



## **AST Recommended Standards of Practice for the Surgical Scrub**

### **Introduction**

The following recommended 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 April 13, 2008.

AST developed the Recommended Standards of Practice to support health care facilities in the reinforcement of best practices related to performing the surgical scrub in the perioperative setting. The purpose of the Recommended Standards is to provide an outline that health care workers (HCWs) in the perioperative setting can use to develop and implement policies and procedures for performing the surgical scrub. The Recommended Standards is presented with the understanding that it is the responsibility of the health care facility to develop, approve, and establish policies and procedures for performing the surgical scrub according to established health care facility protocols.

### **Rationale**

The following are Recommended Standards of practice related to properly performing the surgical scrub in the perioperative setting. Dating back to the Hungarian physician Ignaz Semmelweis, who advocated and implemented strict hand washing guidelines for medical students, it has long been recognized that the skin is a primary source for harboring microorganisms that represent as being a potential cause of cross-contamination.<sup>7</sup> Bacteria residing on the hands of the surgical team can be the cause of surgical site infections (SSI).<sup>4</sup> When the members of the sterile surgical team use a non-antimicrobial scrubbing agent, the bacteria rapidly multiply under surgical gloves.<sup>6</sup> Even though the members of the sterile surgical team wear sterile gowns and gloves, studies have shown that bacterial growth is decreased when an antiseptic scrubbing agent is used when performing the surgical scrub, thus reducing the risk of SSI in particular if a glove sustains a puncture or tear.<sup>9,26</sup> Health care facilities should evaluate and choose surgical scrub solutions based on their meeting US Food and Drug Administration (FDA) standards; ability to decrease to an irreducible minimum the number of bacteria on the hands and forearms immediately after performing the surgical scrub, ability to provide persistent antimicrobial activity and to provide long-term cumulative activity.<sup>6</sup> Of those items used to evaluate a scrub solution, immediate and persistent activity are considered the most important when determining the efficacy of the solution.<sup>6</sup> FDA standards state that solutions used for the surgical scrub should substantially reduce microbes that reside on the skin, contain a nonirritating antimicrobial preparation, possess a broad-spectrum of antimicrobial properties, be fast-acting and have persistent, cumulative activity.<sup>40</sup> In summary, the purposes of the surgical scrub are to remove transient microorganisms and debris from the hands and forearms; decrease the number of resident microorganisms to an irreducible minimum; and inhibit rapid proliferation of microorganisms on the nails, hands and forearms. All surgery department personnel should be involved in the process

of developing and implementing health care facility policies and procedures for performing the surgical scrub.

## **Standard of Practice I**

**The surgical scrub should be performed by all members of the sterile surgical team, who will be donning a sterile gown and gloves.**

1. The surgical scrub, when properly performed, has been shown to remove transient skin flora from the fingernails, hands and forearms; reduce the resident microbial population to an irreducible minimum; and slow the growth of bacteria in order to contribute to reducing the risk of a SSI.<sup>6</sup>
2. Surgical hand antisepsis should be accomplished using either an antimicrobial soap or an alcohol-based solution with cumulative, persistent antimicrobial activity before donning the sterile gown and gloves.<sup>6</sup>

## **Standard of Practice II**

**The members of the sterile surgical team should complete the pre-scrub activities in preparation to performing the surgical scrub.**

1. The fingernails should be kept clean, not extend beyond the fingertips and artificial nails should not be worn.
  - A. Fingernails that are long and extend beyond the fingertips can puncture the gloves placing the patient at risk of SSI from exposure to the transient and resident skin flora.<sup>5</sup> Additionally, long fingernails place the patient at risk for injury when the surgical team member is providing direct care to the patient, eg aiding the patient in moving from the stretcher to the O.R. bed, patient positioning, etc.
  - B. The subungual has been identified as harboring the majority of microorganisms as compared to the skin of the hands and forearms. Debris should be removed from the subungual area with the use of a sterile, plastic single-use, disposable nail cleaner that is usually provided with the scrub brush package. Reusable nail cleaners are not recommended. Orangewood sticks should not be used to clean the fingernails due to the tendency of the wood to splinter and harbor *Pseudomonas* organisms.<sup>33</sup> The fingernails should be cleaned under running water at the scrub sink. After use, the disposable nail cleaner should be disposed according to health care facility policy. The dirty nail cleaner should not be discarded into the scrub sink in order to prevent cross contamination.
  - C. Nail polish, if worn, should be freshly applied and free of chips. Studies have not established a correlation between the wearing of freshly applied nail polish and an increase in microbial growth.<sup>5</sup> However, nails with chipped polish or polish that has been worn for more than four days harbor a greater number of bacteria as compared to unpolished nails.<sup>13</sup> Surgical personnel should follow health care facility policy related to wearing nail polish.
  - D. Artificial nails and other types of artificial nail coverings, such as silk overlays should not be worn by any member of the surgical team, no

matter what team role they are fulfilling.<sup>6</sup> Cultures of surgical team members who wear artificial nails demonstrate increased bacterial and fungal counts as compared to personnel who do not wear artificial nails.<sup>5,15,27</sup> Additionally, hand carriage of Gram-negative organisms has been shown to be greater among wearers of artificial nails than among non-wearers.<sup>5</sup>

- E. Cuticles should be kept clean and intact; the cuticles should not be trimmed or cut.
2. The intact skin layer is the first line of defense for preventing the entry of microbes into the body. When the skin is damaged by burns, lesions, abrasions, and cuts, it creates an opening for the invasion of microbes, placing the patient and surgical team member at risk for acquiring an infection.<sup>34</sup> Additionally, the sterile team member could transfer pathogens, if bodily fluids in the form of exudate from burns, lesions, abrasions, and cuts, come into contact with the patient.
    - A. The skin of the hands and forearms should be intact with no burns, lesions, abrasions, and cuts present. The surgical team member should inspect the hands and forearms prior to performing the surgical scrub to confirm the skin is intact.
    - B. If there is a break in the integrity of the skin, the surgical team member should determine if the extent of the damage to the skin prevents performing the surgical scrub and participating as a member of the sterile team.
  3. All jewelry including rings, bracelets, and watches should be removed prior to performing the surgical scrub.<sup>6</sup>
    - A. Jewelry is not sterile and can harbor microorganisms. Studies have reported a significant increase in the bioload on the hands of personnel who wear rings after performing a hand wash as compared to personnel who perform a hand wash not wearing rings.<sup>35,39</sup> Studies have also demonstrated that the skin underneath rings is more heavily colonized as compared to areas of the skin on the fingers where rings were not worn.<sup>18,19,25</sup> Lastly, studies show that the bioload and concentration of microorganisms increase exponentially correlated to the number of rings worn.<sup>14</sup>
    - B. Jewelry is removed in order to allow the surgical scrub solution to make contact with the entire skin and sides (planes) of the fingers, hands, and forearms.

### **Standard of Practice III**

**Scrub solution dispensing containers should be a closed container that is maintained in working condition.**

1. The scrub solution dispensing containers should have a lid.
2. The use of single-use containers is recommended, and they should be discarded when empty according to health care facility policy.
3. If reusable containers are used, it is recommended that the container be evaluated prior to purchase for ease in cleaning, including the tubing and dispensing spout,

- ability to maintain its function for long periods of time, and ability of tubing and dispensing spout to remain free from obstruction.<sup>20</sup> If reusable containers are used, it is recommended that health care facilities purchase reusable containers that can be sterilized between uses.
4. Prior to reuse, the decontamination process should be completed to include the outside and inside of the reusable container, sterilized if possible and dried. The container should be dry in order not to “water-down” the scrub solution and reduce its microbial effectiveness.
  5. The container should never be refilled or what is referred to as “topping off.” Refilling or topping off without first decontaminating the container can cause contamination of the scrub solution and container, thus contributing to the risk of cross contamination.

## **Standard of Practice IV**

**The health care facility should provide an FDA-approved scrub solution that has immediate, cumulative and persistent antimicrobial action for use by the surgical personnel.**

1. The surgical personnel and infection control officer should be involved in the process of evaluating and selecting scrub solutions. In the US antiseptic scrub solutions 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 scrub solution was tested according to FDA requirements and to review the results of the testing to confirm efficacy.<sup>39</sup>
  - A. The involvement of the surgical personnel in the decision-making process has been shown to contribute to compliance with hand washing and scrub procedures.<sup>5,6</sup> The surgical personnel are able to evaluate the properties of the scrub solution, including effects on the skin and contribute to the final decision about the scrub solutions that are the most effective antimicrobial solutions and least harmful to the skin. The cost of the surgical scrub solution product should not be a factor that influences the decision making process.<sup>6</sup>
  - B. When evaluating a scrub solution, the following FDA standards should be taken into consideration. The scrub solution should:
    - substantially reduce transient microorganisms
    - possess a broad-spectrum of antimicrobial properties
    - be fast-acting
    - have persistent, cumulative activity
    - be a nonirritating antimicrobial preparation

## **Standard of Practice V**

**Alcohol-based solutions are an effective scrubbing agent.<sup>6</sup> The selection of an alcohol-based solution should be based upon the solution being FDA-approved that provides persistent, cumulative activity and is approved by the health care facility.**

1. The antimicrobial action of alcohols is the denaturing of proteins. Alcohol solutions that contain 60%-95% alcohol are the most effective. Solutions higher in

- alcohol concentration are less effective since the denaturing of proteins does not easily occur in the absence of water.<sup>6</sup>
2. Alcohols have a broad-spectrum of 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>6,21</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 scrub solution persistent, cumulative activity results.<sup>6</sup> Therefore, if a health care facility adopts the use of alcohol, it is recommended that the agent be a combination of alcohol and another scrubbing agent (alcohol-based solution).
    - A. Alcohol-based solutions have a greater antimicrobial activity as compared to other scrub solutions. Studies have shown that alcohol-based solutions immediately lower the microbial count on the skin postscrub more effectively than other scrub solutions.<sup>6</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 chlorhexidine gluconate alone. The next most effective scrubbing agents are chlorhexidine gluconate, iodophors, and triclosan.<sup>1</sup> Studies of parachlorometaxylenol (PCMX) have produced contradictory results and therefore, further studies are required in order to determine the efficacy of the agent with other scrubbing agents.<sup>38</sup>
  4. When using an alcohol-based solution, the health care facility procedure for performing the surgical scrub should follow the manufacturer's instructions since the instructions can vary according to the solution that is being used.
  5. The alcohol-based solution should not be used when the hands and/or forearms are visibly dirty or contaminated with proteinaceous materials since that decreases the antimicrobial action of the alcohol.<sup>22</sup> The hands and forearms should be prewashed with a non-antimicrobial soap; the hands and forearms should be thoroughly dried before using the alcohol-based solution.
  6. Alcohols are a flammable liquid 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 health care facility for the storage of flammables and removed from sources of flames, heating vents, and high temperatures.
    - B. Alcohol is the gold standard for hand washing and surgical scrub in Europe where it has been used extensively for years.<sup>6,13</sup> Reports concerning the use of alcohol-based solutions indicate a very low incidence of fires.<sup>41</sup>
    - C. Careful planning should occur related to the placement of the scrub solution dispensing containers. Because alcohols are highly volatile, the solution dispensing containers should be located away from light switches (source of sparks) and sources of heat, but still situated in a manner that is convenient for use by the surgical team members.

- D. The solution dispensing containers must be designed to prevent evaporation due to the volatility of alcohols.<sup>6</sup>
- E. The surgical team member must allow the hands and forearms to be thoroughly dry before donning the sterile gown and gloves.<sup>17,29</sup>

## **Standard of Practice VI**

**Surgical team members should perform a standardized surgical scrub procedure based upon manufacturer's written instructions that are specific to the scrub solution to be used and according to health care facility policy and procedures.**

1. Research and studies have not established what is the ideal procedure and duration of a surgical scrub. The Association of Professionals in Infection Control (APIC) recommendations include that the ideal duration of a surgical scrub has not been established and, in part, because it may be related to the type of scrub solution that is being used. Additionally, APIC indicates that no research clearly establishes if subsequent scrubs can be shorter as far as time.<sup>23</sup> The following research is presented in order to aid health care facilities establish what they consider is an optimal policy and procedure.
  - A. The American College of Surgeons recommends the duration of at least two minutes for the surgical scrub.<sup>37</sup>
  - B. Several European and Australian studies indicate that three to four minute scrubs are just as effective as a five-minute scrub.<sup>13</sup>
  - C. Several studies have shown that a five-minute scrub is as effective as a 10-minute scrub in reducing the microbial count.<sup>10,12,30</sup>
  - D. Other studies have also shown that a two- to-three-minute scrub reduces the microbial count to an acceptable level.<sup>16,31</sup>
  - E. Lastly, additional studies have indicated that a two-stage surgical scrub, using an antiseptic agent, followed by the use of an alcohol-containing preparation is as effective as a five-minute scrub with only an antiseptic agent.<sup>8,32</sup>
  - F. The advantages of a shorter scrub time include less damage to the skin and water conservation.<sup>6</sup>
2. The anatomical timed method or counted stroke method of performing the surgical scrub is acceptable. The surgical team member should follow health care facility policy.
3. The surgical team member should follow the general principles of completing a surgical scrub.
  - A. Prewash the hands and forearms with non-antimicrobial soap.
  - B. The subungual area should be cleaned with the use of a disposable nail cleaner under running water. The nail cleaner should not be discarded into the scrub sink and disposed of according to health care facility policy to prevent cross-contamination of the scrub sink.
  - C. The scrub should begin at the finger tips and end 2" above the elbows without returning to a clean area. The fingers, hands and forearms should be visualized as having four sides (planes) that must be thoroughly scrubbed, including the web space between each digit.

- D. One hand and forearm should be scrubbed, the scrub brush switched hands, and the other hand and forearm scrubbed.
- E. Hold hands higher than the elbows so that water runs from the finger tips toward the elbows. Additionally, keep the hands and arms away from the scrub attire, while keeping the elbows in a flexed position.
- F. If possible, when the water is not in use, it should be turned off to conserve.
- G. The scrub brush should not be discarded into the scrub sink and disposed of according to health care facility policy to prevent cross-contamination of the scrub sink.
- H. The surgical team member, after entering the O.R., should thoroughly dry hands and arms using aseptic technique prior to donning the sterile gown to prevent strike-through contamination. If an alcohol-based solution is used, it is necessary that the hands and arms be completely dry.

## Standard of Practice VII

### Performing the surgical scrub without a brush or sponge is acceptable.

1. The practice of using a brush can damage the skin resulting in increased shedding of microorganisms from the hands and arms. Scrubbing with a brush also contributes to an increase in the shedding of skin cells.<sup>28</sup>
2. Several studies confirm that the use of a brush or sponge is not necessary as well as demonstrating lower bacterial counts when a brushless surgical scrub is performed, as compared to the use of a brush, in particular when an alcohol-based solution is used that consists of 1% chlorhexidine gluconate and 61% to 70% alcohol.<sup>17,24,29</sup>

### Competency Statements

Competency Statements	Measurable Criteria
1. Certified Surgical Technologists (CSTs) and Certified First Assistants (CFAs) have the knowledge of infection control practices in order to prevent SSI.	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>
2. The CST and CFA have the knowledge and skills to perform the surgical scrub in an aseptic manner that promotes prevention of SSI.	2. The subjects of infection control practices to prevent SSI, aseptic technique, and performance of the surgical scrub are included in the didactic studies as a student.
3. The CST and CFA are qualified to participate in the decision making processes as related to evaluating surgical scrub solutions for use in the health care facility.	3. Students demonstrate knowledge of infection control practices, aseptic technique, and performance of the surgical scrub in the lab/mock O.R. setting and during clinical rotation.
4. The CST and CFA are qualified to	

<p>participate in the development and review of the health care facility policy and procedures for performing the surgical scrub.</p>	<p>4. As practitioners, CSTs and CFAs implement infection control practices, aseptic technique and perform the surgical scrub.</p> <p>5. As practitioners, CSTs and CFAs participate in the decision making processes for evaluating surgical scrub solutions for use in the health care facility. Additionally, they participate in the development and review of health care facility policy and procedures for performing the surgical scrub.</p> <p>6. CSTs and CFAs complete continuing education to remain current in their knowledge of infection control practices, aseptic technique, and surgical scrub.</p>
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