STERILE DRAPING:
FUNDAMENTAL PRACTICES

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STUDY GUIDE

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STERILE DRAPING: FUNDAMENTAL PRACTICES
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Sterile Draping: Fundamental Practices

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PURPOSE/GOAL
The purpose of this study guide and companion video is to review techniques for sterile draping, which is a fundamental aspect of sterile technique.

OBJECTIVES
After viewing the video and completing the study guide, the participant will be able to:

1. Explain the rationale for using sterile drapes to establish the sterile field.
2. Describe methods to drape equipment located next to or within the sterile field.
3. Discuss basic techniques for draping patients.
4. Identify proper ways to drape patients for four types of surgical procedures.
OVERVIEW
This study guide reviews concepts and practices related to sterile surgical drapes and draping, which are fundamental components of sterile technique.

Surgical drapes are used to create a sterile field around the surgical site and establish a physical barrier that reduces the risk of surgical site infections (SSIs) by decreasing the movement of microorganisms from unsterile to sterile areas. AORN recommends that perioperative team members use sterile surgical drapes on the patient, OR furniture, and equipment that are to be included in the sterile field, and that personnel handle surgical drapes in ways that prevent contamination.

Proper selection and correct use of sterile surgical drapes are essential practices for establishing and maintaining a sterile field. Sterile drapes must be handled properly to optimize their function and prevent contamination. They must also be placed correctly depending on the invasive procedure to be performed.

This guide first reviews basic principles of drape selection and use, and then describes proper draping methods for laparotomy, extremity surgery, lithotomy, and surgeries requiring facial exposure and robotic surgery.

HISTORICAL REVIEW
Standards for surgical drapes have evolved over time as researchers have studied and improved the physical barrier function of draping materials.

Reusable woven fabrics have been used to protect the surgical site since the turn of the last century. Initially, the most frequently used material for draping was muslin, a loosely woven cotton fabric; however, muslin was later observed to lose its barrier efficacy when wet. Because of this, muslin eventually was replaced with other woven, reusable materials and with nonwoven, single-use disposable surgical drapes.

The textile industry later began developing limited performance standards and methods to test products for barrier efficacy; however, manufacturers did not adapt or follow consistent protocols for these practices. Reusable drapes, in particular, were tested with a variety of methods. These inconsistencies made it difficult to compare the quality and performance of different products. In addition, as recently as the 1980s, there were no standards for flammability or fiber content, and numerous woven and nonwoven materials remained on the market.

Recently, these problems have drawn additional scrutiny because of increasing rates of bloodborne pathogen infections. These infections can be transmitted during surgery and other invasive procedures when products fail during surgery or when appropriate infection-prevention guidelines are not followed.

The American National Standards Institute, and the Association for the Advancement of Medical Instrumentation have published a common system for classifying drapes and protective apparel used in health care facilities, and have also published labeling requirements for these items. This guidance is based on standardized testing that assesses liquid barrier performance. The AORN recommendations emphasize the importance of consistent classification and labeling of surgical drapes by manufacturers.

SELECTING DRAPING MATERIALS
Selecting appropriate, high-quality draping materials is an important step in protecting patients from surgical-site and other health-care-associated infections. Several factors merit consideration during this process.

Drapes should be intact and of sufficient quality to withstand exposure to blood, body fluids, and other potentially infectious materials, as well as other liquids, rips, and abrasions. Drapes with holes, wear, or tears can allow microorganisms to pass through, increasing the risk of surgical site and other health-care-associated infections. In addition, the wicking of liquid
through a surgical drape can facilitate the passage of microbes. Excess pressure or stretching on a drape can also facilitate microbial transfer, if the force applied to the drape exceeds the material’s inherent resistance.

For these reasons, perioperative personnel should select drape products that are as resistant to penetration by blood, other body fluids, and tear force from hands and surgical instruments, as necessary, based on the specifics of the invasive procedure for which drapes will be used. AORN further recommends that manufacturers provide data on the ability of their materials to resist passage of microbes, particulates, and fluids, and that end users review this data.

Draperies should also be nontoxic, nonallergenic, maintain ambient and desired body temperature, and be large enough to conform to the patient’s body. Drapes should be low-linting because microorganisms and other particulates can attach to lint and settle in the surgical site or wound, causing SSIs.

Reusable drapes should be made from materials that are appropriate for the sterilization method used by the health care facility. Workers should not resterilize unused single-use drapes, unless they follow U.S. Food and Drug Administration (FDA) guidelines, or the specific written instructions of the manufacturer.

Finally, AORN recommendations state that drapes should have an acceptable cost-benefit ratio. However, cost should not be the main consideration when choosing surgical drape products.

**ESSENTIAL PRINCIPLES OF DRAPING**

Maximal sterile barrier precautions should be implemented to reduce the risk of health-care-associated infections. The Centers for Disease Control and Prevention (CDC) recommends maximal sterile barrier precautions, including placement of a full-body drape during placement of central venous catheters, peripherally inserted central catheters, and guidewire exchanges. This recommendation was the result of a randomized, controlled trial of patients undergoing non-tunneled central catheter insertion that was conducted at a 500-bed oncology referral center. The study found that the use of maximum sterile barrier precautions, which consisted of a full-body sterile drape plus a sterile gown, gloves, mask, and cap, was associated with lower rates of catheter colonization and catheter-related bloodstream infections as compared with the use of sterile gloves and a small drape only. The rate of catheter-associated septicemia in the control group was 6.3 times higher than in the intervention group. A cost-benefit analysis also favored the use of maximum barrier precautions.

Several important practices should be implemented to maintain sterility of surgical drapes and optimize their performance.

First, sterile drapes should be handled and moved as little as possible. Extraneous movement creates air currents, which increases the risk of contamination with airborne microorganisms and particles (e.g., lint and dust) that subsequently could enter the surgical site. In one study, researchers confirmed the presence of airborne contaminants in an OR by using a personal cascade impactor sampling
device to identify airborne lint and bacterial pathogens (e.g., *Staphylococcus aureus*) near the surgical field during vascular surgery.\(^5\)

Second, because microbial contamination is time-dependent, the amount of time between creation of the sterile field and the start of surgery should be kept as short as reasonably possible.\(^1\)

In addition, surgical drapes must be held so they cannot come in contact with unsterile surfaces.\(^1\) When draping the patient, the team members placing the drapes should begin at the surgical site and move toward the peripheral areas. This prevents drapes from dragging particles and microbes into the sterile field. Drapes also should be positioned so that when scrubbed team members lean over the sterile field during a procedure, the front of their surgical gowns do not touch unsterile surfaces.

Only the top of a draped table is considered sterile.\(^1\) Any part of the drape that falls below the table edge is regarded as unsterile and must not be moved back to the sterile zone. Likewise, if a sterilized item extends beyond the sterile boundary, it should be considered contaminated. Contaminated items must be removed and not returned to the sterile field.

To secure cables, tubing, and other surgical equipment to the drape, non-perforating tools should be used.\(^1\) Perforating the drape while attaching equipment to it increases the risk of microbial contamination and exposure to blood, body fluids, and other potentially infectious materials. It is preferred that sterilized instruments and tools added to the sterile field should be passed to a scrubbed team member instead of being placed on the draped sterile field.

Finally, the upper part of the C-arm drape should be considered contaminated.\(^1\) This recommendation is based on results from a prospective study of the sterility of C-arm drapes used during spinal surgery.\(^9\) Preoperative (control) and postoperative cultures were performed of swabs taken from five different sites on standard fluoroscopic C-arm drapes. Postoperative contamination was confirmed for all the sites tested, but contamination was highest at the top of the C-arm drape (56% of drapes contaminated) and the upper front of the receiver (28% contaminated). In contrast, the control drapes had a contamination rate of only 4%.
USING DRAPES TO ESTABLISH A STERILE FIELD

Laparotomy
This section reviews correct practices for laparotomy. Many aspects of draping for laparotomy also apply to draping patients for other types of surgery.

Draping Equipment
The AORN guidelines recommend that unsterile equipment (e.g., Mayo stands) be fully covered with sterile barriers before they are brought into the sterile field. Sterile-barrier material should also cover the parts of equipment that are positioned immediately adjacent to the sterile field. In addition, drapes should be controlled in a way that prevents them from moving and creating unnecessary air currents or touching unsterile surfaces before or during an invasive procedure.

• Sterile towels are used to outline the prepared surgical site.
• The folded laparotomy sheet is then placed on the prepped patient.
• The fenestration (opening) of the sheet should be directly on top of the surgical site. The fenestration is reinforced for additional protection and control of seepage of blood, body fluids, and other potentially infectious materials.
• The sterile gloves of the scrub person are protected by keeping them under the cuff of the folded laparotomy sheet.
• The drape is unfolded over the sides of the patient and the procedure or operating table or bed.
• The upper part of the sheet is unfolded toward the head of the bed and draped over the anesthesia screen.
• The bottom of the sheet is draped over the foot of the bed.
DRAPING FOR SPECIFIC OPERATIVE PROCEDURES
This learning guide next reviews aspects of draping for extremity, lithotomy, head and face, and robotic procedures.

Extremity Procedures
When preparing for extremity surgery, the patient’s limb should be draped after he or she is positioned and the skin is prepared. For procedures that require the use of large quantities of fluid (e.g., arthroscopy, wound irrigation), it is important to use drapes that do not permit soaking.¹

Another option to consider is the use of specially-designed sterile, disposable drapes that have fenestrations for the upper and lower limbs.

These steps should be followed⁶:
- A sheet is placed under the extremity.
- A towel is placed around the extremity, above the intended surgical site, and secured with a non-perforating towel clip.
- The extremity is covered with a sterile stockinette.
- The stockinette is an impervious, cylindrical drape that the scrubbed team member rolls up the arm or leg.
- A sheet is placed above the surgical area and secured with non-perforating towel clips.
- The extremity is drawn through the opening of a fenestrated drape.
Lithotomy Procedures
Perioperative personnel may use either a single fenestrated drape or multiple drapes during a lithotomy procedure. The single-drape method uses a one-piece drape that is specifically designed to cover the legs and the surgical site. When practicing this method, two scrubbed team members are required to open the folds and position the leggings over the legs.

These steps should be followed:

- First, the under-buttocks sheet is placed beneath the patient.
- The perineal area may be outlined with sterile towels.
- The drape is brought down between the legs so that the perineal fenestration can be seen.
- Placing gloved hands in the cuff, each legging is opened and drawn over a leg.
- The drape is unfolded toward the head.
- The armboard covers are then extended laterally.
- Surgical lines and tubing are then inserted through the tube holders and pouches on the drape.

When using multiple drapes:

- First, the under-buttocks sheet is placed beneath the patient.
- The perineal area may be outlined with sterile towels.
- Then the triangular lithotomy leggings are unfolded and drawn over the legs.
- Next, a fenestrated sheet is placed over the lower abdomen so that the opening is just above the pubic bone, exposing the genitals and perineum.
- A plain, non-fenestrated sheet is used for an anesthesia screen.
Head and Face Procedures
Some procedures require that the patient’s face be exposed (e.g., nasal surgery, blepharoplasty).

To adequately drape the patient, these steps should be followed:

- After the patient is positioned and the skin prepared, the scrubbed person should place a sterile towel on a sterile sheet.
- The center of the towel edges should be set approximately 2 inches in from the center of the sheet.
- The scrubbed team member’s gloved hands should remain within a protective cuff as the towel and drape are placed under the patient’s head.
- The patient’s head is elevated by an unscrubbed team member as the scrubbed person places the drape.
- The towel is brought up and around the patient’s head, over the forehead to the hairline, first one side and then the other.
- The towel is secured with a small, non-perforating towel clip.
- The surgical site is framed with 2 to 3 additional towels.
- A fenestrated, U-shaped drape is placed just below the surgical site.
- The sides of the drape are brought up to overlap the drape that is under the head.
- The bottom half of the operating bed is covered with an additional sheet.

Robotic Procedures
Use of robots during invasive procedures is becoming more common as technologies expand and are adapted for specific medical conditions. Robotic surgeries offer several advantages, including the potential for smaller incisions; decreased bleeding; less tissue trauma, inflammation, and postoperative pain; and shorter hospital stays and recovery times.

Methods of draping patients for robotic surgeries depend on the particular procedure being performed. For gynecologic procedures, for example, the patient should be draped using the same practices as for laparoscopic surgery.

When preparing for robotic surgery, the robotic system should be draped in sequence to implement and maintain sterility. The general sequence for draping is as follows:

- The ports, instruments, and arm clutching are draped.
- Then, the instrument arm is draped.
- Next, the touch screen monitor and the camera arm are draped.
- The endoscope and assembly are draped last.
SUMMARY
Evidence supports the use of sterile surgical drapes to protect perioperative personnel and patients during surgical and other invasive procedures. Perioperative professionals play an important role in using surgical drapes to create and protect the sterile field. Draping is most effective when perioperative team members plan the process carefully, evaluate sizes and characteristics of drapes based on the requirements for particular procedures and individuals, and follow standardized draping practices that maximize both patient safety and facility resources.
REFERENCES


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POST-TEST
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Multiple choice. Please choose the word or phrase that best completes the following statements.

1. Which of the following is NOT an effective practice to optimize the performance and safety of sterile surgical drapes?
   a. Resterilizing an unused, single-use drape only after consulting the manufacturer’s labeling directions and FDA guidelines
   b. Using a drape that is sized to conform closely to a patient’s body
   c. Selecting drapes based on the seepage, tear force, and duration expected for a particular invasive procedure
   d. Development of industry-wide standards by manufacturers for consistent classification and labeling of surgical drapes

2. Which of the following could compromise the physical barrier function of a sterile surgical drape and increase the risk of surgical site infections?
   a. Blood pooling on the drape
   b. Water wicking through the drape
   c. Excessive pressure or stretching during a procedure
   d. All of the above

3. When draping equipment:
   a. fully cover Mayo stands after they are introduced to the sterile field
   b. cover only the part of the equipment that is positioned next to the sterile field
   c. control the drapes to prevent them from moving and touching unsterile surfaces before or during an invasive procedure
   d. none of the above

4. When draping for a laparotomy, which of the following is NOT an accepted practice?
   a. Use sterile towels to outline the prepared surgical site
   b. Place the fenestration directly above the prepped surgical site
   c. Drape from the edges of the table toward the surgical site
   d. Protect the sterile gloves of scrubbed team members by keeping them under the cuff of the folded laparotomy sheet

5. When using a single drape for a lithotomy, the following instructions are correct, EXCEPT:
   a. place the drape so the edge is 2 inches from the perineum
   b. use the drape to cover the legs and surgical site
   c. unfold the drape toward the head, with the armboard covers extended laterally
   d. bring the drape between the legs so that the perineal fenestration is visible

6. When using several drapes for a lithotomy procedure, which of the following steps is NOT correct?
   a. Place the under-buttocks sheet underneath the patient
   b. Unfold the triangular lithotomy leggings all the way down the legs
   c. Place the fenestrated sheet over the lower abdomen so that the opening exposes the genitals and perineum
   d. Use a second fenestrated sheet for an anesthesia screen

7. When draping for an extremity procedure, perioperative personnel should choose surgical drapes with increased ability to withstand wicking and pooling.
   a. True
   b. False

8. Which of the following steps is NOT a correct step in draping for head and face procedures?
   a. The patient’s head is elevated by a scrubbed team member as the scrubbed person places the drape.
   b. The towel is brought up and around the patient’s head, over the forehead to the hairline, first one side and then the other.
   c. The towel is secured with a small, non-perforating towel clip.
   d. The surgical site is framed with 2 to 3 additional towels.
9. When draping for a robotic surgery, which order of draping should perioperative personnel follow?
   a. Endoscope and assembly; instrument arm; ports, instruments, and arm clutching; touch screen monitor and camera arm
   b. Ports, instruments, and arm clutching; instrument arm; touch screen monitor and camera arm; endoscope and assembly
   c. Endoscope and assembly; touch screen monitor and camera arm; instrument arm; ports, instruments, and arm clutching
   d. None of the above

10. Draping is most effective when perioperative nurses and other health care workers:
    a. plan the draping process carefully
    b. choose types and sizes of drapes by considering what is needed for particular procedures, patients, and team members
    c. follow standardized draping practices that maximize both patient safety and facility resources
    d. all of the above
POST-TEST ANSWERS
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1. d
2. a
3. c
4. c
5. a
6. d
7. a
8. a
9. b
10. d