

# ISOLATION PRECAUTION GUIDELINES FOR HOSPITALS

**KEY CONCEPTS** you will learn in this chapter include:

- What the reasons for the Transmission-Based Precautions are
- What Transmission-Based Precautions are designed to do
- What preventive processes and practices are recommended for each route of infection transmission
- How to effectively use Transmission-Based Precautions

## BACKGROUND

Although the spread of infectious diseases in hospitals has been recognized for many years, understanding how to prevent nosocomial (hospital-acquired) infections and implementing policies and practices that are successful have been more difficult. The transmission of nosocomial infections requires three elements: a **source** of infecting microorganisms, a **susceptible host** and a **mode of transmission**.

The **human source** of nosocomial infections may be patients, hospital personnel or, less often, visitors. These people may have infectious diseases, be in the incubation period (no symptoms), or may be chronic carriers. Other **sources** of infecting microorganisms are inanimate objects that become contaminated (e.g., examination tables or medical instruments) and the environment, including air and water.

**Susceptible hosts** are those patients, hospital personnel and, less often, visitors who may become infected. Resistance among people to infecting microorganisms varies; for example, some are immune, others get infected and become asymptomatic carriers; and still others get infected and develop a clinical disease. Factors such as age, underlying diseases, treatment with certain drugs (e.g., antimicrobials, corticosteroids and other agents that decrease immunity) and irradiation play a role in this process.

The three main routes of infection transmission in hospitals are **airborne**, **droplet** and **contact**. An infecting microorganism, however, can be transmitted by more than one route. For example, varicella (chicken pox) is transmitted both by the airborne and contact route at different stages of the disease.

In previous sections (**Chapters 1 and 2**), the rationale and fundamentals of the new hospital-based isolation precautions have been laid out. The purpose of this chapter is to further explain how Transmission-Based Precautions are used in the hospital to minimize the risk of clients,

patients, visitors and staff becoming infected (i.e., developing a nosocomial infection) while dealing with the healthcare system.

## DEFINITIONS

- **Airborne transmission.** Transfer of particles 5 µm or less in size into the air, either as airborne droplets or dust particles containing the infectious microorganism; can be produced by coughing, sneezing, talking or procedures such as bronchoscopy or suctioning; can remain in the air for up to several hours; and can be spread widely within a room or over longer distances. Special air handling and ventilation are needed to prevent airborne transmission.
- **Cohorting.** Practice of placing patients with the same active infectious disease (e.g., chicken pox)—but no other infection—in the same room or ward.
- **Colonization.** Pathogenic (illness- or disease-causing) organisms are present in a person (i.e., they can be detected by cultures or other tests) but are not causing symptoms or clinical findings (i.e., no cellular changes or damage). Coming in contact with and acquiring new organisms, while increasing the risk of infection, usually does not lead to infection because the body's natural defense mechanism (the immune system) is able to tolerate and/or destroy them. Thus, when organisms are transmitted from one person to another, colonization rather than infection is generally the result. Colonized persons, however, can be a major source of transfer of pathogens to other persons (cross-contamination) especially if the organisms persist in the person (chronic carrier), such as with HIV, HBV and HCV.
- **Contact transmission.** Infectious agent (bacteria, virus or parasite) transmitted directly or indirectly from one infected or colonized person to a susceptible host (patient), often on the contaminated hands of a health worker.
- **Droplet transmission.** Contact of the mucous membranes of the nose, mouth or conjunctivae of the eye with infectious particles larger than 5 µm in size that can be produced by coughing, sneezing, talking or procedures such as bronchoscopy or suctioning. Droplet transmission requires close contact between the source and the susceptible person because particles remain airborne briefly and travel only about 1 meter (3 feet) or less.
- **Nosocomial or hospital-acquired infection (terms used interchangeably).** Infection that is neither present nor incubating at the time the patient came to the hospital. (Nosocomial refers to the association between care and the subsequent onset of infection. It is a time-related criterion that does not imply a cause and effect relationship.)

**TRANSMISSION-BASED PRECAUTIONS**

**Note:** Protective isolation of immunocompromised patients, such as those with AIDS, is not an effective way to reduce the risk of cross-infection (Manangan et al 2001).

The isolation guidelines issued by CDC in 1996 involve a two-level approach: **Standard Precautions**, which apply to **all clients** and **patients** attending healthcare facilities, and **Transmission-Based Precautions**, which apply primarily to **hospitalized patients** (Garner and HICPAC 1996). As briefly presented in **Chapter 1**, this system replaces the cumbersome disease-specific isolation precautions with three sets of Transmission-Based Precautions (air, droplet or contact).

In all situations, whether used alone or in combination, Transmission-Based Precautions must be used in conjunction with the Standard Precautions (Garner and HICPAC 1996).

**Airborne Precautions**

These precautions are designed to reduce the nosocomial transmission of particles 5 µm or less in size that can remain in the air for several hours and be widely dispersed (**Table 21-1**). Microorganisms spread wholly or partly by the airborne route include tuberculosis (TB), chicken pox (varicella virus) and measles (rubeola virus). Airborne precautions are recommended for patients with either **known** or **suspected** infections with these agents. For example, an HIV-infected person with a cough, night sweats or fever, and clinical or X-ray findings in the lungs should go on airborne precautions until TB is ruled out.

**Table 21-1. Airborne Precautions**

Used in addition to Standard Precautions for a patient known or suspected to be infected with microorganisms transmitted by the airborne route.

**PATIENT PLACEMENT**



- Private room.
- Door closed.
- Room air is exhausted to the outside (negative air pressure) using fan or other filtration system.
- If private room not available, place patient in room with patient having active infection with the same disease, but with no other infection (cohorting).
- Check all visitors for susceptibility before allowing them to visit.

**RESPIRATORY PROTECTION**



- Wear surgical mask.
- If TB known or suspected, wear particulate respirator (if available).
- If chicken pox or measles:
  - Immune persons—no mask required.
  - Susceptible persons—do not enter room.
- Remove mask after leaving the room and place in a plastic bag or waste container with tight-fitting lid.

**PATIENT TRANSPORT**



- Limit transport of patient to essential purposes only.
- During transport, patient must wear surgical mask.
- Notify area receiving patient.

*Adapted from:* ETNA Communications 2000.

Where TB is prevalent, it is important to have a mechanism to quickly assess (triage) patients with suspected TB because delayed diagnosis, resulting in lack of isolation, has been shown to be an important factor in hospital-based transmission to other patients. In this situation, airborne precautions are the last defense in reducing the risk of TB transmission.

### **Droplet Precautions**

These precautions reduce the risks for nosocomial transmission of pathogens spread wholly or partly by droplets larger than 5 µm in size (e.g., *H. influenzae* and *N. meningitidis* meningitis; *M. pneumoniae*, flu, mumps and rubella viruses). Other conditions include diphtheria, pertussis (whooping cough), pneumonic plague and strep pharyngitis (scarlet fever in infants and young children).

Droplet precautions are simpler than airborne precautions because the particles remain in the air only for a short time and travel only a few feet; therefore, contact with the source must be close for a susceptible host to become infected (**Table 21-2**).

**Table 21-2. Droplet Precautions**

Use in addition to Standard Precautions for a patient known or suspected to be infected with microorganisms transmitted by large-particle droplets (larger than 5 µm).

#### **PATIENT PLACEMENT**



- Private room; door may be left open.
- If private room not available, place patient in room with patient having active infection with the same disease, but with no other infection (cohorting).
- If neither option is available, maintain separation of at least 1 meter (3 feet) between patients.

#### **RESPIRATORY PROTECTION**



- Wear mask if within 1 meter (3 feet) of patient.

#### **PATIENT TRANSPORT**



- Limit transport of patient to essential purposes only.
- During transport, patient must wear surgical mask.
- Notify area receiving patient.

*Adapted from: ETNA Communications 2000.*

### **Contact Precautions**

These precautions reduce the risk of transmission of organisms from an infected or colonized patient through direct or indirect contact (**Table 21-3**). They are indicated for patients infected or colonized with enteric pathogens (hepatitis A or echo viruses), herpes simplex and hemorrhagic fever viruses and multidrug (antibiotic)-resistant bacteria. Interestingly, chicken pox is spread both by the airborne and contact routes at different stages of the illness. Among infants there are a number of viruses

transmitted by direct contact. In addition, Contact Precautions should be implemented for patients with wet or draining infections that may be contagious (e.g., draining abscesses, herpes zoster, impetigo, conjunctivitis, scabies, lice and wound infections).

**Table 21-3. Contact Precautions**

Use in addition to Standard Precautions for a patient known or suspected to be infected or colonized with microorganisms transmitted by direct contact with the patient or indirect contact with environmental surfaces or patient care items.

**PATIENT PLACEMENT**



- Private room; door may be left open.
- If private room not available, place patient in room with patient having active infection with the same microorganism, but with no other infection (cohorting).

**GLOVING**



- Wear clean, nonsterile examination gloves (or reprocessed surgical gloves) when entering room.
- Change gloves after contact with infectious material (e.g., feces or wound drainage).
- Remove gloves before leaving patient room.

**HANDWASHING**



- Wash hands with antibacterial agent, or use a waterless, alcohol-based antiseptic handrub, after removing gloves.
- Do not touch potentially contaminated surfaces or items before leaving the room.

**GOWNS AND PROTECTIVE APPAREL**



- Wear clean, nonsterile gown when entering patient room if patient contact is anticipated or patient is incontinent, has diarrhea, an ileostomy, colostomy or wound drainage not contained by a dressing.
- Remove gown before leaving room. Do not allow clothing to touch potentially contaminated surfaces or items before leaving the room.

**PATIENT TRANSPORT**



- Limit transport of patient to essential purposes only.
- During transport, ensure precautions are maintained to minimize risk of transmission of organisms.

**PATIENT CARE EQUIPMENT**



- Reserve noncritical patient care equipment for use with a single patient if possible.
- Clean and disinfect any equipment shared among infected and noninfected patients after each use.

*Adapted from:* ETNA Communications 2000.

**Empiric Use of Transmission-Based Precautions**

If there is any question of an infectious process in a patient without a known diagnosis, implementing Transmission-Based Precautions should be considered based on the patient’s signs and symptoms (empiric basis) until a definitive diagnosis is made. Moreover, where healthcare resources, including laboratory testing, are limited, diagnosis-based isolation precautions are not helpful in practice. In these circumstances, the isolation system needs to be completely based on the clinical findings (signs and symptoms).

Examples of the “empiric use” of these precautions are illustrated in **Table 21-4**.

<b>Table 21-4. Empiric Use of Transmission-Based Precautions (by signs and symptoms)</b>		
<b>AIRBORNE</b>	<b>DROPLET</b>	<b>CONTACT</b>
<ul style="list-style-type: none"> <li>• Cough, fever and upper lobe chest findings (dullness and decreased breath sounds)</li> <li>• Cough, fever and chest findings in any area in HIV-infected person or at high risk for HIV</li> <li>• Rashes (vesicule or pustule)</li> </ul>	<ul style="list-style-type: none"> <li>• Severe, persistent cough during periods when pertussis is present in community</li> <li>• Meningitis (fever, vomiting and stiff neck)</li> <li>• Hemorrhagic rash with fever</li> <li>• Generalized rash of unknown cause</li> </ul>	<ul style="list-style-type: none"> <li>• Acute diarrhea in an incontinent or diapered patient</li> <li>• Diarrhea in adult with history of recent antibiotic use</li> <li>• Bronchitis and croup in infants and young children</li> <li>• History of infection with multiresistant organisms (except TB)</li> <li>• Abscess or draining wound that cannot be covered</li> </ul>

A complete listing of the clinical syndromes or conditions warranting the empiric use of Transmission-Based Precautions is presented in **Table 21-5**.

The use of these precautions, including their empiric use in selected circumstances, is designed to reduce the risk of airborne-, droplet- and contact-transmitted infections between hospitalized patients and healthcare staff. To assist health workers in correctly implementing the appropriate precautions, **Table 21-6** provides a summary of the types of isolation precautions and the illnesses for which each type of precaution is recommended. In addition, **Appendix I** provides a complete listing of the types and duration of the isolation precautions needed for the vast majority of infectious diseases.

**Table 21-5. Clinical Syndromes or Conditions to Be Considered for “Empiric Use” of Transmission-Based Precautions**

CLINICAL SYNDROME OR CONDITION <sup>a</sup>	POTENTIAL PATHOGENS <sup>b</sup>	EMPIRIC PRECAUTIONS
Diarrhea		
Acute diarrhea with a likely infectious cause in an incontinent or diapered patient	Enteric pathogens <sup>c</sup>	Contact
Diarrhea in an adult with a history of recent antibiotic use	<i>Clostridium difficile</i>	Contact
Meningitis	<i>Neisseria meningitidis</i>	Droplet
Rash or exanthems, generalized, etiology unknown		
Petechial/ecchymotic with fever	<i>Neisseria meningitidis</i>	Droplet
Vesicular	Varicella (chicken pox)	Airborne and Contact
Maculopapular with coryza and fever	Rubeola (measles)	Airborne
Respiratory infections		
Cough/fever/upper lobe pulmonary infiltrate in an HIV-negative patient or a patient at low risk for HIV infection	<i>Mycobacterium tuberculosis</i>	Airborne
Cough/fever/pulmonary infiltrate in any lung location in an HIV-infected patient or a patient at high risk for HIV infection	<i>Mycobacterium tuberculosis</i>	Airborne
Paroxysmal or severe persistent cough during periods of pertussis activity	<i>Bordetella pertussis</i>	Droplet
Respiratory infections, particularly bronchiolitis and croup, in infants and young children	Respiratory syncytial or parainfluenza virus	Contact
Risk of multidrug-resistant microorganisms		
History of infection or colonization with multidrug-resistant organisms <sup>d</sup>	Resistant bacteria <sup>d</sup>	Contact
Skin, wound or urinary tract infection in a patient with a recent hospital or nursing home stay in a facility where multidrug-resistant organisms are prevalent	Resistant bacteria <sup>d</sup>	Contact
Skin or wound infection	<i>Staphylococcus aureus</i> , group A streptococcus	Contact

<sup>a</sup> Patients with the syndromes or conditions listed below may present with atypical signs or symptoms (e.g., pertussis in neonates and adults may not have paroxysmal or severe cough). The clinician’s index of suspicion should be guided by the prevalence of specific conditions in the community, as well as clinical judgment.

<sup>b</sup> The organisms listed under the column “Potential Pathogens” are not intended to represent the complete, or even most likely, diagnoses, but rather possible etiologic agents that require additional precautions beyond Standard Precautions until they can be ruled out.

<sup>c</sup> These pathogens include enterohemorrhagic *Escherichia coli* O157:H7, *Shigella*, hepatitis A and rotavirus.

<sup>d</sup> Resistant bacteria judged by the infection control program, based on current state, regional or national recommendations, to be of special clinical or epidemiological significance.

*Adapted from:* Garner and HICPAC 1996.

**Table 21-6. Summary of Types of Precautions and Patients Requiring the Precautions**

**Standard Precautions**

Use Standard Precautions for the care of all patients.

**Airborne Precautions**

In addition to Standard Precautions, use Airborne Precautions for patients known or suspected to have serious illnesses transmitted by airborne droplet nuclei. Examples of such illnesses include:

- Measles
- Varicella (including disseminated zoster)<sup>a</sup>
- Tuberculosis<sup>b</sup>

**Droplet Precautions**

In addition to Standard Precautions, use Droplet Precautions for patients known or suspected to have serious illnesses transmitted by large particle droplets. Examples of such illnesses include:

Invasive *Haemophilus influenzae* type b disease, including meningitis, pneumonia, epiglottitis and sepsis

Invasive *Neisseria meningitidis* disease, including meningitis, pneumonia and sepsis

Other serious bacterial respiratory infections spread by droplet transmission, including:

- Diphtheria (pharyngeal)
- Mycoplasma pneumonia
- Pertussis
- Pneumonic plague
- Streptococcal (group A) pharyngitis, pneumonia, or scarlet fever in infants and young children

Serious viral infections spread by droplet transmission, including:

- Adenovirus<sup>a</sup>
- Influenza
- Mumps
- Parvovirus B19
- Rubella

**Contact Precautions**

In addition to Standard Precautions, use Contact Precautions for patients known or suspected to have serious illnesses easily transmitted by direct patient contact or by contact with items in the patient's environment. Examples of such illnesses include: Gastrointestinal, respiratory, skin or wound infections or colonization with multidrug-resistant bacteria judged by the infection control program, based on current state, regional or national recommendations, to be of special clinical and epidemiologic significance.

Enteric infections with a low infectious dose or prolonged environmental survival, including:

- Clostridium difficile

For diapered or incontinent patients: enterohemorrhagic *Escherichia coli* O157:H7, *Shigella*, hepatitis A or rotavirus

Respiratory syncytial virus, parainfluenza virus or enteroviral infections in infants and young children

Skin infections that are highly contagious or that may occur on dry skin, including:

- Diphtheria (cutaneous)
- Herpes simplex virus (neonatal or mucocutaneous)
- Impetigo
- Major (noncontained) abscesses, cellulitis or decubiti
- Pediculosis
- Scabies
- Staphylococcal furunculosis in infants and young children
- Zoster (disseminated or in the immunocompromised host)<sup>a</sup>

Viral/hemorrhagic conjunctivitis

Viral hemorrhagic infections (Ebola, Lassa, or Marburg)\*

\* See **Appendix I** for a complete listing of infections requiring precautions, including appropriate footnotes.

<sup>a</sup> Certain infections require more than one type of precaution.

<sup>b</sup> See CDC "Guidelines for Preventing the Transmission of Tuberculosis in Health-Care Facilities."

*Adapted from: Garner and HICPAC 1996.*

**REFERENCES**

ETNA Communications. 2000. Infection Control Signs, Available on: [www.etnacomm.com](http://www.etnacomm.com)

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