Effective October 20, 2008
Revised January 2013
Revised July 2014

Standards of Practice for Gowning and Gloving

Introduction

The following Standards of Practice were researched and authored by the AST Education and Professional Standards Committee and are AST approved.

AST developed the following Standards to support healthcare facilities (HCF) and reinforce best practices as related to gowning and gloving in the perioperative setting. The purpose of the Standards is to provide information surgical team members can use to develop and implement polices and procedures for gowning and gloving. The Standards are presented with the understanding that it is the responsibility of the HCF to develop, approve, and establish policies and procedures for gowning and gloving according to established HCF protocols.

Rationale

The following are Standards of Practice related to gowning and gloving in the perioperative setting. Gowning and gloving is part of the daily routine of the CST in the OR. As required by Standard Precautions, sterile gowns and gloves are worn to prevent the migration of microbes from the skin and scrub attire of the sterile team member to the sterile field. Additionally, sterile attire prevents blood and body fluids from contaminating the team member. Lastly, sterile attire aids in preventing surgical site infections (SSI) by allowing team members to work within the sterile field. As a reminder OR personnel's skin, especially the hands, may not be an intact barrier to viral penetration on any given day. Allergic rashes, shearing injuries from suture tying, and weekend sports or other activities may cause unapparent breaks in the skin. Personal protective equipment should be chosen with these factors in mind. The inability to identify all patients infected with bloodborne pathogens reinforces the need for *effective* protection with all patients.

All surgical team members should be involved in the process of developing and implementing HCF policies and procedures for gowning and gloving.

Standard of Practice I

All sterile surgical team members are required to don a sterile surgical gown prior to entering the sterile field to aid in preventing surgical site infection (SSI).

1. Gowns are required to be worn according to Standard Precautions to provide a barrier between the patient and sterile surgical team member to reduce microbial and body fluid contamination of the surgical wound. Additionally, the gown protects the team member from the patient's blood and body fluids.[24]
2. Gowns are sterile in the front from mid-chest level to the level of the sterile field or waist level.
    A. If a surgical team member requires a standing platform, it should be positioned prior to the team member taking position at the sterile field. The team member should avoid changing levels, eg stepping down to take a new position at the sterile field.
    B. If the surgeon is seated for the surgical procedure, the entire surgical team should be seated and remain seated for the entire procedure, avoiding changing levels.
3. The gowns are sterile from two inches above the elbow to the cuff seam. The axillary region is not considered a sterile area.
4. The back of the gown is not considered sterile, because it cannot be observed by the sterile team member.
5. The sterile gown package for the CST in the first scrub role should be opened on a flat surface that is separate from the sterile back table; it is recommended to use the Mayo stand or prep table. The gown should not be opened onto the sterile back table, and the CST should not obtain the gown from the back table in order to avoid contaminating the sterile field, eg water dripping from the hands and/or arms or inadvertently touching a sterile item.
    A. A CST or other surgical personnel who have performed a surgical scrub and enters the OR when the procedure is in process should gown and glove from a flat surface that is separate from the sterile back table; it is recommended to use the prep table. The gown should not be opened onto the sterile back table or any other sterile surface, and the individual should not obtain the gown from the back table or sterile surface in order to avoid contaminating the sterile field, eg water dripping from the hands and/or arms, or inadvertently touching a sterile item.
    B. The final step of donning the gown and gloves is called turning. The circulator assists the CST with the turning of a wraparound-style gown. Since the CST cannot observe the back of the gown (see #4 above), it requires the coordinated effort of the two individuals to prevent contamination.
        (1) The CST must establish a 12" distance from sterile areas until the gown has been turned and secured; the CST should face the sterile field at all times and not turn the back to a sterile area.[3]
        (2) Upon undoing the tag from the gown the CST hands it to the circulator. The circulator should move behind the CST while the CST stands still; once the circulator is positioned to the left of

the CST, he/she can slightly rotate to receive the tie from the circulator.[3]

(3) This method of turning avoids contamination by preventing the back of the gown from facing a sterile field, the CST turning which stirs up dust and particles as well as causes billowing of the gown, and establishes a coordinated movement by the CST and circulator.

6. Gowns must be properly sterilized in accordance with the recommendations of the Association for the Advancement of Medical Instrumentation (AAMI) and American National Standards Institute (ANSI).
    A. Methods of sterilization for gowns include but are not limited to, radiation, steam, and ethylene oxide.
    B. Single-use gowns that are included in the sterile back table pack or were opened and included in the sterile set-up, but not used, should not be re-sterilized.
7. When reusable woven gowns are used, manufacturer's instructions should be consulted in regard to the care and reprocessing of the gowns.
8. Disposable and non-disposable contaminated gowns should be properly contained at the end of the surgical procedure. The gowns should be placed in impervious bags that are labeled with the biohazard symbol.
    A. Gowns should be removed prior to the removal of the gloves.

Standard of Practice II

A compromise in the integrity of the microbial barrier results in contamination.

1. Gowns must be free of holes, punctures and tears.
    A. Gowns should be resistant to punctures and tears to prevent microbial contamination of the sterile field and prevent SSI.

Standard of Practice III

Gown selection should be made according to the surgical procedure and the anticipated level of exposure to blood and body fluids.

1. Gowns should be resistant to blood and body fluid penetration.
    A. Intraoperatively patient body fluids and irrigating solutions come into contact with gowns.
    B. Gowns should be impervious and fluid-resistant to prevent strike-through contamination from microorganisms.[4] Prevention of strike-through contamination reduces the risk of SSI.
2. The gown product selection process should include evaluation of the performance qualities listed below as recommended by AAMI and ANSI/AAMI.[17,18]
    A. Microbial and fluid resistance
    B. Resistance to tears and punctures
    C. Comfort; fit loosely and comfortably to prevent excess heat build up.
    D. Durability, particularly related to repeated sterilization of non-disposable materials
    E. Gowns, in particular gowns composed of reusable woven material, are free of toxic substances, such as dyes and laundry detergent residues.

F. Flammability resistance
G. Lint free

3. Gowns, both disposable and non-disposable, are manufactured in styles that vary in the level of reinforcement, thus affecting the extent of fluid resistance.[13]
    A. It is the ethical responsibility of the surgical team to contribute to controlling the costs of the surgical procedure. The choice of gown should be based upon the procedure to be performed and the anticipated level of exposure to blood and body fluids.[15, 23] For example, exposure to blood and body fluids is minimal when a blepharoplasty is performed; therefore, a routine gown with the least reinforcement and thus less expensive will provide adequate protection. However, a high degree of exposure to blood and body fluids will occur during a total hip arthroplasty, thus requiring a gown with maximum reinforcement. The Stull and Pournoor (1998) article is a good source to consult; the tables in the article match procedures to level of exposure to blood and body fluids in order to better determine and select the gown to be used.[20]
4. It is recommended when a HCF is in the process of selecting gown materials that the AAMI Technical Information Report *Selection of Surgical Gowns and Drapes in Health Care Facilities*, No. 11-1994 be used as a primary guide.[17]

Standard of Practice IV
Gowns should be lint free as well as free of toxic substances.

1. Lint is recognized as a vector for causing SSI. Additionally, airborne lint serves as a medium for transport of microbes.
    A. Lint-free gowns minimize airborne contamination and spreading of particles into the surgical wound.
2. Gowns should be free of toxic substances.
    A. Gowns should be free of toxic substances such as dyes. Reusable gowns should also be free of laundry detergent residues.
    B. These substances could cause the surgical team member or patient to experience a negative reaction, ranging from mild skin rash to anaphylaxis.

Standard of Practice V
Gowns should be flame resistant.

A. Manufacturers of gowns should follow the standards for surgical gowns as established by the Consumer Product Safety Commission (CPSC) and National Fire Protection Agency (NFPA). The manufacturer should provide data concerning the gowns in order for the end user to evaluate the efficacy of the product. The surgical team should refer to the following standards when evaluating gowns:
    - NFPA: NFPA No. 702-1980 *Standard for Classification of the Flammability of Wearing Apparel*. In 1986, the NFPA removed this from their list of current standards, but it is still used as a reference by manufacturers, FDA, and AAMI as one of the standards to be used for evaluating the safety and performance

characteristics of gowns. This standard established four classes for rating gowns by two factors: ignition and flame spread. Class 1, relatively slow burn, is the most relevant for surgical team members.

- CPSC: 16 CFR Part 1610, *Standard for the Flammability of Clothing Textiles*. Through this standard, the CPSC is responsible for the regulation of gowns. When evaluating a gown, the surgical team members should confirm that the manufacturer's information includes the statement *The Basic Fabric Meets the Class 1 Flammability Requirements for CPSC 16 CFR Part 1610*.

2. Gowns should resist ignition from sources, such as lasers, fiberoptics, and electrosurgery within the sterile field.
    A. Surgery personnel should wear flame-resistant gowns when performing laser surgery.
    B. Surgery personnel should still exercise caution when wearing any type of gown, including flame-resistant gowns. Gown material is composed of natural and/or synthetic fibers that could be flammable. If the three components of the fire triangle, fuel, ignition, and oxygen, are present, the possibility of a fire exists.
3. HCFs should establish policies and procedures for fire prevention.
    A. Surgical personnel should complete annual competencies on fire safety.

Standard of Practice VI
The surgical team members should evaluate gowns based upon specific factors and characteristics.

1. When evaluating gowns the surgical team members should evaluate the information as provided by the American Society for Testing and Materials (ASTM).
    A. ASTM developed two tests, F1670 and F1671 for assessing the fluid and microbial barriers of surgical non-woven and woven fabrics.[17, 18]
    B. The manufacturer should provide the information as related to the results of these tests when the surgical team members are evaluating gowns.
    C. AAMI and the U. S. Food and Drug Administration both confirm that the ASTM tests are the definitive tests for assessing the fluid and microbial barriers of surgical fabrics.

Standard of Practice VII
Gowns made of reusable woven fabric should have the same barrier characteristics as single-use non-woven disposable fabrics.

1. The thread count and chemical treatments establish barrier properties of the woven fabric.
    A. It is recommended that woven fabrics with a thread count of 270 to 280 be used as sterile gowns.
    B. It is recommended that woven fabrics treated with chemicals to increase the barrier properties be used as sterile gowns.

2. A system should be established for monitoring the number of times a woven fabric gown undergoes reprocessing.[9]
    A. Repeated laundering and sterilization of woven fabrics decreases the barrier effectiveness.
    B. The number of uses, launderings, and sterilization should be recorded in order to monitor the woven fabrics effectiveness as a barrier. Woven fabrics with a high-thread count should be considered a non-effective barrier after approximately 75 reprocessings.
3. Reusable gowns must be visually inspected prior to sterilization.
    A. For small holes or thin, stretched areas of fabric, a patch of the same type of draping material may be applied. The patches should be heat-sealed to the gown; stitching the patch must never be allowed as a method for repairing a drape.

Standard of Practice VIII
Surgical team members should be involved in the selection process of gowns to be used in the OR.

1. Surgical team members should be involved in the evaluation of gowns that are being considered for use in the OR.
    A. It is highly recommended that the team members refer to the AAMI document *Technical Information Report TIR No. 11-1994* during the evaluation process.[17]
    B. It is also recommended that team members refer to the ANSI/AAMI document *Liquid Barrier Performance and Classification of Protective Apparel and Drapes Intended for Use in Healthcare Facilities* during the evaluation process.[18]
    C. It is recommended the team members evaluate a variety of manufactures gowns including reviewing the manufacturer's documentation in order to determine they are meeting ANSI/AAMI standards for performance.
    D. Manufacturers should be requested to provide information that verifies the gowns fabric provides the appropriate barrier against microorganisms and fluids, is resistant to tears and punctures, and is flammable resistant.

Standard of Practice IX
All sterile surgical team members are required to don sterile gloves prior to entering the sterile field to aid in preventing SSI.

1. Gloves are required to be worn according to Standard Precautions to provide a barrier between the patient and sterile surgical team member to reduce microbial and body fluid contamination of the surgical wound. Additionally the gloves protect the team member from the patient's blood and body fluids.
2. Gloves must be worn in order for the team member to handle sterile supplies, equipment and instruments, and touch tissue.
3. The closed gloving method is the recommended method for donning the gloves.[3]
    A. The closed gloving method is best practice for preventing contamination when gloving since the fingers, hands and wrists are not exposed.

B. When performing the closed gloved method the fingers and hands should not extend into the cuff until the gloves are being pulled on.

4. If a glove becomes contaminated, the situation should be immediately addressed by implementing one of the following methods. The methods reflect best practice as well as routine practice through the application of the principles of asepsis in order to prevent the patient from acquiring a SSI.
    A. Circulator, wearing non-sterile gloves, removes the contaminated glove touching only the glove and not the gown. The circulator should not include the cuff of the gown by pulling it over the team member's hand since the cuff is not considered sterile. A member of the sterile team should then re-glove the person, eg, assisted gloving.
    B. If a member of the sterile team cannot perform assisted gloving the team member with the contaminated glove should remove the gown and gloves, and re-gown and re-glove using the closed gloving method.
    C. If the above methods cannot be implemented and in order to prevent the patient from acquiring an SSI, the team member with the contaminated glove should perform self gloving using the open glove technique.
    D. When necessary if the above methods cannot be implemented, the team member should don a sterile glove over the contaminated glove using the open gloving technique. When time permits one of the other methods stated above should be performed.
5. Contaminated gloves should be properly contained at the end of the surgical procedure.
    A. Gloves are removed after the gown is removed.
    B. The gloves should be placed in impervious bags that are identified by the biohazard symbol. The gloves should not be thrown or "sling-shot" into the container; this can cause blood or body fluids to be splattered on the floor, walls and/or OR furniture, as well as cause exposure to the eyes of the other team members.[7]
    C. Hand washing should be performed after removing the gloves.

Standard of Practice X

The primary factors for glove selection are thickness, strength and durability.

1. Glove material differs in chemical composition, strength, thickness and durability. [16]
    A. The team members should evaluate gloves based upon specific factors and characteristics.
    B. The glove product selection process should include reviewing the information provided by the American Society of Testing Materials (ASTM) for the glove material in order to allow the surgical team members to make an informed choice or choices.
    C. Information that should be requested and obtained from the glove manufacturer includes technical data, infection control data, and failure rate data pertaining to testing the glove material under simulated use conditions.

2. Gloves should be resistant to blood and body fluid penetration.
    A. Intraoperatively patient body fluids and irrigating solutions come into contact with gloves. The gloves should be impervious and fluid-resistant to prevent the wearer being contaminated by microorganisms.
3. Gloves made of natural rubber latex or synthetic non-latex is the glove materials of choice when the potential exists for exposure to blood and body fluids.
    A. Synthetic non-latex gloves are comparable to natural latex rubber gloves in barrier performance, comfort, and tactile sensitivity.
4. Synthetic non-latex gloves offer an alternative to the natural rubber latex sensitive surgical team member. Examples of synthetic non-latex materials include butyl, neoprene, nitrile and styrene. Refer to the AST standard on latex allergy for additional information.
5. Vinyl gloves are not recommended for use by the team members.
    A. The barrier properties of vinyl gloves are inferior to natural rubber latex and synthetic non-latex gloves. [2,10,16]
    B. Vinyl gloves quickly degrade with use and have a high failure rate in simulated use conditions.[16]

Standard of Practice XI
Double gloving is recommended for all surgical procedures.

1. The literature review of the results of five major studies reveals the following[8,12,14,21,22:]
    A. There is no difference in the number of perforations between a single pair of gloves and the outer glove when the individual is double gloved.
    B. The number of perforations to the innermost glove when an individual is double gloved is significantly reduced.
    C. There is no difference in the number of perforations to the innermost glove when double gloving as compared to wearing a single pair of orthopedic gloves.
    D. When wearing a colored glove as the innermost when double gloving it is considerably easier to detect perforations to the outer glove. However, it does not increase the detection of perforations of the innermost glove.
    E. Glove liners worn between the two gloves when double gloving significantly reduces the number of perforations to the innermost glove.
    F. Wearing an outer cloth glove over the inner glove versus standard double gloving significantly reduces the number of perforations to the innermost glove.
    G. There is no difference in the number of perforations to the innermost glove when wearing steel weave gloves as the outer glove as compared to standard double gloving.
2. The following recommendations are made based upon the literature review.
    A. Members of the sterile surgical team should double glove for added protection and consequently to reduce the risk of exposure to patient blood and body fluids. Additionally, if a sharp accident occurs, the amount of blood and body fluid is reduced by being wiped or stripped off

the sharp as it passes through the first glove thus reducing the risk of exposure to the wearer as the sharp passes through the innermost glove.

B. The CDC supports double gloving as a routine practice for all invasive procedures.[4] The Berguer and Heller article published in the Journal of the American College of Surgeons supports routine double gloving based upon the results of studies.[1]

C. The team members should wear a colored glove as the innermost glove. During orthopedic procedures, in particular those procedures that involve handling bone, the team members should consider wearing a glove liner between two pairs of gloves or wearing a cloth outer glove over the inner standard glove. However, it is recommended the team members take into consideration that the wearing of steal weave outer gloves does not reduce the number of perforations to the innermost glove as compared to standard double gloving.

D. The team members should remove the outer glove prior to applying the sterile dressing.[7]

Competency Statements

Competency Statements	Measurable Criteria
1. The CST is knowledgeable of the importance of reducing microbial contamination through the use of sterile gowns and gloves to reduce the risk of SSI. 2. The CST is knowledgeable of the need to prevent strike-through contamination to protect themselves and the patient from microbial contamination. 3. The CST is knowledgeable of the gowning and gloving procedures and has the skills for properly performing the procedures in an aseptic manner. 4. The CST is knowledgeable of the need to implement cost-effective measures in the selection and use of gowns and gloves without compromising the care of the patient. 5. The CST is knowledgeable of the fire hazards in the HCF and measures that are implemented to reduce the risks.	1. Educational standards as established by the *Core Curriculum for Surgical Technology*.[5] 2. The subject of gowning and gloving is included in the didactic studies as a student as well as the principles of asepsis. 3. Students demonstrate knowledge of gowning and gloving procedures in the lab/mock OR setting and during clinical rotation. 4. As practitioners, CSTs perform gowning and gloving procedures. 5. CSTs complete continuing education to remain current in the principles of asepsis and practice of sterile techniques including annual review of the policies of the HCF.

References

1. Berguer R, Heller PJ. (2004). Preventing sharps injuries in the operating room. *J Am Coll Surg*. 199, 462-467.

2. Burt S. What you need to know about latex allergy. *Nurse Manager*. (1999). *30*(8), 20-25.

3. Long JB. Surgical case management. In: KB Frey, T Ross, eds. *Surgical Technology for the Surgical Technologist: A Positive Care Approach,* 4th ed. Clifton Park, NY: Cengage Learning; 2014: 321-394.

4. Centers for Disease Control and Prevention. Guideline for prevention of surgical site infection.1999. Available at: http://www.cdc.gov/hicpac/pdf/ssiguidelines.pdf. Accessed February 4, 2008.

5. *Core Curriculum for Surgical Technology*. 6th ed. Littleton, CO: Association of Surgical Technologists; 2011.

6. Davis MS. *Advanced Precautions for Today's O.R.* 2nd ed. Atlanta, GA: Sweinbinder Publications; 2001.

7. Duron JJ, Keilani K, Elian NG. (1996). Efficacy of double gloving with a coloured inner pair for immediate detection of operative glove perforations. *Eur J Surg, 162*(12), 941-944.

8. Healthcare Laundry Accreditation Council. (2006). Accreditation standards for processing reusable textiles for use in healthcare facilities. Available at: http://www.hlacnet.org/HLAC_Standards_042006.pdf. Accessed April 11, 2008.

9. Korniewicz DM, Laughon BE, Butz A, Larson E. (1989). Integrity of vinyl and latex procedure gloves. *Nursing Research, 38*(3), 144-146.

10. Liquid barrier performance and classification of protective apparel and drapes intended for use in healthcare facilities. (PB70 2012) American National Standards Institute/Association for the Advancement of Medical Instrumentation. Arlington, VA; 2012.

11. Louis SS, Steinberg EL, Gruen OA, Bartlett CS, Helfet DL. (1998). Outer gloves in orthopaedic procedures: A polyester/stainless steel wire weave glove liner compared with latex. *J Orthop Trauma, 12*(2), 101-105.

12. McCullough EA. (1993). Methods for determining the barrier efficacy of surgical gowns. *Am J Infect Control, 21*(6), 368-374.

13. Murta EF, Silva CS, Júrnior OR. (2003). Frequency of glove perforation and the protective effect of double gloves in gynecological surgery. *Arch Gynecol Obstet, 268*(2), 82-84.

14. Occupational and Safety Health Administration. US Department of Labor. Bloodborne pathogens 1910.1030. Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051. Accessed February 28, 2008.

15. Rego A, Roley L. (1999). In-use barrier integrity of gloves: Latex and nitrile superior to vinyl. *Am J Infect Control, 27*(5), 405-410.

16. Selection of surgical gowns and drapes in health care facilities. *AAMI Technical Information Report TIR No. 11-1994*. Association for the Advancement of Medical Instrumentation. Arlington, VA; 1994.

17. Standard test method for resistance of materials used in protective clothing to penetration by bloodborne pathogens using Phi-X174 bacteriophage penetration as a test system. (F1671-976.) American Society of Testing Materials. West Conshohocken, PA: 2003.

18. Standard test method for resistance of materials used in protective clothing to penetration by synthetic blood. (F1670-98.) American Society of Testing Materials. West Conshohocken, PA; 1998.

19. Stull JO, Pournoor KJ. (1998). Using the ASTM test methods to select surgical gowns and drapes. *Surgical Services Management, 4*(2), 13-15, 19-22.

20. Sutton PM. (1998). The protective effect of a cut-resistant glove liner: A prospective, randomized trial. *J Bone Joint Surg, 80-B*, 411-413.

21. Tanner J, Parkinson H. (2006). Double gloving to reduce surgical cross-infection. *Cochrane Database of Systematic Reviews, 2*, Art. No. CD003087, DOI 10.1002/14651858.CD003087.pub2

22. Telford GL, Quebbeman EJ. (1993, December). Assessing the risk of blood exposure in the operating room. *Am J of Infect Control, 21*(6), 351-356.

23. Wong ES. Surgical site infections. In: CG Mayhall, ed. *Hospital Epidemiology and Infection Control*, 4th ed., pp. 154-175. Philadelphia, PA: Lippincott Williams & Wilkins; 2011.