

Do Surgical Personnel Really Need to Double-Glove?

JANET THOMAS-COPELAND, RN, BSN, MA

In 2007, AORN revised its “Recommended practices on prevention of transmissible infections in the perioperative practice setting” regarding gloving to read, “Health care practitioners should double-glove during invasive procedures.”^{1(p621)} This is a change from the former recommendation in the “Recommended practices for maintaining a sterile field,” which stated that “wearing two pairs of gloves (ie, double-gloving) may be indicated for some procedures. . . .”^{2(p367)} This change was made because of compelling research indicating that health care workers are better protected from bloodborne pathogen transfer by wearing two pairs of gloves, but many health care personnel have not yet changed their gloving practices.

ABSTRACT

In 2007, AORN’s Recommended Practices Task Force revised the “Recommended practices on prevention of transmissible infections in the perioperative practice setting” to recommend that health care practitioners double-glove during invasive procedures. Previously, AORN had suggested that wearing two pairs of gloves might be indicated for some procedures.

Research on the protective effects of double gloving provides compelling evidence that surgical personnel should double-glove during all surgical procedures. Statistics on unreported injuries and conversion rates of HIV and hepatitis B indicate that change is difficult; however, research also suggests that objections to double-gloving can be overcome and a practice change implemented to ensure the safety of health care workers and patients alike.

Key words: *gloves, double-gloving, glove performance.* *AORN J* 89 (February 2009) 322-328. © AORN, Inc, 2009.

This article reviews the history of glove use, discusses factors that affect glove failure in the OR, and presents possible consequences of glove failure. Research on double-gloving also is reviewed including techniques to make double-gloving more comfortable and effective.

EVOLUTION OF SURGICAL GLOVE USE

Gloves were first introduced into the surgical arena in the 1890s. William Halstead, MD, commissioned the Goodyear Rubber Company to make the first pairs of rubber gloves to protect the hands of nurses and surgical assistants from the harsh disinfecting agent carbolic acid.³ The gloves were crude and cumbersome, but they protected workers’ hands from this and other harsh chemicals. It soon became apparent that wearing the gloves also reduced the rate of postoperative infections among patients and decreased mortality.³ By the early 1900s, the use of rubber surgical gloves had become routine in ORs in both Europe and the United States.⁴

In the 1980s, health care practices began to change as concerns about HIV and hepatitis increased. With the proliferation of these diseases, the Centers for Disease Control and Prevention (CDC) instituted universal precautions—now called standard precautions—in the late 1980s.⁵ The Occupational Safety and

© indicates that continuing education contact hours are available for this activity. Earn the contact hours by reading this article and taking the examination on pages 329–330 and then completing the answer sheet and learner evaluation on pages 331–332. The continuing education credits for this article expire February 29, 2012.

You also may access this article online at <http://www.aornjournal.org>.

Health Administration (OSHA) published its bloodborne pathogen standard in 1992, which required the use of medical gloves as a method to protect health care workers when contact with blood or body fluid was anticipated.⁶

As pathogens have evolved, so has the concern regarding antimicrobial resistance, which has led many OR personnel to begin to think more about the surgical gloves they use. Health care professionals expect gloves to be of good quality, to perform effectively, and at the same time to provide good fit and comfort for the variety of procedures that are performed in today's busy ORs. To make fully informed decisions regarding the appropriateness of double-gloving in the OR, surgical personnel need to educate themselves about standards for the glove manufacturing process; requirements for glove performance; factors occurring during surgery that can cause glove failure, and risks associated with glove failure.

FACTORS AFFECTING GLOVE PERFORMANCE

The ASTM, previously known as American Society for Testing and Material, sets the standards for the manufacture of latex and synthetic gloves to include standards for

- sterility,
- freedom from holes,
- physical dimensions,
- physical properties,
- powder-free residue,
- protein content,
- amount of powder, and
- antigenic protein content.⁷

The US Food and Drug Administration (FDA) and OSHA enforce these standards, ensuring that all manufacturers adhere to them. Some of these standards are exact (eg, the freedom from holes is exactly 1.5 holes per 1,000 gloves). Others have minimum numbers that must be obtained, such as physical dimensions for gloves (eg, length, thickness, tensile strength, elongation, modulus). Most of the ASTM requirements are expressed in ranges, and that is why gloves will vary somewhat from manufacturer to manufacturer. For example, natural rubber latex surgical gloves must be 10.5 to 12 inches long.

Furthermore, to meet FDA requirements, all gloves must provide adequate barrier protection

Health care professionals expect gloves to be of good quality and to perform effectively and at the same time provide good fit and comfort for the variety of procedures that are performed in today's busy ORs.

against pathogens such as HIV and hepatitis B and must fulfill the requirements of glove protection as described in OSHA's bloodborne pathogen standard.⁸ Manufacturers must submit a 510(k) application (ie, premarket application) to the FDA. The information in this application describes and documents the safety and efficacy of the finished medical device. If the FDA deems the device to be substantially equivalent to a legally marketed medical device that is currently approved for sale in the United States, clearance is granted to market the product.⁸

Manufacturers adhering to these regulations have met the challenge of producing high-quality surgical gloves with outstanding performance capabilities in both latex and synthetic materials for use by health care workers around the world. Even with the improved technology for producing modern-day surgical gloves, however, there are still factors that increase the likelihood of glove failure. These factors include mechanical stress on the glove, type of surgery performed, number of instruments used during the procedure, the wearer's role in the surgical procedure, and the length of the surgery.

MECHANICAL STRESS, TYPE OF SURGERY, AND NUMBER OF INSTRUMENTS. Many factors in the OR act as mechanical stressors on the glove to influence its performance (eg, type of surgical procedure, type and number of instruments used). Using heavy, sharp instruments, (eg, drill, reamers, osteotomes) such as those used in large orthopedic procedures, contributes to more frequent glove failure.

Yinusa identified a glove perforation rate in nearly half of orthopedic procedures studied and determined that scrubbed team members were at significant risk of exposure to patients' bodily fluids.

One mechanical stressor is the type of surgical procedure that is being performed. Several studies have evaluated glove perforation rates during surgical procedures.⁹⁻¹¹ These rates vary from 22% to 61% during various types of surgical procedures. According to Berguer,⁹ the highest rates (61%) were reported in orthopedic, trauma, and thoracic surgery because surgeons in these fields deal with sharp, fractured bones or bony structures in the thoracic cage. According to Laine,¹⁰ the rate of glove perforation was 18.3% for all types of procedures. Laparoscopic surgery showed a lower frequency of glove perforations.¹⁰ Yinusa¹¹ identified a glove perforation rate in nearly half of orthopedic procedures studied and determined that scrubbed team members were at significant risk of exposure to patients' bodily fluids. Boney procedures have been associated with higher glove failure than soft tissue surgery.^{12,13} There is a trend in the literature showing that in any type of surgery, greater numbers of instruments present on the surgical field are associated with a higher glove failure rate.

GLOVE-WEARER'S ROLE. Researchers have identified significant differences in the glove defect rate depending on the wearer's role during the surgical procedure. Some studies describe scrub personnel as being at the highest risk for experiencing glove failure and cite glove failure rates as high as 17%.¹⁰⁻¹² Other studies determined that surgeons have the highest risk for glove failure and cite failure rates as high as 30%. Yet

other studies have found that assistants experience glove failure 21% of the time.^{12,13}

More importantly, many of the defects are not noticed until the end of the surgical procedure when the gloves are removed and blood is observed on the hands.³ Injuries are most likely to occur on the nondominant hand and involve primarily the index finger, followed by the thumb, then the second finger, and finally the dorsal aspect of the palm. The index finger of the left hand of the surgeon is the most prone part of the glove to be punctured.^{10,12} The second most common place for the glove to fail is the left thumb of the surgeon.¹² This is because the surgeon typically holds the instrument (eg, needle holder with needle) in his or her right hand and accidentally punctures the glove of the opposite hand. Although the mechanism of glove injuries is not always clear, several practices seem to increase the number of glove perforations:

- retracting tissue with the fingers,
- using dull instruments,
- blindly feeling for needle placement with the tip of the finger, and
- loading and unloading the needle holder by hand.

This last practice is extremely dangerous as evidenced by glove perforation numbers from scrub personnel.¹⁴

Glove failures seem to be related to

- the experience of the health care provider involved,
- the complexity of the instrumentation,
- human fatigue, and
- increased permeability of the glove.

Experience is conversely related to the risk of glove failure; the more experienced the health care worker, the higher the glove failure rate. Chapman and Duff¹⁴ found that senior residents experienced increased numbers of glove perforations, which may be because they function as primary surgeons or assistants on more difficult procedures.

TIME OF WEAR AND SURGICAL PROCEDURE LENGTH.

Glove performance decreases with the length of time the gloves are worn. According to St Germain et al,¹⁵ glove defects are as high as 56% for surgeries that last more than two hours, compared to 20% for surgeries that last

less than two hours. Studies have shown that the incidence of glove defects increases with the duration of surgery.^{3,15} One study found that the risk of glove perforation increases 1.115 times for every 10 minutes of surgical time.³ Perforations are significantly higher for emergency procedures than they are for scheduled procedures.³

RESEARCH REGARDING DOUBLE-GLOVING

The evidence for wearing two pairs of gloves during surgical procedures is strong and compelling. In 1992, Quebbeman et al¹⁶ studied exposure in the surgical environment and reported a 51% hand-contamination rate for those who wore a single pair of gloves compared to a 7% contamination rate for those who wore two pairs of gloves. Tanner and Parkinson,¹⁷ authors of a 2002 Cochrane review on double-gloving, independently assessed the relevance and quality of 18 studies on double-gloving from various surgical arenas that differed in terms of stressors applied to the gloves, such as bone fragments, wire closures, and types and numbers of instruments used. Practitioners varied from primary surgeons to scrub personnel. The results of the review demonstrated that double-gloving represents increased barrier protection for the wearer compared to single-gloving.¹⁷ Conclusions from the Cochrane review were that

Two layers of surgical gloves can reduce the number of breaks to the innermost glove that might allow cross-infection between the surgical team and patient. . . . A second pair of gloves does protect the first set, without apparently lessening surgical skill.¹⁷

Chapman and Duff¹⁴ reported data on double-gloving in obstetrical procedures. Of six sets of double-glove studied, 66 holes were found

in the outer gloves and seven holes in the inner gloves. Their summary determined that the difference in the frequency of damage to inner and outer gloves was highly significant. Chapman and Duff suggested new recommendations to double-glove routinely during delivery and obstetric surgical procedures.¹⁴ Albin et al,¹⁸ determined that when tested at 15-minute intervals, double gloves leaked 25% of the time, while single gloves leaked 59% of the time. A study by Greco and Garza¹⁹ supported double-gloving, stating that OR personnel's risk decreased by 70% when wearing two pairs of gloves in comparison with wearing a single pair of gloves.

HEALTH CARE WORKER RISK AND INJURY

Given the available evidence, why isn't everyone double-gloving? One reason may be that most research does not also inform health care workers of the consequences of blood and body fluid contamination by reporting on postexposure seroconversion after injuries and blood exposures. It is essential for health care providers to understand the true risk of exposure and the probability of postexposure seroconversion should a breach in the gloves occur via injury or blood contamination on broken or chapped skin. Several studies have indicated that a large number, and perhaps a majority, of OR injuries go unreported.^{9,20} According to a survey of 14,215 health care workers, surgeons failed to report 73% of sharps injuries and other health care workers did not report 52% of injuries.²⁰

Suture needles are the most frequent source of injury, involved in as many as 77% of injuries. Sixteen percent of injuries occur during the passing of sharp instruments.⁹ Most injuries are unintentionally self-inflicted, but coworkers accidentally inflict a notable number on one another, perhaps as many as 24%.¹² Approximately 33%

Of six sets of double gloves studied, 66 holes were found in the outer gloves and seven holes in the inner gloves.

In one study comparing sensitivity with one and two pairs of gloves, surgeons showed no alteration in the ability to tie surgical knots or in the two-point discrimination test. The consensus was that wearing the larger glove on the outside was more comfortable than wearing the larger glove on the inside.

of devices that cause injuries come in contact with the patient after the injury to the health care worker, so there is also risk of disease transmission from the health care worker to the patient.⁹

A sharps injury can mean dire consequences for the individual. Every year, an estimated 100 to 200 injured workers die from hepatitis B.²⁰ Hundreds of others contract hepatitis C, which can be fatal as well. The CDC also has documented nearly 200 cases of HIV in health care workers as of June 2001, classifying them as either confirmed or possible occupationally related transmissions.²⁰ Health care providers have an ethical responsibility to report injuries and to take appropriate postexposure medication.

INSTITUTING A CHANGE IN PRACTICE

Any change in practice is difficult. The most frequently heard objection to donning two sets of gloves has been that the wearer anticipates or perceives that donning a second pair of gloves will decrease tactile sensitivity.¹⁰ Quebbeman et al¹⁶ found, however, that there was an 88% acceptance rate among study participants who wore two pairs of gloves, and none of the study participants perceived any decrease in tactile sensitivity.

Webb and Pentlow²¹ also examined the effects

of double-gloving on tactile sensitivity and dexterity. Double-glove testing was conducted in several different ways, with a larger glove worn on the inside as well as a larger glove worn on the outside. There was an equal distribution of glove sizes used by surgeons for double-gloving: larger glove inside (31%), smaller glove inside (35%), both gloves the same size (31%). Surgeons were asked to tie surgical knots and complete the Dellon's moving two-point discrimination test (ie, to determine when a glove wearer feels sensation in different areas of the hand and fingers). The test was performed twice with the surgeons wearing one and two pairs of gloves, and the values were compared for sensitivity. The findings showed no alteration in the ability to tie surgical knots or in the two-point discrimination test. The consensus was that wearing the larger glove on the outside was more comfortable than wearing the larger glove on the inside.²¹

Before universal precautions were instituted in the 1980s, nurses did not wear examination gloves for routine patient care. With the change to universal precautions, it became necessary for nurses to wear gloves to start IVs. Many nurses were concerned that they would not be able to find the vein and start an IV with gloves on. According to a report from Edlich et al, however,

Given a comfortable size combination, it is likely that during the accommodation period, cortical retraining will occur. The somatosensory cortex will undergo cortical remapping when challenged with new sensory stimuli. Therefore, the perception of decreased sensation, experienced by the surgeon when first using double-gloves, will likely be minimized and overcome with sensory cortical remapping. . . . The [health care provider] who is just beginning to use double-gloves should try various combinations; when a comfortable fit is found, perceived hand sensitivity will likely improve with increased experience using double-gloves.^{22(p90)}

TWO-COLOR GLOVE INDICATOR SYSTEM

One significant issue identified in the literature review was that most glove defects were not identified at the time of the incident; most

are noticed at the end of the procedure when the gloves are removed and blood is noted on the hand.³ One method to increase the likelihood of noticing perforations is to wear a two-color indicator system of surgical gloves. This indicator system is made up of two gloves of different colors so that punctures on the outer glove are revealed when they occur. Florman²³ determined that 84% of the holes in the indicator system for latex surgical gloves were recognized in an average of 22 seconds, and 56% of the holes in synthetic surgical gloves were noted in 42 seconds. In nonindicator systems, the latex and synthetic holes were only identified 8% and 12% of the time at 47 seconds and 67 seconds respectively.

Nicoali et al²⁴ determined that wearing gloves of two different colors significantly increased the awareness of perforation. Avery et al determined that there were "fewer unnoticed perforations in the glove perforation indicator group than the standard surgical glove group [ie, 19% compared with 79%]."^{25(p316)} Whether a color indicator system is being used or not, both the inner and outer gloves should be changed as soon as possible when a perforation is noted. Perforations in the outer gloves are an indication that the inner glove may be compromised as well.

CONCLUSION

Two gloves are better than one. The history of double-glove use as well as current research has shown that the incidence of perforations during glove use is lower, at times as much as 10 to one, for double-gloving versus single-gloving. There are ways to implement double-gloving that increase comfort and protection. Glove safety can be further increased by wearing properly sized gloves and changing them regularly. Although currently the choice to double-glove is optional, evidence indicates that double-gloving is the best practice that can protect both the health care provider and patient. — **AORN** —

REFERENCES

1. Recommended practices for prevention of transmissible infection in the perioperative practice setting. In: *Standards, Recommended Practices, and Guidelines*. Denver, CO: AORN, Inc; 2007:619-629.
2. Recommended practices for maintaining a sterile field. In: *Standards, Recommended Practices, and Guidelines*. Denver, CO: AORN, Inc; 2004:367.
3. Twomey CL, Double gloving: a risk reduction strategy. *Jt Comm J Qual Saf*. 2003;29(7):369-378.
4. Korniewicz DM. Barrier protection of latex. *Immunol Allergy Clin North Am*. 1995;15(1):123-136.
5. Universal precautions for prevention of transmission of HIV and other bloodborne pathogens. Centers for Disease Control and Prevention. http://www.cdc.gov/ncidod/dhqp/bp_universal_precautions.html. Accessed December 16, 2008.
6. Bloodborne pathogens – 1910.1030. US Department of Labor; Occupational Safety and Health Administration. *Fed Regist*. 1991;56(235):64004. Codified at 29 CFR §1910.1030. http://www.osha.gov/pls/oshaweb/owa_disp.show_document?p_table=STANDARDS&p_id=10051. Accessed December 12, 2008.
7. ASTM D3577-06e1 standard specification for rubber surgical gloves. ASTM International. <http://www.astm.org/Standards/D3577.htm>. Accessed December 19, 2008.
8. Premarket notification 510(k). US Food and Drug Administration. <http://www.fda.gov/CDRH/DEV/ADVICE/314.html>. Accessed December 19, 2008.
9. Berguer R, Heller PJ. Preventing sharps injuries in the operating room. *J Am Coll Surg*. 2004;199(3):462-467.
10. Laine T, Aarnio P. How often does glove perforation occur in surgery? Comparison between single gloves and double-gloving system. *Am J Surg*. 2001;181(6):564-566.
11. Yinusa W, Li YH, Chow W, Ho WY, Leong JC. Glove punctures in orthopaedic surgery. *Int Orthop*. 2004;28(1):36-39.
12. Hollaus PH, Lax F, Janakiev D, Wurnig PN, Pridun NS. Glove perforation rate in open lung surgery. *Eur J Cardiothorac Surg*. 1999;5(4):461-464.
13. Thanni OA, Yinusa W. Incidence of glove failure during orthopedic operations and the protective effect of double gloves. *J Natl Med Assoc*. 2003;95(12):1184-1188.
14. Chapman S, Duff P. Frequency of glove perforations and subsequent blood contact in association with selected obstetric surgical procedures. *Am J Obstet Gynecol*. 1993;168(5):1354-1357.
15. St Germaine RL, Hanson J, de Gara CJ. Double gloving and practice attitudes among surgeons. *Am J Surg*. 2003;185(2):141-145.
16. Quebbeman EJ, Telford GL, Wadsworth K, Hubbard S, Goodman H, Gottlieb MS. Double gloving: protecting surgeons from blood contamination in the operating room. *Arch Surg*. 1992;127(2):213-217.
17. Tanner J, Parkinson H. Double gloving to reduce surgical cross-infection (Review). *Cochrane Database Syst Rev*. 2003;(3):CD003087. <http://www.cochrane.org/reviews/en/ab003087.html>. Accessed December 19, 2008.
18. Albin MS, Bunegin L, Duke ES, Ritter RR, Page CP. Anatomy of a defective barrier: sequential glove leak detection in a surgical and dental environment. *Crit Care Med*. 1991;20(2):170-184.

19. Greco RJ, Garza JR. Use of double gloves to protect the surgeon from blood contact during aesthetic procedures. *Aesthetic Plast Surg.* 1995;19(3):265-267.

20. Bierman S. Stamping out risky business. *Manag Infect Cont.* 2004;4(6):14-20.

21. Webb JM, Pentlow BD. Double gloving and surgical technique. *Ann R Coll Surg Engl.* 1993;75(4):291-292.

22. Edlich RF, Wind TC, Hill LG, Thacker JG. Resistance of double-glove hole puncture indication systems to surgical needle puncture. *J Long Term Eff Med Implants.* 2003;13(2):85-90.

23. Florman S, Burgdof M, Finigan K, Slakey D, Hewitt R, Nichols RL. Efficacy of double gloving with an intrinsic indicator system. *Surg Infect (Larchmt).* 2005;6(4):385-395.

24. Nicoali P, Aldam CH, Allen PW. Increased awareness of glove perforation in major joint replacement. A prospective, randomized study of

Regent Biogel reveal gloves. *J Bone Joint Surg Br.* 1997;79(3):371-373.

25. Avery CM, Taylor J, Johnson PA. Double gloving and a system for identifying glove perforations in maxillofacial trauma surgery. *Br J Oral Maxillofac Surg.* 1999;37(4):316-319.

Janet Thomas-Copeland, RN, BSN, MA, is the manager of performance improvement at VHA, Southeast, Tampa, FL. As a previous employee of Ansell Healthcare, Red Bank, NJ, at the time this article was written, Ms Thomas-Copeland acknowledges an affiliation that could be perceived as a potential conflict of interest in publishing this article.

Future Congress Dates and Locations

Make plans now to attend AORN Congress in upcoming years. Following is a list of future Congress dates and locations:

- 2009—March 15 to 19, Chicago, Illinois
- 2010—March 14 to 18, Denver, Colorado
- 2011—March 19 to 24, Philadelphia, Pennsylvania
- 2012—March 25 to 29, New Orleans, Louisiana
- 2013—March 3 to 7, San Diego, California

Anti-Nausea Medicine May Increase Bleeding Risk

Dexamethasone dose-dependently reduces postoperative nausea and vomiting in children undergoing tonsillectomy, but it also may increase postoperative bleeding, according to a study in the December 10, 2008, issue of *JAMA*. The study involved 215 children undergoing elective tonsillectomy in Switzerland.

Researchers randomly assigned the children to receive:

- 0.05 mg/kg of dexamethasone,
- 0.15 mg/kg of dexamethasone,
- 0.5 mg/kg of dexamethasone, or
- placebo.

Dexamethasone or placebo were given intravenously after anesthesia was induced, and all of the children received acetaminophen-codeine and ibuprofen for postoperative pain relief.

Twenty-four hours after surgery, nausea and vomiting was seen in

- 44% of the placebo group,
- 38% of the 0.05 mg/kg group,

- 24% of the 0.15 mg/kg group, and
- 12% of the 0.5 mg/kg group.

In addition, children who were given dexamethasone required less ibuprofen.

The researchers also noted 26 postoperative bleeding episodes in 22 children:

- 4% of the placebo group,
- 11% of the 0.05 mg/kg group,
- 4% of the 0.15 mg/kg group, and
- 24% of the 0.5 mg/kg group.

Eight children who were given dexamethasone had to undergo emergency reoperation because of bleeding. Researchers ended the trial early because of safety risks and concluded that dexamethasone was associated with increased risk of postoperative bleeding.

Czarnetzki C, Elia N, Lysakowski C, et al. Dexamethasone and risk of nausea and vomiting and postoperative bleeding after tonsillectomy in children. JAMA. 2008;300(22):2621-2630.

Do Surgical Personnel Really Need to Double-Glove?

PURPOSE/GOAL

To educate perioperative nurses about the importance of double-gloving in protecting patients and surgical personnel.

BEHAVIORAL OBJECTIVES

After reading and studying the article on double-gloving in the perioperative environment, nurses will be able to

1. discuss the evolution of surgical glove use,
2. describe the factors that increase the likelihood of glove failure,
3. identify the risks of disease transmission as a result of glove failure, and
4. compare wearing one pair of surgical gloves to wearing two pairs.

QUESTIONS

1. The first pair of rubber gloves was made to protect the hands of nurses and surgical assistants from
 - a. sodium hypochlorite.
 - b. carbolic acid.
 - c. hydrochloric acid.
2. As a method of protecting health care workers, the use of medical gloves when contact with blood or body fluid is anticipated is required as a part of the Occupational Safety and Health Administration's
 - a. bloodborne pathogen standard.
 - b. standard precautions.
 - c. Universal Protocol.
3. All gloves meeting US Food and Drug Administration (FDA) requirements must provide adequate barrier protection against
 1. hepatitis B.
 2. HIV.
 3. prions.
 - a. 1 and 2
 - b. 1 and 3
 - c. 2 and 3
 - d. 1, 2, and 3
4. Factors that increase the likelihood of glove failure include
 1. mechanical stress on the glove.
 2. the number of instruments used during the procedure.
 3. the length of the surgery.
 4. the wearer's role in the surgical procedure.
 5. the type of surgery performed.
 - a. 2 and 3
 - b. 1, 4, and 5
 - c. 2, 3, 4, and 5
 - d. 1, 2, 3, 4, and 5
5. In the studies presented in this article, glove failures seem to be related to
 1. human fatigue.
 2. increased permeability of the glove.
 3. the complexity of the instrumentation.
 4. the experience of the health care provider involved.
 - a. 1 and 3
 - b. 2 and 4
 - c. 2, 3, and 4
 - d. 1, 2, 3, and 4
6. The more experienced the health care

- worker, the lower the glove failure rate.
- a. true**
b. false
7. According to a Cochrane review by Tanner and Parkinson, wearing two pairs of surgical gloves
1. apparently does not lessen surgical skill.
 2. can reduce the number of breaks to the innermost glove.
 3. represents increased barrier protection for the wearer compared to single-gloving.
- a. 1 and 3**
b. 2 and 4
c. 1, 2, and 3
8. There is a risk of disease transmission from the health care worker to the patient
- because approximately _____ of devices that cause injuries come in contact with the patient after the injury to the health care worker.
- a. 33%**
b. 50%
c. 75%
9. Every year, an estimated _____ injured workers die from hepatitis B.
- a. 100 to 200**
b. 200 to 500
c. 1,000 to 2,000
d. 2,000 to 5,000
10. Wearing a two-color indicator system of surgical gloves increases the likelihood of noticing surgical glove perforations.
- a. true**
b. false

The behavioral objectives and examination for this program were prepared by Rebecca Holm, RN, MSN, CNOR, clinical editor, with consultation from Susan Bakewell, RN, MS, BC, director, Center for Perioperative Education. Ms Holm and Ms Bakewell have no declared affiliations that could be perceived as potential conflicts of interest in publishing this article.

This program meets criteria for CNOR and CRNFA recertification, as well as other continuing education requirements.

AORN is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

AORN recognizes these activities as continuing education for registered nurses. This recognition does not imply that AORN or the American Nurses Credentialing Center approves or endorses products mentioned in the activity.

AORN is provider-approved by the California Board of Registered Nursing, Provider Number CEP 13019. Check with your state board of nursing for acceptance of this activity for relicensure.

Do Surgical Personnel Really Need to Double-Glove?

Event #09095
Session #9757

PLEASE FILL OUT the application and answer form on this page and the evaluation form on the back of this page. Tear the page out of the *Journal* or make photocopies and mail with appropriate fee to:

AORN Customer Service

c/o AORN Journal Continuing Education
2170 S Parker Rd, Suite 300
Denver, CO 80231-5711

or fax with credit card information to
(303) 750-3212.

Additionally, please verify by signature that you have reviewed the objectives and read the article, or you will not receive credit.

Signature _____

1. Record your AORN member identification number in the appropriate section below. (See your member card.)
2. Completely darken the spaces that indicate your answers to examination questions 1 through 10. Use blue or black ink only.
3. Our accrediting body requires that we verify the time you needed to complete this 1.4 continuing education contact hour (84-minute) program. _____
4. Enclose fee if information is mailed.

AORN (ID) # _____

Name _____

Address _____

City _____

State _____ Zip _____

Phone number _____

RN license # _____

State _____

Fee enclosed _____

or bill the credit card indicated MC Visa American Express Discover

Card # _____

Expiration date _____

Signature _____ (for credit card authorization)

**Fee: Members \$7
Nonmembers \$14**

Program offered February 2009
The deadline for this program is February 29, 2012

A score of 70% correct on the examination is required for credit.
Participants receive feedback on incorrect answers.
Each applicant who successfully completes this program will receive a certificate of completion.



ID Number

<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0

50729



Session Number

<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0
<input type="checkbox"/>	1	2	3	4	5	6	7	8	9	0

Mark only one answer per question.

- | | |
|-----------------------|------------------------|
| 1 (A) (B) (C) (D) (E) | 6 (A) (B) (C) (D) (E) |
| 2 (A) (B) (C) (D) (E) | 7 (A) (B) (C) (D) (E) |
| 3 (A) (B) (C) (D) (E) | 8 (A) (B) (C) (D) (E) |
| 4 (A) (B) (C) (D) (E) | 9 (A) (B) (C) (D) (E) |
| 5 (A) (B) (C) (D) (E) | 10 (A) (B) (C) (D) (E) |



Do Surgical Personnel Really Need to Double-Glove?

THIS EVALUATION is used to determine the extent to which this continuing education program met your learning needs. Rate these items on a scale of 1 to 5.

PURPOSE/GOAL

To educate perioperative nurses about the importance of double-gloving in protecting patients and surgical personnel.

OBJECTIVES

To what extent were the following objectives of this continuing education program achieved?

1. Discuss the evolution of surgical glove use.
2. Describe the factors that increase the likelihood of glove failure.
3. Identify the risks of disease transmission as a result of glove failure.
4. Compare wearing one pair of surgical gloves to wearing two pairs.

CONTENT

To what extent

5. did this article increase your knowledge of the subject matter?
6. was the content clear and organized?
7. did this article facilitate learning?
8. were your individual objectives met?
9. did the objectives relate to the overall purpose/goal?

TEST QUESTIONS/ANSWERS

To what extent

10. were they reflective of the content?
11. were they easy to understand?
12. did they address important points?

LEARNER INPUT

13. Will you be able to use the information from this article in your work setting?
 - a. yes
 - b. no
14. I learned of this article via
 - a. the *AORN Journal* I receive as an AORN member.
 - b. an *AORN Journal* I obtained elsewhere.
 - c. the *AORN Journal* web site.

Session Number

	1	2	3	4	5	6	7	8	9	0
	1	2	3	4	5	6	7	8	9	0
	1	2	3	4	5	6	7	8	9	0
	1	2	3	4	5	6	7	8	9	0

13109

(Low) (High) (Low) (High)

1 1 2 3 4 5	11 1 2 3 4 5
2 1 2 3 4 5	12 1 2 3 4 5
3 1 2 3 4 5	13 1 2 3 4 5
4 1 2 3 4 5	14 1 2 3 4 5
5 1 2 3 4 5	15 1 2 3 4 5
6 1 2 3 4 5	16 1 2 3 4 5
7 1 2 3 4 5	17 1 2 3 4 5
8 1 2 3 4 5	18 1 2 3 4 5
9 1 2 3 4 5	19 1 2 3 4 5
10 1 2 3 4 5	20 1 2 3 4 5

15. What factor most affects whether you take an *AORN Journal* continuing education examination?
 - a. need for continuing education contact hours
 - b. price
 - c. subject matter relevant to current position
 - d. number of continuing education contact hours offered

What other topics would you like to see addressed in a future continuing education article? Would you be interested or do you know someone who would be interested in writing an article on this topic?

Topic(s): _____

Author names and addresses: _____
