

# Application of the Updated CDC Isolation Guidelines for Health Care Facilities

SHAUNA ELY TARRAC, RN, MSN, CIC, CNOR, CPAN

The Centers for Disease Control and Prevention (CDC) has published updated guidelines that outline how health care workers can prevent the transmission of infectious agents to their patients as well as to one another.<sup>1</sup> During the past 11 years since the previous guidelines were published,<sup>2</sup> research has expanded, and effective interventions have been developed.<sup>3-6</sup> The CDC also published "Management of multidrug-resistant organisms in healthcare settings, 2006"<sup>3</sup> to address multidrug-resistant organisms (MDROs).

This article highlights some of the changes in the updated "Guidelines for isolation precautions: preventing transmission of infectious agents in health-care settings."<sup>1</sup> Particularly, the article guides clinicians in the appropriate application of standard precautions and prepares clinicians to incorporate respi-

ratory hygiene/cough etiquette into infection control practices, which has been added as a component of standard precautions. It is important to note that several terms have been changed. The term *nosocomial infections* has been replaced with the term *healthcare-associated infections* (HAIs) and the term *negative pressure room* has been replaced with the term *airborne infection isolation room*.

## RE-EMPHASIS ON STANDARD PRECAUTIONS

Standard precautions, previously known as universal precautions, have become one of the first-line tools for decreasing transmission of disease from patient-to-patient or patient-to-health care worker. The key elements of standard precautions include performing hand hygiene; using appropriate personal protective equipment (PPE) depending on the expected type of exposure (ie, gowns for exposure to blood or diarrheal drainage, mask and eye protection for cough-producing procedures); employing safe injection practices; and adhering to respiratory etiquette.<sup>1</sup>

Standard precautions are "based on the principle that all blood, body fluids, secretions, and excretions . . . may contain transmissible infectious agents."<sup>1(p66)</sup> These infection prevention practices apply to all patients, regardless of suspected or confirmed infection status, in

## ABSTRACT

THE CENTERS FOR DISEASE CONTROL and Prevention has published updated guidelines for isolation precautions that outline how health care workers can prevent the transmission of infectious agents to their patients and to themselves.

THE GUIDELINES RE-EMPHASIZE standard precautions, which guide clinicians in the use of appropriate personal protective equipment (PPE), depending on the expected type of exposure. Respiratory hygiene/cough etiquette is incorporated into infection control practices as a new component of standard precautions.

THE ARTICLE PROVIDES information on the new guidelines as well as information on newly emerging pathogens and methods to prevent disease transmission in health care settings. *AORN J* 87 (March 2008) 534--542. © AORN, Inc, 2008.

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any setting in which health care is delivered.

One component of standard precautions is using safe injection practices.<sup>7</sup> These guidelines mirror the Occupational Safety and Health Administration guidelines for health care worker protection from blood and body fluid pathogens.<sup>8</sup> The precautions include

- using a sterile, disposable needle and syringe with a protective device for each injection and discarding all items intact in an appropriate sharps container after use;
- using single-dose medication vials, prefilled syringes, and ampules when possible;
- not using bags of IV solution as a common source of supply for multiple patients; and
- using aseptic technique to avoid contamination of sterile injection equipment.

Another concern is the potential for contamination of patient care equipment with infectious body fluids. Health care personnel must handle equipment in a manner that prevents transmission of infectious agents. Recommendations include wearing gloves during direct contact with contaminated equipment; containing heavily soiled equipment; and properly cleaning, disinfecting, and sterilizing equipment before use on another patient.<sup>1,9</sup>

In the surgical setting, a patient may be admitted for emergency surgery but also may be harboring an unknown bacterial or viral infection. By consistently applying standard precautions, the possibility of infection transmission is decreased greatly. These precautions may include hand hygiene and use of gloves, eye protection or a face shield, a mask, or a gown depending on the anticipated exposure. For example, when the circulating nurse assists with intubation and extubation, he or she should wear the appropriate PPE (eg, gloves, mask, eye protection).

Precautions are necessary for invasive procedures involving the insertion of catheters or in-

jection of material into spinal or epidural spaces via lumbar puncture (eg, myelogram, spinal or epidural anesthesia).<sup>1</sup> Although most elements of standard precautions evolved from universal precautions that were developed for protection of health care personnel, these new elements of standard precautions focus on protection of patients. Staff members now are advised to wear masks during these invasive procedures.<sup>10,11</sup>

### RESPIRATORY HYGIENE/COUGH ETIQUETTE

The transmission of severe acute respiratory syndrome-associated Coronavirus (SARS-CoV), a variant of the Coronavirus, in emergency departments by patients and their family members during the SARS outbreaks in 2003 highlighted the need for vigilance. Prompt implementation of infection control

measures at the first point of encounter within a health care setting (eg, reception and triage areas in emergency departments and outpatient and urgent care clinics) is vital.<sup>12-14</sup>

The strategy to contain respiratory infectious diseases has been termed *respiratory hygiene/cough etiquette*<sup>15</sup> and should be incorporated into infection control practices as a new component of standard precautions. The strategy is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections and applies to any person who enters a health care facility with signs of illness, including cough, congestion, rhinorrhea, or increased production of respiratory secretions.<sup>16,17</sup>

The elements of respiratory hygiene/cough etiquette include educating health care personnel, patients, and visitors. This can be accomplished by posting signs in languages appropriate to the population served combined with instructions to patients and accompanying family members or friends regarding source control measures (eg, covering one's

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mouth and nose with a tissue when coughing, prompt disposal of used tissues).

### DISEASE TRANSMISSION

Disease transmission can occur through direct contact (eg, the hands of a health care worker who is a carrier of the disease); indirect contact (eg, patient care devices, the hands of a health care worker who has touched a contaminated item, shared toys, medical instruments that have not been cleaned or disinfected adequately); and airborne and droplet routes (Table 1). The envi-

ronment also has been implicated in infections via contaminated food, water, IV fluids, and dust or debris on the outside of sterile supply packages. For transmission to occur, a source must exist, a mode of transmission must be present, and a susceptible host must be exposed.

**DIRECT CONTACT TRANSMISSION.** Transmission via direct contact remains the most common source of microorganism transmission. Direct contact refers to transmission from one person directly to another. Sources include peoples' hands and coughing or sneezing. Susceptible hosts include very old people; the very young; and any patient with chronic diseases, especially diseases involving the immune system.

**INDIRECT CONTACT TRANSMISSION.** Indirect transmission occurs when an intermediate object (eg, a contaminated needle or instrument, the hands of a health care worker) transfers microorganisms to a susceptible host. Sources that are particularly unsanitary are referred to as "high touch surfaces" (eg, elevator buttons, telephones, door handles). Another example of indirect disease transmission is that of vectorborne illnesses that are propagated by mosquitoes, flies, rats, deer, and squirrels. Diseases in this category include Lyme disease, plague, tickborne relapsing fever, tularemia, Eastern equine and West Nile encephalitis, and yellow fever.<sup>18-20</sup>

**AIRBORNE TRANSMISSION.** Airborne transmission occurs when a person inhales an infectious agent. The infectious particles are small enough to be suspended in the air and to move along air currents. Patients with airborne infectious diseases must be placed in an airborne infection isolation room (ie, previously known as negative pressure room) with negative pressure in relation to the corridor. All staff members providing care for the patient should wear a National Institute of Occupational Safety and Health (NIOSH)-certified N95 respirator.<sup>13,14</sup>

Patients with airborne infections should not be removed from their rooms unless a procedure cannot be performed in a patient room (eg, nonportable x-rays) or is deemed an emergent situation (eg, emergency surgical interventions). When patients do require transport outside of their rooms, the patient is required to wear a surgical mask. Transmission of *Aspergillus* spores between patients have been noted in an

TABLE 1

### Types of Standard Precautions Depending on the Routes of Disease Transmission<sup>1</sup>

#### Contact precautions

Methicillin-resistant *Staphylococcus aureus*  
Vancomycin-resistant *Enterococci*  
*Clostridium difficile*  
Norovirus (ie, for institutional outbreaks)  
Respiratory syncytial virus

#### Airborne precautions

*Aspergillus* species  
*Mycobacterium tuberculosis*  
Rubeola virus (ie, measles)  
Varicella virus (ie, chickenpox)  
Variola (ie, smallpox)  
Severe acute respiratory syndrome

#### Droplet precautions

Bordetella pertussis (ie, whooping cough)  
Influenza virus (ie, flu)  
*Mycoplasma pneumoniae*  
Severe acute respiratory syndrome\*  
Group A streptococcus\*\*  
*Neisseria meningitidis* (ie, bacterial meningitis)  
Rubella (ie, German measles)

\* If an airborne infection isolation room is not available

\*\* For the first 24 hours after administration of antibiotics

1. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings 2007. Centers for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>. Accessed January 3, 2008.

intensive care unit where a patient required frequent wound debridement and extensive dressing changes.<sup>21</sup> Transmission was thought to have occurred via aerosolization of the spore.

**DROPLET TRANSMISSION.** Diseases can be transmitted via the respiratory system from one person to another directly or indirectly.

*When an infected person sneezes, coughs, or speaks, droplet particles can be generated, can stay suspended for long periods of time, and can be inhaled or swallowed by another person, usually within a distance of 3 ft.*<sup>1(p132)</sup>

Experimental studies performed with smallpox and observations during the SARS outbreak in 2003 indicate that these two infections may be transmitted up to 6 ft from the source patient.<sup>22</sup> In addition, some people are considered “shedders” (ie, nasal carriers) exhibiting “cloud baby syndrome” or “cloud adult syndrome.” For these syndromes, transmission of microorganisms that are not normally transmitted by the airborne route have been documented. This phenomenon has been noted in outbreak cases with the transmission of *Staphylococcus aureus* from colonized patients or health care workers.<sup>23-25</sup>

### ORGANISMS OF INTEREST

“Any infectious agent transmitted in health care settings may, under defined conditions, become targeted for control.”<sup>1(p21)</sup> Clinicians at each health care facility must monitor the endemic rate of these infections to determine a baseline threshold for that organism. Surveillance then continues, and an unexplained increase over and above the endemic rate, with or without an increase in the severity of disease, requires investigation and the institution of control measures.

**MDROs.** Resistant organisms refer to certain bacterial pathogens that have proven resistant to any first-line therapy medication. Any organism that is resistant to more than two antibiotics generally is considered to be an MDRO. Transmission is from patient to patient, usually via the hands of health care workers.<sup>3</sup> Examples of MDROs include

- bacteria with extended-spectrum beta-lactamase resistance.
- methicillin-resistant *Staphylococcus aureus*,

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- vancomycin-resistant enterococci,
- vancomycin-intermediate *Staphylococcus aureus*, and
- vancomycin-resistant *Staphylococcus aureus*.

**CLOSTRIDIUM DIFFICILE.** *Clostridium difficile* is a spore-forming, gram-positive bacillus. It first was isolated and documented in the 1930s and was identified as a major component in the cause of pseudomembranous colitis in 1977.<sup>26</sup> Numerous large outbreaks in health care facilities have been documented.<sup>27-29</sup> This disease usually is related to recent or prolonged antibiotic therapy. In addition, a relatively new strain made its appearance in England, Canada, and the United States beginning in 2001.<sup>30</sup> This strain—toxinotype III, North American PFGE (pulsed-field gel electrophoresis) type 1—has been shown to produce 16 times more toxin A and 23 times more toxin B than has been observed historically with *Clostridium difficile*.<sup>26,30,31</sup>

Prevention focuses on

- instituting contact precautions for any patient with diarrhea;
- increasing the environmental cleaning of surfaces, especially patient rooms, bathrooms, and commodes; and
- ensuring consistent hand hygiene with soap and water for mechanical removal of the spores.

Some facilities have noted a decrease in *Clostridium difficile* transmission when a bleach-containing disinfectant is used for environmental cleaning.<sup>28,29,32,33</sup>

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**Transmission of severe acute respiratory syndrome has been documented during endotracheal intubation, continuous positive airway pressure or bilevel positive airway pressure, and cardiopulmonary resuscitation.**

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**CREUTZFELDT-JAKOB DISEASE (CJD).** Creutzfeldt-Jakob disease is a progressive neurological disorder involving an infection with a prion.<sup>33</sup> A prion is thought to be a transmissible, proteinaceous agent. In the United States, CJD occurs in one person per million per year. Prion diseases also can infect sheep (ie, scrapie), cattle (ie, bovine spongiform encephalopathy), and deer and elk (ie, chronic wasting disease). Transmission has been linked to treatment with

- human cadaveric pituitary-derived hormone;
- human dura mater grafts;
- corneal transplants; and
- contaminated neurosurgical instruments, including stereotactic electroencephalogram electrodes.

Bloodborne transmission has been linked to two infections in patients with variant CJD.<sup>34</sup>

Standard precautions are recommended when caring for patients infected with CJD.<sup>33</sup> Special processes are required when handling tissue in the histology laboratory or when performing an autopsy. It is essential that a very specific method be used for disinfecting surgical equipment and instruments.<sup>35-37</sup> Processing any CJD-suspect equipment includes soaking the item in sodium hydroxide solution (ie, 1N NaOH) and after removing the item from the solution, steam sterilizing it at 134° C (273° F) for 18 minutes. Alternatively, the item may be soaked in 1N NaOH and, after removal from the solution, steam sterilized at 121° C (250° F) for 30 minutes. Recent studies have indicated that the temperature for steriliza-

tion must be exact. If the temperature is above the recommendation, prion growth may occur.<sup>38-41</sup>

**SARS.** According to the World Health Organization, a total of 8,098 people worldwide became sick with SARS during the 2003 outbreak.<sup>42,43</sup> Of those infected, 774 died. As of February 2003, a total of 418 patients were thought to be infected with SARS in the United States. Of those patients 344 were classified as having “suspected” and 74 as having “probable” SARS cases.<sup>44</sup> All of these people had traveled to other parts of the world where SARS was prevalent. Disease transmission has been documented during endotracheal intubation; noninvasive positive pressure (eg, continuous positive airway pressure, bilevel positive airway pressure); and cardiopulmonary resuscitation.<sup>45-48</sup>

The incubation period of SARS CoV is two to 10 days, and symptoms include generalized upper respiratory infections, temperature greater than 38° C (100.4° F), chills, rigors, headache, and rapidly progressing dyspnea.<sup>42,43,49,50</sup> Outbreaks in health care settings have been documented with health care workers becoming ill with the disease after caring for infected patients.<sup>49,51,52</sup>

**AVIAN FLU.** Usually, the term *avian influenza virus* refers to influenza A viruses found most predominantly in birds, but infections with these viruses can and have occurred in humans.<sup>53,54</sup> Confirmed cases of human infection from several subtypes of avian influenza have been reported since 1997.<sup>55</sup> Most cases of avian influenza in humans have resulted from contact with infected poultry (eg, domesticated chicken, ducks, turkeys) or surfaces contaminated with secretion or excretions from infected birds.<sup>56-59</sup> The spread of avian influenza virus from one ill person to another has been reported very rarely and has been limited, inefficient, and unsustainable.<sup>56-59</sup>

Symptoms of avian influenza in humans have ranged from typical human influenza-like symptoms (eg, fever, cough, sore throat, muscle aches) to eye infections, pneumonia, and severe respiratory diseases (eg, acute respiratory distress) and other severe and life-threatening complications. The symptoms of avian influenza may depend on which type of avian influenza virus caused the infection.

When the virus is documented in humans in the United States, all patients who present to a health care setting with fever and respiratory symptoms should be managed according to CDC recommendations, including respiratory etiquette. Patients and visitors should be questioned regarding their recent travel history. Patients with a history of travel in the previous 10 days to a country with avian influenza activity and who are hospitalized with a severe febrile respiratory illness,<sup>54</sup> or are otherwise being evaluated for avian influenza, should be managed using isolation precautions identical to those recommended for patients with known SARS. These include the following:

- Standard precautions—health care personnel should pay careful attention to hand hygiene before and after all patient contact or contact with items potentially contaminated with respiratory secretions.
- Contact precautions—health care personnel should
  - wear gloves and a gown for all patient contact and
  - use dedicated equipment (eg, stethoscopes, disposable blood pressure cuffs, disposable thermometers) whenever possible.
- Airborne precautions—health care personnel should use a fit-tested respirator, at least as protective as a NIOSH-approved N-95 filtering mask (ie, disposable) respirator, when entering the room. The patient should be placed in an airborne infection isolation room
  - with monitored negative air pressure in relation to the corridor,
  - with six to 12 air exchanges per hour, and
  - that exhausts air directly outside or recirculates air filtered by a high-efficiency particulate air (HEPA) filter.

If an airborne infection isolation room is unavailable, the health care facility engineer should be contacted to assist or obtain portable HEPA filters to initiate the number of air exchanges per hour.

**NOROVIRUS.** This virus, formerly known as “Norwalk-like” virus,<sup>60-62</sup> is transmitted via contaminated food and water and person-to-person via fecal-oral contamination. Infection with this disease can reach epidemic proportions quickly, especially in hospitals, nursing homes, cruise

ships, hotels, and schools,<sup>60-64</sup> possibly because the minimal infecting dose required for infection to occur is extremely low (ie, less than 100 viral particles). The incubation period is 12 to 48 hours, and symptoms last 12 to 60 hours. Patients report nausea, vomiting, abdominal cramps, and diarrhea. Although transmission is primarily fecal-oral, there have been reports of transmission via aerosolization of infectious particles from vomitus or fecal material. It has been suggested that health care workers may inhale and then swallow the virus.

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### **MANAGING HEALTH CARE ENVIRONMENTS**

The definition of isolation was the mainstay on which hospital isolation protocols were established. In recent years, however, the term *isolation* has evolved to characterize a process designed to manage the health care environment. Modern isolation techniques incorporate a broad-based theory that addresses the needs of both patients and employees to ensure that the safest possible environment is maintained throughout the health care facility. The term *isolation* has changed from meaning a special “set of precautions” performed by a few health care providers for a select few patients to a safety system that is practiced by virtually everyone in the course of routine patient care.

These changes have evolved in stages during the past few years. Early isolation standards

TABLE 2

## Summary of the Updated Centers for Disease Control and Prevention Isolation Guidelines<sup>1</sup>

Recommendation	When to use
Hand hygiene	After touching <ul style="list-style-type: none"> <li>● blood,</li> <li>● bloody fluids,</li> <li>● secretions,</li> <li>● excretions, or</li> <li>● contaminated items</li> </ul> Immediately after removing gloves Between patient contacts When moving from dirty to clean areas
Gloves	When anticipating touching <ul style="list-style-type: none"> <li>● blood,</li> <li>● body fluids,</li> <li>● secretions,</li> <li>● excretions,</li> <li>● contaminated items,</li> <li>● mucous membranes, or</li> <li>● nonintact skin</li> </ul>
Gown	During procedures and patient-care activities when anticipating contact with <ul style="list-style-type: none"> <li>● clothing,</li> <li>● blood,</li> <li>● body fluids,</li> <li>● secretions, or</li> <li>● excretions</li> </ul>
Mask/goggles/face shield	During procedures and patient-care activities likely to generate splashes or sprays of <ul style="list-style-type: none"> <li>● blood,</li> <li>● body fluid, or</li> <li>● secretions (eg, suctioning, endotracheal intubation)</li> </ul>

1. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings 2007. Centers for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>. Accessed January 3, 2008.

required that patients be placed under isolation protocols when an infectious process was diagnosed or strongly suspected. Patients were assigned isolation protocols based on a system that categorized them according to the type of disease and its primary method of transmission.

The concept and re-emphasis of standard precautions is creating a need for health care professionals to change the way they think about infection and the way they interact with

all patients. The CDC worked to streamline the existing system and create a new system that would be easy to understand and easy to use. It is from this background that the current guidelines evolved. Critical thinking by perioperative nursing staff members is essential to reduce exposures to infectious agents in acute care facilities. When in doubt, clinicians should consult with the facility infection prevention practitioner and should institute the 2007 isolation guidelines (Table 2). — **AORN** —

### REFERENCES

1. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings 2007. Centers for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>. Accessed January 3, 2008.
2. Garner JS. Guideline for isolation precautions in hospitals. The Hospital Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol*. 1996;17(1):53-80.
3. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. Management of multidrug-resistant organisms in healthcare settings, 2006. Centers for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf>. Accessed January 3, 2008.
4. Harris AD, Bradham DD, Baumgarten M, Zuckerman IH, Fink JC, Perencevich EN. The use and interpretation of quasi-experimental studies in infectious diseases. *Clin Infect Dis*. 2004;38(11):1586-1591.
5. Bent S, Shojania KG, Saint S. The use of systematic reviews and meta-analyses in infection control and hospital epidemiology. *Am J Infect Control*. 2004;32(4):246-254.
6. Harris AD, Lautenbach E, Perencevich E. A systematic review of quasi-experimental study designs

- in the fields of infection control and antibiotic resistance. *Clin Infect Dis*. 2005;41(1):77-82.
7. Centers for Disease Control and Prevention. Transmission of hepatitis B and C viruses in outpatient settings—New York, Oklahoma, and Nebraska, 2000-2002. *MMWR Morb Mortal Wkly Rep*. 2003;52(38):901-906.
  8. Regulations (Standards—29 CFR). Bloodborne pathogens—1910.1030. Occupational Safety and Health Administration. [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10051](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051). Accessed January 17, 2008.
  9. Interim recommendations for infection control in healthcare facilities caring for patients with known or suspected avian influenza. Centers for Disease Control and Prevention. <http://www.cdc.gov/flu/avian/professional/infect-control.htm>. Accessed January 3, 2008.
  10. Philips BJ, Fergusson S, Armstrong P, Anderson FM, Wildsmith JA. Surgical face masks are effective in reducing bacterial contamination caused by dispersal from the upper airway. *Br J Anaesth*. 1992;69(4):407-408.
  11. O'Grady NP, Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. *MMWR Recomm Rep*. 2002;51(RR-10):1-29.
  12. Sehulster L, Chinn RY; CDC; Healthcare Infection Control Practices Advisory Committee (HICPAC). Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the HICPAC. *MMWR Recomm Rep*. 2003;52(RR10):1-42.
  13. Jensen PA, Lambert LA, Iademarco MF, Ridzon R; CDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. *MMWR Morb Recomm Rep*. 2005;54(17):1-141.
  14. Facility Guidelines Institute; American Institute of Architects Academy of Architecture for Health; US Department of Health and Human Services. 2006 *Guidelines for Design and Construction of Hospital and Health Care Facilities*. Washington, DC: American Institute of Architects Press; 2006. [https://aia-timssnet.uapps.net/timssnet/products/TNT\\_Products.cfm?SR=1&action=long&primary\\_id=157165013X](https://aia-timssnet.uapps.net/timssnet/products/TNT_Products.cfm?SR=1&action=long&primary_id=157165013X). Accessed January 3, 2008.
  15. Srinivasan A, McDonald LC, Jernigan D, et al. Foundations of the severe acute respiratory syndrome preparedness and response plan for health-care facilities. *Infect Control Hosp Epidemiol*. 2004;25(12):1020-1025.
  16. Valenti WM, Pincus PH, Messner MK. Nosocomial pertussis: possible spread by a hospital visitor. *Am J Dis Child*. 1980;134(5):520-521.
  17. Christie CD, Glover AM, Willke MJ, Marx ML, Reising SF, Hutchinson NM. Containment of pertussis in the regional pediatric hospital during the greater Cincinnati epidemic of 1993. *Infect Control Hosp Epidemiol*. 1995;16(10):556-563.
  18. Donskey CJ. The role of the intestinal tract as a reservoir and source for transmission of nosocomial pathogens. *Clin Infect Dis*. 2004;39(2):219-226.
  19. Bhalla A, Pultz NJ, Gries DM, et al. Acquisition of nosocomial pathogens on hands after contact with environmental surfaces near hospitalized patients. *Infect Control Hosp Epidemiol*. 2004;25(2):164-167.
  20. Duckro AN, Blom DW, Lyle EA, Weinstein RA, Hayden MK. Transfer of vancomycin-resistant enterococci via health care worker hands. *Arch Intern Med*. 2005;165(3):302-307.
  21. Peques DA, Lasker BA, McNeil MM, Hamm PM, Lundal JL, Kubak BM. Cluster of cases of invasive *Aspergillosis* in a transplant intensive care unit: evidence of person-to-person airborne transmission. *Clin Infect Dis*. 2002;34(3):412-416.
  22. Seto WH, Tsang D, Yung RW, et al. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). *Lancet*. 2003;361(9368):1519-1520.
  23. Bassetti S, Bischoff WE, Walter M, et al. Dispersal of *Staphylococcus aureus* into the air associated with a rhinovirus infection. *Infect Control Hosp Epidemiol*. 2005;26(2):196-203.
  24. Eichenwald HF, Kotsevalov O, Fasso LA. The "cloud baby": an example of bacterial-viral interaction. *Am J Dis Child*. August 1960:100.
  25. Sheretz RJ, Reagan DR, Hampton KD, et al. A cloud adult: the *Staphylococcus aureus*-virus interaction revisited. *Ann Intern Med*. 1996;124(6):539-547.
  26. McFarland LV, Mulligan ME, Kwok RY, Stamm WE. Nosocomial acquisition of *Clostridium difficile* infection. *N Engl J Med*. 1989;320(4):204-210.
  27. Wilcox MH, Fawley WN, Wigglesworth N, Parnell P, Verity P, Freeman J. Comparison of the effect of detergent versus hypochlorite cleaning on environmental contamination and incidence of *Clostridium difficile* infection. *J Hosp Infect*. 2003;54(2):109-114.
  28. Mayfield JL, Leet T, Miller J, Mundy LM. Environmental control to reduce transmission of *Clostridium difficile*. *Clin Infect Dis*. 2000;31(4):995-1000.
  29. Rutala WA, Weber DJ. Disinfection and sterilization guidelines: what you need to know. Presented at: The 2007 Conference of the Association for Professionals in Infection Control & Epidemiology; June 2007; San Jose, CA. <http://www.unc.edu/depts/spice/dis/slides4.html>. Accessed January 22, 2008.
  30. Pépin J, Valiquette L, Alary ME, et al. *Clostridium difficile*-associated diarrhea in a region of Quebec from 1991 to 2003: a changing pattern of disease severity. *CMAJ*. 2004;171(5):466-472.
  31. Outbreak of *Clostridium difficile* infection in a hospital in south east England. *CDR Weekly*. 2005;15(24). <http://www.hpa.org.uk/cdr/archives/archive05/News/news2405.htm>. Accessed January 3, 2008.
  32. Ansari SA, Springthorpe VS, Sattar SA. Survival and vehicular spread of human rotaviruses: possible relation to seasonality of outbreaks. *Rev Infect Dis*. 1991;13(3):448-461.
  33. Centers for Disease Control and Prevention. Surveillance for Creutzfeldt-Jakob Disease—United States. *MMWR Morb Mortal Wkly Rep*. 1996;45(31):665-668.
  34. Llewelyn CA, Hewitt PE, Knight RS, et al. Possible transmission of variant Creutzfeldt-Jakob disease



- by blood transfusion. *Lancet*. 2004;363(9407):417-421.
35. Johnson RT, Gibbs CJ Jr. Creutzfeldt-Jakob disease and related transmissible spongiform encephalopathies. *N Engl J Med*. 1998;339(27):1994-2004.
36. Brown P, Gajdusek DC, Gibbs CJ Jr, Asher DM. Potential epidemic of Creutzfeldt-Jakob disease from human growth hormone therapy. *N Engl J Med*. 1985;313(12):728-731.
37. Frasier SD, Foley TP Jr. Clinical review 58: Creutzfeldt-Jakob disease in recipients of pituitary hormones. *J Clin Endocrinol Metab*. 1994;78(6):1277-1279.
38. el Hachimi KH, Chaunu MP, Cervenakova L, Brown P, Foncin JF. Putative neurosurgical transmission of Creutzfeldt-Jakob disease with analysis of donor and recipient: agent strains. *C R Acad Sci III*. 1997;320(4):319-328.
39. Will RG, Matthews WB. Evidence for case-to-case transmission of Creutzfeldt-Jakob disease. *J Neurol Neurosurg Psychiatry* 1982;45(3):235-238.
40. Bernoulli C, Siegfried J, Baumgartner G, et al. Danger of accidental person-to-person transmission of Creutzfeldt-Jakob disease by surgery. *Lancet* 1977; 1(8009):478-479.
41. Rutala WA, Weber DJ. Creutzfeldt-Jakob disease: recommendations for disinfection and sterilization. *Clin Infect Dis*. 2001;32(9):1348-1356.
42. Peiris JS, Yuen KY, Osterhaus AD, Stöhr K. The severe acute respiratory syndrome. *N Engl J Med*. 2003;349(25):2431-2441.
43. Olsen SJ, Chang HL, Cheung TY, et al. Transmission of the severe acute respiratory syndrome on aircraft. *N Engl J Med*. 2003;349(25):2416-2422.
44. Centers for Disease Control and Prevention. Update: severe acute respiratory syndrome—worldwide and United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2003;52(28):664-665.
45. Loeb M, McGeer A, Henry B, et al. SARS among critical care nurses, Toronto. *Emerg Infect Dis* 2004; 10(2):251-255.
46. Fowler RA, Guest CB, Lapinsky SE, et al. Transmission of severe acute respiratory syndrome during intubation and mechanical ventilation. *Am J Respir Crit Care Med*. 2004;169(11):1198-1202.
47. Scales D, Green K, Chan AK, et al. Illness in intensive care staff after brief exposure to severe acute respiratory syndrome. *Emerg Infect Dis*. 2003;9(10):1205-1210.
48. Christian MD, Loutfy M, McDonald LC, et al. Possible SARS coronavirus transmission during cardiopulmonary resuscitation. *Emerg Infect Dis*. 2004;10(2):287-293.
49. Wilder-Smith A, Leong HN, Villacian JS. In-flight transmission of severe acute respiratory syndrome (SARS): a case report. *J Travel Med*. 2003;10(5):299-300.
50. Booth TF, Kournikakis B, Bastien N, et al. Detection of airborne severe acute respiratory syndrome (SARS) coronavirus and environmental contamination in SARS outbreak units. *J Infect Dis*. 2005;191(9):1472-1477.
51. Yu IT, Li Y, Wong TW, et al. Evidence of airborne transmission of the severe acute respiratory syndrome virus. *N Engl J Med*. 2004;350(17):1731-1739.
52. Centers for Disease Control and Prevention. Cluster of severe acute respiratory syndrome cases among protected health-care workers—Toronto, Canada, April 2003. *MMWR Morb Mortal Wkly Rep*. 2003;52(19):433-436.
53. Sims LD, Ellis TM, Liu KK, et al. Avian influenza in Hong Kong 1997–2002. *Avian Dis*. 2003;47(3 Suppl):832-838.
54. Guan Y, Peiris JSM, Lipatov AS, et al. Emergence of multiple genotypes of H5N1 avian influenza viruses in Hong Kong SAR. *Proc Natl Acad Sci U S A*. 2002;99(13): 8950-8955.
55. Avian influenza (bird flu). Centers for Disease Control and Prevention. <http://www.cdc.gov/Flu/avian>. Accessed January 22, 2008.
56. Sturm-Ramirez KM, Ellis T, Bousfield B, et al. Reemerging H5N1 influenza viruses in Hong Kong in 2002 are highly pathogenic to ducks. *J Virol*. 2004; 78(9):4892-4901.
57. Peiris JSM, Yu WC, Leung CW, et al. Re-emergence of fatal human influenza A subtype H5N1 disease. *Lancet*. 2004;363(9409):617-619.
58. Webster RG, Hulse DJ. Microbial adaptation and change: avian influenza. *Rev Sci Tech*. 2004;23(2):453-465.
59. Subbarao K, Klimov A, Katz J, et al. Characterization of an avian influenza A (H5N1) virus isolated from a child with a fatal respiratory illness. *Science*. 1998;279(5349):393-396.
60. Parashar U, Quiroz ES, Mounts AW, et al. “Norwalk-like viruses.” Public health consequences and outbreak management. *MMWR Recomm Rep*. 2001;50(RR-9):1-17.
61. Wu HM, Fornek M, Schwab KJ, et al. A norovirus outbreak at a long-term-care facility: the role of environmental surface contamination. *Infect Control Hosp Epidemiol*. 2005;26(10):802-810.
62. Zingg W, Colombo C, Jucker T, Bossart W, Ruef C. Impact of an outbreak of norovirus infection on hospital resources. *Infect Control Hosp Epidemiol*. 2005;26(3):263-267.
63. Calderon-Margalit R, Sheffer R, Halperin T, Orr N, Cohen D, Shohat T. A large-scale gastroenteritis outbreak associated with Norovirus in nursing homes. *Epidemiol Infect*. 2005;133(1):35-40.
64. Marx A, Shay DK, Noel JS, et al. An outbreak of acute gastroenteritis in a geriatric long-term care facility: combined application of epidemiological and molecular diagnostic methods. *Infect Control Hosp Epidemiol*. 1999;20(5):306-311.

**Shauna Ely Tarrac**, RN, MSN, CIC, CNOR, CPAN, is an infection prevention and clinical epidemiology practitioner at Sharp Grossmont Hospital, La Mesa, CA. Ms Tarrac has no declared affiliation that could be perceived as a potential conflict of interest in publishing this article.

## Application of the Updated CDC Isolation Guidelines for Health Care Facilities

### PURPOSE/GOAL

To educate perioperative nurses about applying the updated Centers for Disease Control and Prevention (CDC) isolation guidelines for health care facilities.

### BEHAVIORAL OBJECTIVES

After reading and studying the article on applying the updated CDC isolation guidelines, nurses will be able to

1. identify the elements of standard precautions,
2. discuss routes of disease transmission,
3. define organisms of interest that clinicians should monitor,
4. describe the types of standard precautions to be used depending on the applicable method of disease transmission, and
5. discuss nursing actions to combat organisms of interest.

### QUESTIONS

1. The key elements of standard precautions include
  1. adhering to respiratory etiquette.
  2. employing safe injection practices.
  3. performing hand hygiene.
  4. using appropriate personal protective equipment.
  - a. 1 and 3
  - b. 2 and 4
  - c. 1, 2, and 3
  - d. 1, 2, 3, and 4
2. Staff members should wear masks during invasive procedures involving the insertion of catheters or injection of material into spinal or epidural spaces via lumbar puncture.
  - a. true
  - b. false
3. Indirect transmission can occur when a health care worker touches a piece of contaminated equipment and transfers microorganisms to a patient.
  - a. true
  - b. false
4. Methicillin-resistant *Staphylococcus aureus* is transmitted by the \_\_\_\_\_ route.
  - a. airborne
  - b. contact
  - c. droplet
5. A 72-year-old man is being admitted for emergency surgery for a broken arm. During the preoperative interview, the patient mentions that he has just returned from a trip to an area in China where there currently is an outbreak of severe acute respiratory syndrome. The patient is demonstrating upper respiratory symptoms. What actions should the nurse take?
  1. Nothing as this does not reflect a current infection.
  2. Initiate droplet and airborne precautions.
  3. Notify the surgeon, anesthesia care provider, perioperative department manager, and OR and postanesthesia care unit staff members of the patient's potential exposure status.

- a. 1  
b. 2  
c. 2 and 3
6. An inpatient is scheduled for a liver biopsy and resection of a mass identified on computed tomography scan. The patient also has lesions in the right upper lobe of the lung. All sputum samples have been negative. Frozen section staining of the hepatic lesion indicates acid-fast bacillus and probable *Mycobacterium tuberculosis*. What type of precautions are appropriate?  
a. airborne  
b. contact  
c. droplet
7. Some facilities have noted a decrease in *Clostridium difficile* transmission when  
a. antibiotics are administered for an extended period of time.  
b. airborne precautions are instituted immediately when the symptoms are first noted.  
c. a bleach-containing disinfectant is used for environmental cleaning.
8. Processing equipment that is suspected of having been exposed to Creutzfeldt-Jakob disease (CJD) includes soaking the item in sodium hydroxide solution and, after removing the item from the solution,  
steam sterilizing it at  
1. 121° C (250° F) for 10 minutes.  
2. 121° C (250° F) for 30 minutes.  
3. 134° C (273° F) for 4 minutes.  
4. 134° C (273° F) for 18 minutes.  
a. 1 or 3  
b. 2 or 4  
c. 1, 2, or 3  
d. 1, 2, 3, or 4
9. If a patient presents to the preoperative area with fever, cough, sore throat, muscle aches, eye infection, pneumonia, and acute respiratory distress and has a history of having traveled abroad recently, the preoperative nurse should consider the possibility that the patient has  
a. CJD.  
b. Lyme disease.  
c. norovirus.  
d. avian flu.
10. Clinicians should wash their hands  
1. after touching blood, bloody fluids or secretions.  
2. immediately after removing gloves.  
3. between patient contacts.  
4. when moving from dirty to clean areas.  
a. 1 and 3  
b. 2 and 4  
c. 1, 3, and 4  
d. 1, 2, 3, and 4

*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.*

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## Application of the Updated CDC Isolation Guidelines for Health Care Facilities

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**Mark only one answer per question.**

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5	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9

## Application of the Updated CDC Isolation Guidelines for Health Care Facilities

**T**HIS 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 applying the updated Centers for Disease Control and Prevention isolation guidelines for health care facilities.

### OBJECTIVES

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

1. Identify the elements of standard precautions.
2. Discuss routes of disease transmission.
3. Define organisms of interest that clinicians should monitor.
4. Describe the types of standard precautions to be used depending on the applicable method of disease transmission.
5. Discuss nursing actions to combat organisms of interest.

### CONTENT

To what extent

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


### TEST QUESTIONS/ANSWERS

To what extent

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

### LEARNER INPUT

14. Will you be able to use the information from this article in your work setting?
  1. yes
  2. no
15. I learned of this article via
  1. the *Journal* I receive as an AORN member.



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

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

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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): \_\_\_\_\_  
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