



## **AST Standards of Practice for Skin Prep of the Surgical Patient**

### **Introduction**

The following Standards of Practice were researched and authored by the AST Education and Professional Standards Committee and have been approved by the AST Board of Directors. They are effective October 20, 2008.

AST developed the Standards of Practice to support healthcare facilities in the reinforcement of best practices related to the patient skin preparation (henceforth in this document referred to as the “skin prep”) in the perioperative setting. The purpose of the Recommended Standards is to provide an outline that surgical team members can use to develop and implement policies and procedures for skin prep. The Standards are presented with the understanding that it is the responsibility of the healthcare facility to develop, approve, and establish policies and procedures for skin prep according to established healthcare facility protocols.

### **Rationale**

The following are Standards of Practice related to skin prep in the perioperative setting. The skin prep is part of the daily patient care routine of the Certified Surgical Technologist (CST) and Certified Surgical First Assistant (CSFA) in the OR. The majority of surgical site infections (SSIs) are caused by the entry of the patient’s own microbial flora into the surgical wound. Since the patient’s skin cannot be sterilized, skin prep is performed. Skin prep aids in preventing SSIs by removing debris from, and cleansing, the skin, bringing the resident and transient microbes to an irreducible minimum, and hindering the growth of microbes during the surgical procedure.<sup>1</sup>

All surgical team members should be involved in the process of developing and implementing healthcare facility policies and procedures for the patient skin prep.

### **Standard of Practice I**

**The patient and surgical team members should follow the surgeon’s preoperative orders. Additionally, preoperative preparations by the surgical team should be completed.**

1. The surgeon’s orders may include the patient taking a bath or showering with an antiseptic agent the night before surgery and/or the morning of surgery.
  - A. The CDC recommends requiring patients to bathe or shower with an antiseptic agent the night before surgery.<sup>4</sup>
  - B. If chlorhexidine gluconate (CHG) is to be used, the following instructions should be provided to the patient:

- (1) CHG is inactivated by soaps and shampoos. The patient must make sure the soap and shampoo is thoroughly rinsed off prior to using CHG.
  - (2) CHG is an eye irritant and can burn the corneas as well as being ototoxic. The patient should be instructed to be very careful and to keep CHG from entering eyes and ears.
  - (3) The patient should be instructed not to use a body lotion after bathing or showering with CHG. The body lotion will inactivate the residual bacteriostatic effects of CHG.<sup>11</sup>
2. The preoperative patient interview should include asking the patient if she/he has any known allergies, as well as a review of the patient's history and physical.
  - A. If the information gathered from the interview, history and physical indicate the patient is allergic to shellfish, may which contain iodine, a non-iodine prep solution should be used. The information already indicates the patient being allergic to iodine due to prior exposure.
  - B. If the information indicates the patient has allergies to strawberries, bananas, kiwis, or poinsettias, which contain elements of latex, it should be documented that the patient is latex allergic. The information may already indicate the patient being latex allergic due to prior exposure. The shave and skin prep will need to be performed in a latex-free OR environment.
  - C. If the patient indicates an allergy or allergies to particular antimicrobial solution(s), this should be indicated in the patient chart, on the cover of the patient chart, and on the patient allergy wrist band to be worn on the day of surgery. Latex allergy should be indicated in the same way.
  - D. The patient care plan should be revised to reflect the allergy and ensure the correct antimicrobial agent is used or latex-free environment is established.
3. The surgical team should refer to the surgeon's orders pertaining to hair removal (also referred to as "shave prep" in this document) should or should not be performed prior to skin prep. However, it is recommended that hair removal not be performed.
  - A. The shave prep continues to be a controversial topic. Several studies, both low quality and higher quality, have been conducted with varying conclusions.<sup>7</sup> The following literature review is provided to demonstrate the complexity of the issue and as an aid to healthcare facilities in forming their own policy and procedures.
    - (1) Institute for Healthcare Improvement (IHI), National Patient Safety Foundation (NPSF), and Texas Medical Association (TMA) teamed together in 2006 to promote the elimination of surgical site shaving. If hair removal is deemed necessary, the IHI recommends it should be performed with clippers right before surgery. Healthcare facilities should establish protocols for when, and how, to remove hair. Patients should be provided educational materials on appropriate hair-removal techniques to prevent shaving at home, and shaving

heart surgery patients for electrocardiograms shortly before surgery should be avoided.<sup>10</sup>

- (2) A Cochrane Database of Systematic Reviews article reviewed 11 randomized-controlled large trials, and the conclusions found no difference in SSIs in hair removal versus no hair removal.<sup>16</sup> If hair must be removed, clipping and depilatory creams result in fewer SSIs, as compared to shaving with a razor, and no difference in SSIs in patients shaved one day before surgery versus day of surgery.
  - (3) Sheinberg and Ross conducted a study in which 346 various types of cranial procedures were performed without hair removal.<sup>13</sup> No infections or complications were encountered. Their conclusion is that cranial surgery without hair removal is safe and not associated with any discernible increase in SSIs.
  - (4) Tang, Yeh, and Sgouros conducted a non-randomized study of 100 cranial procedures involving 90 pediatric patients ages seven days to 16.8 years.<sup>15</sup> Patients were split into two groups: shaved and no shave. Their conclusion is that cranial surgery without hair removal is safe and provides positive psychological benefits to patients of undisturbed body image when recovering from major neurosurgery.
  - (5) The Joanna Briggs Institute published the results of several low and high quality studies with three important conclusions<sup>7</sup>: (a) surgery without hair removal is preferable to preoperative hair removal; (b) if hair removal must be performed clipping is the overall preferred method of hair removal; (c) evidence supports performing the shave prep with clippers as close as possible to the time of surgery as practical, preferably less than two hours prior to surgery, to prevent SSI (2003).
- B. If the shave prep is ordered, it should be performed as close to the time of surgery as possible in order to reduce the risk for microbial growth in breaks in the skin.<sup>1</sup>
  - C. The shave prep should not be performed in the OR The shave prep should be performed in the preoperative holding area where the privacy of the patient can be maintained.
  - D. It is recommended that an electric clipper be used. The second choice for hair removal is a depilatory cream; however, a small amount of the cream should be applied to a small patch of the patient's skin to determine if the patient has a reaction prior to use on a large area of the skin.
  - E. Manufacturer's instructions should be followed for the cleaning and disinfection of reusable electric clippers and shaving head. Single-use shaving heads should be disposed of in a sharps container.
  - F. It is recommended that the skin and hair be wetted in order to perform a wet shave prep. Water makes the hair softer and provides a smoother skin

surface as compared to dry hair and skin, therefore reducing the risk for skin irritation and cuts.

- G. The hair that is removed in preparation for a craniotomy must be placed in a secure container or bag, preferably ziplock-type bag that is labeled with the patient's name and healthcare facility identification number. The container or bag is removed from the OR, but transported with the patient postoperatively, since the hair is the property of the patient.
  - H. Loose hair on the field and patient's skin should be collected for disposal to prevent hair from entering the surgical wound. It is recommended to use hypoallergenic tape or latex-free peel-and-stick mitt (two commercial products include the Medicus Health Pre-OP Glove® and Covidien Preop Mitt).
  - I. Patient education must include informing the patient to not perform a self-shave prep or use a depilatory the night before, or morning of, surgery.
  - J. If hair removal is not performed, an alternative for keeping the hair out of the surgical wound for cranial procedures is to apply a non-flammable gel to the hair.<sup>13</sup>
  - K. Eyebrows should never be shaved. If thick, they should be carefully trimmed using small scissors.
  - L. Long eyelashes should be carefully trimmed using small scissors.
- 4. The patient's body jewelry should be removed from the area of the skin prep.<sup>6</sup>
    - A. The skin under jewelry has been identified as a source of high microbial counts. Removal of jewelry allows for proper cleansing and prepping of the area.
    - B. Jewelry should be removed to avoid patient injury during movement of the patient between the stretcher and OR bed and during positioning; avoid pooling of prep solutions; avoid electrosurgical burns.
    - C. Prior to performing the skin prep, the pierced area should be cleaned.
  - 5. Patient education should include informing the patient to not wear any cosmetics the day of surgery.
    - A. Cosmetics can inhibit the effectiveness of the antiseptic solution.
  - 6. For surgery that involves the fingers, hand or wrist, the patient should be instructed to cut the nails short, thoroughly clean the subungual areas during the preoperative bath or shower, remove artificial nails and nail polish.

## **Standard of Practice II**

**The healthcare facility should use FDA-approved agents that have immediate, cumulative, and persistent antimicrobial action.**

- 1. The skin prep agents should have the following properties: fast-acting, persistent and cumulative actions, and non-irritating.
- 2. The surgical team members and infection control officer should be involved in the process of evaluating and selecting the skin prep agents. In the US, antiseptic agents are regulated by the FDA's Division of Over-the-Counter Drug Products.<sup>5</sup> The evaluation should involve the review of the manufacturer's information to confirm that the antiseptic agents were tested according to FDA requirements and to review the results of the testing to confirm efficacy.

- A. The involvement of the surgical personnel allows the ability to evaluate the properties of the antiseptic agents, including effects on the skin and to contribute to the final decision regarding the antiseptic agents that are the most effective antimicrobial solutions as well as least harmful to the skin. The cost of the antiseptic agents should not be a factor that influences the decision-making process.
- B. When evaluating antiseptic agents, the following FDA standards should be taken into consideration. The agents should:
  - substantially reduce transient microorganisms
  - possess a broad-spectrum of antimicrobial properties
  - be fast-acting
  - have persistent, cumulative activity
  - be nonirritating to the skin

### **Standard of Practice III**

**Alcohol is an accepted antiseptic agent; however, it should not be used as the single agent but as part of the skin prep regimen.**

1. The antimicrobial action of alcohols is the denaturing of proteins. 60%-95% alcohol is the most effective. Additionally, antiseptic solutions that contain alcohol, such as chlorhexidine with 70% alcohol, are less effective at higher alcohol concentrations since the denaturing of proteins does not easily occur in the absence of water.
2. Alcohol has broad-spectrum antimicrobial properties, including the ability to destroy Gram-positive and Gram-negative bacteria as well as multidrug-resistant pathogens including MRSA and VRE, *Mycobacterium tuberculosis* and fungi.<sup>5,8,12</sup>
3. Alcohols have rapid activity when applied to the skin, but alone do not have a persistent, cumulative activity; however, when combined with another antiseptic agent persistent, cumulative activity results. Therefore, if the healthcare facility adopts the use of alcohol, it is recommended that the agent be a combination of alcohol and other antiseptic agent (alcohol-based solution).
  - A. Alcohol-based solutions have a greater antimicrobial activity as compared to other solutions. Studies have shown that alcohol-based solutions immediately lower the microbial count on the skin more effectively than other solutions.<sup>4</sup>
  - B. Alcohol-based solutions that contain 0.5% to 1% chlorhexidine gluconate have been found to have a persistent antimicrobial activity that is equal to, or greater, than that of CHG alone. The next most effective scrubbing agents are chlorhexidine gluconate, iodophors, and triclosan. Studies of parachlorometaxyleneol (PCMX) have produced contradictory results and therefore, further studies are required in order to determine the efficacy of the agent with other agents.<sup>14</sup>
  - C. A surgeon may include in his/her orders the use of alcohol as a wipe (referred to as an alcohol wipe) once the paint solution has been applied. This is an acceptable practice since the alcohol is being used as part of the overall skin prep regimen.

4. When using an alcohol-based solution, the healthcare facility procedure for performing skin prep should follow the manufacturer's instructions since the instructions can vary according to the solution that is being used.
  - A. It is recommended that alcohol and alcohol-based solutions not be used on mucous membranes.
5. The alcohol-based solution should not be used when the patient's skin is visibly dirty or contaminated with proteinaceous materials since that decreases the antimicrobial action of the alcohol.<sup>9</sup> The skin should be prewashed with a non-antimicrobial soap and thoroughly dried prior to using the alcohol-based solution.
6. Alcohols are flammable and therefore, must be properly stored according to National Fire Protection Association recommendations, as well as local and state regulations.
  - A. Alcohol containers should be stored in a dry, cool area that is approved by the healthcare facility for the storage of flammables that is away from sources of flames, heating vents, and high temperatures.
  - B. The alcohol or alcohol-based solution must be allowed to thoroughly dry prior to the placement of the drapes in order to avoid the fumes building up under the drapes and being ignited, particularly if electrosurgery or a laser will be used.

#### **Standard of Practice IV**

#### **Surgical team members should perform a standardized patient skin prep procedure based upon manufacturer's written instructions that are specific to the antimicrobial agent to be used and according to healthcare facility policy and procedures.**

1. The surgical team member(s) who will be performing the skin prep should first perform a hand wash.
2. Gross soil, grease, skin oil, blood and other debris should be removed from the skin prior to performing the skin prep.
  - A. A non-aseptic, non-irritating, non-flammable and non-toxic fat solvent or degreaser should be used to cleanse the skin.<sup>1</sup>
3. Just as with the surgical scrub, the ideal duration of the skin prep has not been established. However, it is recommended that the skin prep last a minimum of five, and until all sponges have been used.
4. Sterile gloves should be worn.
  - A. The skin prep is performed using sterile technique. Care should be exercised to avoid touching non-sterile items such as the OR bed sheets and blanket(s) with sterile gloves, prep solution sponges and paint solution sponge sticks.
  - B. Controversy exists in using a "clean" versus "sterile" skin preparation kit. The use of a sterile-skin preparation kit has not been proven to represent an advantage in the reduction of SSI; and vice-versa, the use of the clean kit has also not been proven to be advantageous.<sup>4</sup> As always, healthcare facility policy should be followed.
5. The boundaries of the skin prep should be much wider than the planned incision site in order to reduce the risk of SSI, allow for lengthening of the incision,

- placement of trocars for endoscopic procedures, possible conversion from an endoscopic to open procedure and placement of wound drains.
6. The prep solution and paint should not be allowed to pool or accumulate under, or adjacent to, the patient in order to prevent chemical burns and decrease the risk of electrosurgical or laser burn.<sup>1</sup>
    - A. Sterile towels should be placed at the periphery of the skin prep boundaries to aid in preventing the accumulation of the agents.
    - B. ECG leads, electrosurgery dispersive electrode (grounding pad), and tourniquet, if in the vicinity of the skin prep region, should be covered by an adhesive clear plastic drape to prevent accumulation of prep fluids and prevent chemical burns. If the antiseptic solution makes contact with any of the above listed items, they should be removed and replaced.
    - C. At the end of the procedure, the towels should be carefully removed to avoid dragging across the prep area and prevent contamination.
  7. The skin prep is begun at the planned incision site and carried to the periphery, using an ever-widening circular motion.<sup>1</sup> Once the boundaries/periphery of the skin prep have been reached, the sponge should be discarded and not brought back over the clean area. The most important principle of skin prep is prepping always progresses from the clean to the dirty area.
  8. The paint solution should be applied with prep stick sponges, using the no-touch technique in order to avoid contamination from the gloves that came into contact with the prep-solution soaked sponges.<sup>6</sup>
  9. CHG, alcohol and alcohol-based agents should not be used on mucous membranes.
  10. Gentle pressure should be used when applying the prep agents on patients with friable skin.

### **Standard of Practice V**

#### **Contaminated areas require special attention and generally should be prepped last.**

1. Areas of high microbial counts, including the axilla, groin, perineal region, anus and vagina are prepped last. Each sponge is used and discarded; it should not be reused.
  - A. The exception is the umbilicus. The umbilicus is considered contaminated, but any time it is a part of the skin prep, it is prepped first, most often with the use of prep-solution soaked cotton-tipped applicators. This prevents debris from the umbilicus from splashing onto the prepped abdomen.
  - B. Stomas, skin ulcers, sinuses and open wounds are considered contaminated and should be prepped last.
    - (1) It is recommended that the stoma be isolated with a sterile clear plastic adhesive drape. If the stoma is to be a part of the skin prep, it should be cleansed first prior to the start of the skin prep. The mucin and organic matter can inhibit the effectiveness of antiseptic agents; removal is necessary. A betadine-soaked sponge should be placed over the stoma after the cleansing. The skin prep of the surrounding area is completed, the sponge removed, and the stoma prepped last following the same

principle of clean-to-dirty. The prep solution should not be allowed to contaminate the previously prepped area.

- (2) Traumatic open wounds may require extensive irrigation with warm sterile normal saline. For small open wounds, the surgeon may use a bulb syringe; for larger wounds, the pulse lavage may be used. A moisture-proof pad should be placed under the patient prior to the irrigation. After the irrigation has been completed, it may still be necessary to place dry towels or sheets under the patient. Additionally, the surgeon may debride the open wound after irrigation.

The surrounding area should be prepped first. The open wound should be packed with sterile gauze, while the surrounding skin is being prepped. The sterile gauze will be removed, and the open wound prepped last.

2. If the surgical procedure involves the penis, the foreskin (patients not having undergone a circumcision) should be retracted and cleansed. After cleansing, the foreskin should be placed back over the glans to avoid vascular disruption.

#### **Standard of Practice VI**

**Surgical procedures, such as grafts, abdominal-perineal and abdominal-vaginal require two separate skin preps to be performed.**

1. Separate skin prep set-ups are required for prepping the donor and recipient sites for skin, bone or vascular graft procedures.
  - A. The donor site is prepped first with a colorless solution, most often CHG, to allow the surgeon the ability to properly visualize the skin, while taking the graft.
  - B. The recipient site is often an open wound, such as a burn, and therefore is considered contaminated. Open wounds should not be prepped with alcohol, alcohol-based agents or povidone-iodine solution, since those can cause chemical burns of the tissues.
2. Abdominal-perineal and abdominal-vaginal procedures require separate skin preps since the perineal and vaginal areas are considered contaminated.
  - A. The perineal or vaginal prep should be performed first in order to avoid splashing and contaminating the abdomen if it were to be prepped first.
    - (1) If using povidone-iodine solution, the mucous membranes of the vagina should only be prepped with the paint solution.
  - B. Once the perineum or vagina is prepped, the area should be covered with sterile towels during the abdominal prep.

#### **Standard of Practice VII**

**Eye and facial preps may require the use of alternative prep solutions or diluted regular solutions in order to avoid injury to the patient.**

1. CHG and iodophors are contraindicated for use in eye and facial preps. Both agents can severely injure the cornea if they accidentally enter the eye.



- Additionally both agents are ototoxic and can cause sensorineural deafness if they enter the inner ear.<sup>11</sup>
2. Triclosan and PCMX are considered non-toxic and should be considered for use in facial preps. However, it is still advised to ensure that the agents do not enter the eyes. Warm sterile water should be used as the rinse.
  3. If the patient is awake during the prep, he/she should be advised to keep eyes closed. If the patient is under anesthesia, the eyes should be protected by placing a small sterile plastic adhesive drape.
  4. Cotton balls should be placed in the ears to prevent the prep agent from entering.

### **Standard of Practice VIII**

#### **Manufacturer's instructions should be followed for the storage and warming of antiseptic agents.**

1. The antiseptic agents should always be stored in the manufacturer's original container.
  - A. The container should never be refilled or the agent transferred to a secondary container. These practices can contribute to microbial contamination of the original and/or secondary container.
  - B. The use of single-use containers is recommended.
2. The manufacturer's instructions should be consulted to determine the safety of warming an antiseptic solution.
  - A. If the solution is flammable, it must not be warmed in order to avoid creating a fire hazard. The chemicals in the solution become volatile and unstable, allowing the solution to easily catch fire.
  - B. Warming can change the chemical properties of solutions, thus reducing the effectiveness of its microbial actions.
  - C. If a solution is warmed, care must be taken that it is not too hot in order to avoid causing a patient burn.

### **Standard of Practice IX**

#### **The Material Safety Data Sheets (MSDS) for the antiseptic agents that are stored and used in the surgery department must be readily available and accessible to all surgical personnel.**

1. As mandated by the Occupational Safety and Health Administration (OSHA), MSDSs for all antiseptic agents and other chemicals that are stored and used in the surgery department must be easily accessible to all surgical personnel.
2. If unsure about the handling, storage, use, etc. of an agent or chemical, surgical personnel should review the MSDS and follow the instructions.

### **Standard of Practice X**

#### **The patient skin prep should be well documented in the patient chart.**

1. Documentation should include, but not be limited to, the following:
  - A. Patient education and preoperative instructions
  - B. Removal and handling of jewelry
  - C. Condition of the skin prior to the shave prep
  - D. Shave prep

- (1) Prep parameters
- (2) Time of prep
- (3) Method used
- (4) Name of person who performed the shave prep
- E. Skin prep
  - (1) Prep parameters
  - (2) Time of prep
  - (3) Condition of skin
  - (4) Fat solvents or degreasers used
  - (5) Antiseptic agent(s) used
  - (6) Name(s) of person(s) performing prep
- F. Condition of skin postoperatively

**Competency Statements**

Competency Statements	Measurable Criteria
<p>1. The CST and CSFA have the knowledge of infection control practices in order to prevent SSI.</p> <p>2. The CST and CSFA have the knowledge and skills to perform the patient skin prep in an aseptic manner that promotes prevention of SSI.</p> <p>3. The CST and CSFA are qualified to participate in the decision-making processes, related to evaluating prepping agents for use in the healthcare facility.</p> <p>4. The CST and CSFA are qualified to participate in the development and review of the healthcare facility policy and procedures for performing the patient skin prep.</p>	<p>1. Educational standards as established by the <i>Core Curriculum for Surgical Assisting</i> and <i>Core Curriculum for Surgical Technology</i>.<sup>2,3</sup></p> <p>2. The subjects of infection control practices to prevent SSI, aseptic technique, and performance of the patient skin prep are included in the didactic studies as a student.</p> <p>3. Students demonstrate knowledge of infection control practices, aseptic technique, and performance of the patient skin prep in the lab/mock OR setting and during clinical rotation.</p> <p>4. As practitioners, CSTs and CSFAs implement infection control practices, aseptic technique and perform the patient skin prep.</p> <p>5. As practitioners, CSTs and CSFAs participate in the decision-making processes of evaluating prep agents for use in the healthcare facility. Additionally, they participate in the development and review of healthcare facility policy and procedures for performing the patient skin prep.</p>

	6. CSTs and CSFAs complete continuing education to remain current in their knowledge of infection control practices, aseptic technique, and performing the patient skin prep.
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