop and introduce more detailed education and test knowledge acquisition and retention through surveys and quizzes.

With education and group recognition of dry time issues, movement is possible by implementing appropriate strategies. As part of this policy or procedural revision, a solution may be as simple as requiring that an egg-timer or similar device be placed in the surgical suite to objectively quantify how long the agent was allowed to dry (Kroning et al., 2019). The cited benefits associated with using timers in the OR are "loud sound, its portability, and, most importantly, its value in reducing the risk of OR fires" (Kroning et al., 2019, para. 1). A risk-benefit analysis can guide selecting the antiseptic agent to be adopted based on the associated risk for fires. Given that research supports the equivalent antiseptic effects of both Betadine and Chloraprep, it seems that the strict use of aqueous preparations of either agent should be considered for incorporation into policy as well (Charhebhili et al., 2019; Ghobrial et al., 2017). Recommended drying time for these agents is equivalent, so there is little issue in terms of efficacy and efficiency, particularly with time management related to surgical preparation, procedures, and OR turnover time. Finally, should an organization or provider strongly prefer the use of an alcohol-based prep, a recent study suggests that including carbon dioxide in the environment immediately around tools such as a cautery is effective in eliminating fires related to ignition of isopropyl alcohol contained in these preparations (Samuels et al., 2020).

Throughout the clinical rotation in the OR, it was apparent that there are specific requirements associated with Chloraprep administration and dry-time. Developing this plan requires keeping all staff engaged and compliant. Steps to further implement change include integrating educational simulations before preparation for surgery. As addressed above, many complications can occur due to the lack of organizations' clearly defining and educating on best

practices and associated techniques before working in the surgical setting. Prepping a client for surgery requires a precise method to ensure the site is correctly cleansed to prevent infection. Stabilizing planned change in medical facilities can expose employees to unnecessary stress and manipulation unless implemented for good reasons. Leaders need to own the change, view the change positively, motivate, and show support for it to continue. Employees should be encouraged to speak openly and collaborate in decision making to overcome objections.

Evaluation is critical when assessing the change and achievement of goals and outcomes. Evaluation occurs throughout the implementation, or movement stage, and as the focus moves to stabilization, otherwise known as the refreezing stage. Evaluation allows change agents to determine if the approach was successful or if further research and modification are needed. Based on these data and the activities identified that are associated with the increased incidence of fires and SSIs in the operating room, these nursing students suggest auditing as a means of evaluation. The Agency for Healthcare Research and Quality (AHRQ) has developed and provided an audit tool (Appendix, Figure 2), which includes measurement of the drying time used for ChloraPrep or related agents during surgical procedures (AHRQ, 2017). This audit tool could initially determine that revised procedures are being followed and subsequently reveal whether enacted policies and adopted changes related to drying time are maintained.

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Appendices

Figure 1. OSF Healthcare Surgical/Operating Room Protocol Example

OSF HealthCare

Skin preparation, preoperative

Revised: May 15, 2020

Introduction

Proper preparation of a patient's skin for surgery renders it as free as possible from microorganisms, which reduces the risk of infection at the incision site.[1]

Unless contraindicated, before undergoing a surgical procedure, the patient should be instructed or assisted to have a preoperative bath or shower the night before or day of the procedure with soap or prescribed skin antiseptic, such as 4% chlorhexidine gluconate, to reduce the number of microorganisms on the skin and to decrease the risk of contaminating the surgical incision. The skin should be dried with a fresh, clean, dry towel, and the patient should put on clean clothing to reduce the risk of reintroducing microorganisms onto clean skin. The patient shouldn't apply any body lotion, emollients, or cosmetics after the shower because they may impede the antiseptic effectiveness of the bath or shower or affect the ability of adhesive products such as monitor leads to adhere to the patient's skin. Patients should also avoid alcohol-based skin products because they may pose a fire risk in the operating room. Patients undergoing a procedure involving the axilla shouldn't apply deodorant.[1]

A patient undergoing surgery of the head or neck should be instructed or assisted to perform a preoperative shampoo with shampoo or a prescribed antiseptic shampoo product. Care should be taken to prevent contact of an antiseptic shampoo with the eyes, ears, and other mucous membranes. Alcohol-based hair care products, conditioners, and other hair care products should be avoided after shampooing.[1]

If hair removal is necessary, it should occur on the day of surgery and in a location outside the operating or procedure room to decrease the risk of surgical site infection.[1,2,3]

The area of skin preparation should always exceed that of the expected incision to minimize the number of microorganisms in the area adjacent to the proposed incision, allow surgical draping of the patient without contamination, and allow for the potential of additional incisions and drains.[1] This skin preparation procedure doesn't duplicate or replace the full sterile preparation that immediately precedes surgery. Instead, it covers skin preparation when preoperative baths or showers haven't been performed. Because the efficacy of antiseptic agents depends on the cleanliness of the skin, any superficial soil, debris, and transient microbes should be removed to reduce the risk of wound contamination.[4]

Equipment

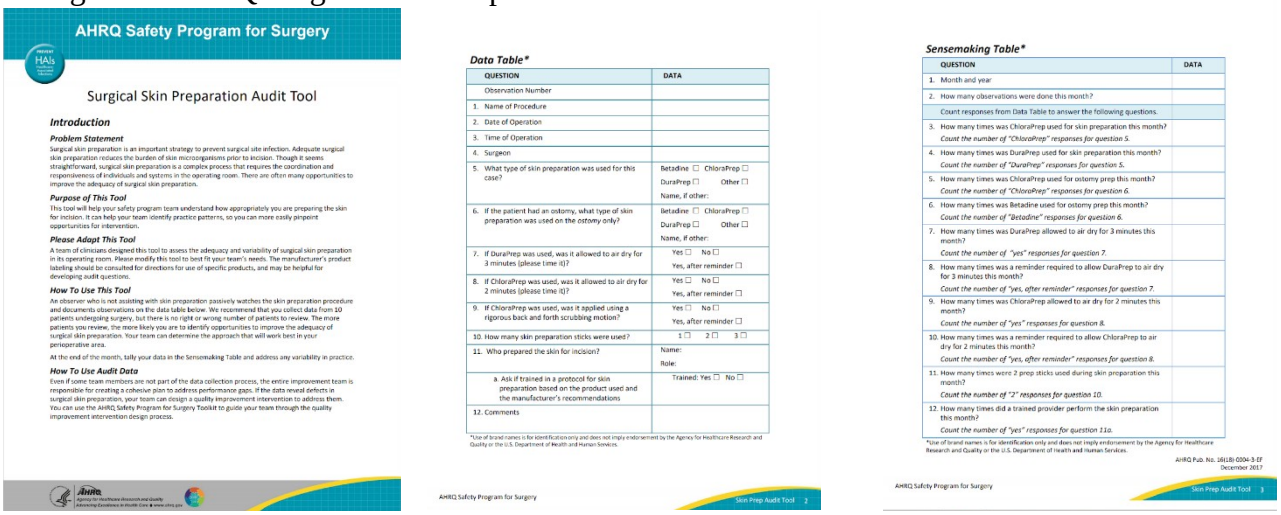
- 4% chlorhexidine gluconate antiseptic skin cleaner
- Gloves
- Tap water
- Bath blanket
- Fluid-impermeable pad
- Washcloth(s)
- Towel
- Basin
- Adjustable light
- Optional: 4" × 4" (10-cm × 10-cm) gauze pads, cotton-tipped applicators, nail polish remover, nonirritating makeup remover, plastic or paper trash bag, electric or battery-operated hair clippers with a single-use head or a reusable head that can be disinfected, other personal protective equipment

Preparation of Equipment

Pour plain, warm tap water into a basin for rinsing. Use warm water *because heat reduces the skin's surface tension and facilitates the removal of soil and hair*. Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your facility.

- Verify the practitioner's order.
- Review the patient's medical record for an allergy or a sensitivity to chlorhexidine. Use an alternative antiseptic agent, if indicated.[1]
- Gather and prepare the necessary equipment and supplies.
- Perform hand hygiene.[4,5,6,7,8,9]
- Confirm the patient's identity using at least two patient identifiers.[10]
- Provide privacy.[11,12,13,14]
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation*.[15]
- Raise the bed to waist level before providing care *to prevent caregiver back strain*.[16]
- Perform hand hygiene.[4,5,6,7,8,9]
- Put on gloves and, as needed, other personal protective equipment.[17,18,19]
- Place the patient in a comfortable position, drape with a bath blanket, and expose the preparation area *to ensure privacy and to avoid chilling the patient*. Expose only one small area at a time while performing skin preparation.
- Position a fluid-impermeable pad beneath the patient *to catch spills and to avoid linen changes*.
- Adjust the light *to illuminate the preparation area*.
- Assess the condition of the patient's skin in the preparation area. Report any rash, abrasion, or laceration to the surgeon before beginning the preparation procedure *because a break in the skin increases the risk of infection and could require cancellation of the planned surgery*.[1]
- Instruct the patient to remove all jewelry.[1]
- Remove cosmetics using a nonirritating agent *to facilitate securement of the endotracheal tube, if needed, and to allow for adequate skin assessment during surgery*.[1]
- Clean under the patient's fingernails and remove nail polish, if needed. If the patient is undergoing surgery of the hand or wrist, ensure that the nails are clean and natural, without artificial nail surfaces (such as extensions, overlays, acrylics, silk wraps, or enhancements).[1]
- When hair removal is necessary, remove it using a hair clipper. Only hair that interferes with the surgical procedure should be removed *because hair removal may increase the risk of infection*.[1,20,21] Limit the amount of clipping *to reduce the risk of microscopic nicks, which may increase the risk of surgical site infection*.[1,3]
- Wash the skin around the surgical site *to remove gross contaminants and oils that may block the penetration of the antiseptic agent used during the sterile prep before surgery*.[1] Clean skin folds and crevices carefully *because they harbor greater numbers of microorganisms*. Clean anatomic areas that contain more debris separately *to prevent the distribution of microorganisms from these areas to the surgical site*.[1]
- If the patient is undergoing abdominal surgery, clean the umbilicus. If needed, instill soap and water, or antiseptic solutions such as chlorhexidine, into the umbilicus *to soften debris*. Then remove the debris using a cotton-tipped applicator *because debris within the umbilicus is a contaminant that can't be adequately disinfected*.
- If an intestinal or urinary stoma is present within the surgical field, clean the area gently and separately from the rest of the prepared area *to remove organic material that might interfere with the effectiveness of the antiseptic agent*.[1]
- For a surgical field that includes the penis, retract the foreskin (if present) and then clean the penis gently *because organic material and microorganisms accumulate under the foreskin*.[1] After cleaning, pull the foreskin back over the glans *to prevent circulatory compromise*.
- Dry the prepared area with a clean towel.
- Remove the fluid-impermeable pad.
- Return the bed to the lowest position *to prevent falls and maintain patient safety*.[22]
- Give the patient any special instructions for care of the prepared area and remind the patient to keep the area clean for surgery. Make sure that the patient is comfortable.
- Discard used supplies in appropriate receptacles.[19]
- Remove and discard your gloves and any other personal protective equipment worn.[19]
- Perform hand hygiene.[4,5,6,7,8,9]
- Document the procedure.[23,24,25,26]

Figure 2. AHRQ Surgical Skin Preparation Audit Tool



AHRQ Safety Program for Surgery

Surgical Skin Preparation Audit Tool

Introduction

Problem Statement

Surgical skin preparation is an important strategy to prevent surgical site infection. Adequate surgical skin preparation reduces the burden of skin microorganisms prior to incision. Though it seems straightforward, surgical skin preparation is a complex process that requires the coordination and responsiveness of individuals and systems in the operating room. There are often many opportunities to improve the adequacy of surgical skin preparation.

Purpose of This Tool

This tool will help your safety program team understand how appropriately you are preparing the skin for incision. It can help your team identify practice patterns, so you can more easily pinpoint opportunities for intervention.

Please Adapt This Tool

A team of clinicians designed this tool to assess the adequacy and variability of surgical skin preparation in its operating room. Please modify this tool to best fit your team's needs. The manufacturer's product labeling should be consulted for directions for use of specific products, and may be helpful for developing audit questions.

How To Use This Tool

An observer who is not assisting with skin preparation passively watches the skin preparation procedure and documents observations on the data table below. We recommend that you collect data from 10 patients undergoing surgery, but there is no right or wrong number of patients to review. The more patients you review, the more likely you are to identify opportunities to improve the adequacy of surgical skin preparation. Your team can determine the approach that will work best in your perioperative area.

At the end of the month, tally your data in the Sensemaking Table and address any variability in practice.

How To Use Audit Data

Even if some team members are not part of the data collection process, the entire improvement team is responsible for creating a cohesive plan to address performance gaps. If the data reveal defects in surgical skin preparation, your team can design a quality improvement intervention to address them. You can use the AHRQ Safety Program for Surgery Toolkit to guide your team through the quality improvement intervention design process.

AHRQ Safety Program for Surgery

Data Table*

QUESTION	DATA
Observation Number	
1. Name of Procedure	
2. Date of Operation	
3. Time of Operation	
4. Surgeon	
5. What type of skin preparation was used for this case?	Betadine ☐ ChloraPrep ☐ DuraPrep ☐ Other ☐ Name, if other:
6. If the patient had an ostomy, what type of skin preparation was used on the ostomy only?	Betadine ☐ ChloraPrep ☐ DuraPrep ☐ Other ☐ Name, if other:
7. If DuraPrep was used, was it allowed to air dry for 3 minutes (please time it)?	Yes ☐ No ☐ Yes, after reminder ☐
8. If ChloraPrep was used, was it allowed to air dry for 2 minutes (please time it)?	Yes ☐ No ☐ Yes, after reminder ☐
9. If ChloraPrep was used, was it applied using a rigorous back and forth scrubbing motion?	Yes ☐ No ☐ Yes, after reminder ☐
10. How many skin preparation sticks were used?	1 ☐ 2 ☐ 3 ☐
11. Who prepared the skin for incision?	Name: Role:
a. Ask if trained in a protocol for skin preparation based on the product used and the manufacturer's recommendations	Trained: Yes ☐ No ☐
12. Comments	

*Use of brand names is for identification only and does not imply endorsement by the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.

AHRQ Safety Program for Surgery Skin Prep Audit Tool 2

Sensemaking Table*

QUESTION	DATA
1. Month and year	
2. How many observations were done this month?	
Count responses from Data Table to answer the following questions.	
3. How many times was ChloraPrep used for skin preparation this month? *Count the number of "ChloraPrep" responses for question 5.*	
4. How many times was DuraPrep used for skin preparation this month? *Count the number of "DuraPrep" responses for question 5.*	
5. How many times was ChloraPrep used for ostomy prep this month? *Count the number of "ChloraPrep" responses for question 6.*	
6. How many times was Betadine used for ostomy prep this month? *Count the number of "Betadine" responses for question 6.*	
7. How many times was DuraPrep allowed to air dry for 3 minutes this month? *Count the number of "yes" responses for question 7.*	
8. How many times was a reminder required to allow DuraPrep to air dry for 3 minutes this month? *Count the number of "yes, after reminder" responses for question 7.*	
9. How many times was ChloraPrep allowed to air dry for 2 minutes this month? *Count the number of "yes" responses for question 8.*	
10. How many times was a reminder required to allow ChloraPrep to air dry for 2 minutes this month? *Count the number of "yes, after reminder" responses for question 8.*	
11. How many times were 2 prep sticks used during skin preparation this month? *Count the number of "2" responses for question 10.*	
12. How many times did a trained provider perform the skin preparation this month? *Count the number of "yes" responses for question 11a.*	

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AHRQ Pub. No. 16(18)-0004-3-EF
December 2017

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