

## DISEASE TRANSMISSION PRECAUTIONS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

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### **Course**

Health Science

### **Unit VII**

Infection Control

### **Essential Question**

*What must health care workers do to protect themselves and others from infection?*

### **TEKS**

130.204 (c) 1G,  
11A, 12A

### **Prior Student Learning**

Understanding of asepsis and the ability to apply gloves.

### **Estimated time**

3 hours

### **Rationale**

Knowledge of standard precautions is important in preventing nosocomial infections. The transmission of microorganisms is different for each infectious process.

### **Objectives**

Upon completion of this lesson, the student will be able to:

- Differentiate between the modes of transmission
- Determine methods for breaking the chain of infection
- Select and use PPE in healthcare settings
- Assess the appropriate circumstances for when each type of PPE should be used
- Correctly demonstrate how to don and remove PPE

### **Engage**

Ask students to respond to the following questions:

- What is the biggest challenge for healthcare workers when using personal protective equipment?
- Do you think the PPE provides the proper protection for healthcare workers?
- What type of PPE do you think is used most frequently by healthcare workers?
- What are the biggest mistakes that you think healthcare workers make when wearing PPE?

### **Key Points**

- I. Standard Precautions
  - A. Equipment and methods that prevent the transmission of microorganisms from one person to another.
    1. Established early in the AIDS epidemic
    2. Prior to the diagnosis of AIDS, personal protective equipment was used only in identified infectious processes. Once AIDS was better understood, personal protective equipment was universally applied to all patients.
  - B. These are applied to all patients/residents at all times because not all diseases are readily observable.
    1. Gloves should be worn at all times; hands should be washed for a minimum of 10 seconds and gloves changed when moving from one patient to another.

2. Depending on the activity performed on the patient, the nature of the patient's illness, and the amount of exposure to blood and body fluids, other protective equipment should be worn. E.g. gown and goggles if patient is coughing, bleeding, or has drainage from wounds or body orifices.
  3. Needles should never be capped.
  4. All sharps (needles, razors, etc.) should be disposed of immediately in biohazard puncture proof sharps containers located in each room.
  5. Never carry needles or sharps from one location to another. If necessary to do so, never point toward another person or yourself. KEEP POINT TOWARD THE FLOOR OR CEILING.
  6. All unknown spills or waste should be treated as potentially hazardous
- C. Types of PPE used in healthcare settings
1. gloves – protect hands
  2. mask – protect mouth/nose
  3. respirator -protect respiratory tract from airborne infectious agents
  4. goggles – protect eyes
  5. face shields – protect face, mouth, nose, and eyes
  6. gowns – protect skin/clothing
  7. cap – protects head
- D. Uses for PPE
1. gloves – Use when touching blood, body fluids, secretions, excretions, contaminated items; for touching mucus membranes and non-intact skin.
  2. gowns – Use during procedures and patient care activities when contact of clothing/ exposed skin with blood/body fluids, secretions, or excretions is anticipated
  3. mask and goggles or a face shield – Use during patient care activities likely to generate splashes or sprays of blood, body fluids, secretions, or excretions
- E. Transmission-based precautions
1. Airborne
    - a. diseases that are spread through the air
    - b. examples include chickenpox, measles, TB
  2. Droplet
    - a. diseases spread by droplets, as in a sneeze or cough
    - b. examples include certain types of meningitis and pneumonia, pertussis, influenza, mumps, German Measles.
  3. Contact
    - a. diseases spread by contact with infected skin or objects
    - b. examples include herpes, impetigo, diphtheria, scabies, AIDS, MRSA
  4. Reverse or Protective Isolation
    - a. this concept is the opposite of every other transmission-based

precaution

- b. it involves protecting the patient/resident from any infectious process carried by the health care providers or the public
- c. necessary for patients with immune deficiency/suppressed immune systems: i.e. AIDS patients, transplant patients, cancer chemotherapy patients

F. How airborne precautions work

- 1. patient's room must be private unless both patients have the same disease
- 2. room may have special ventilation equipment
- 3. the door of the room must remain closed
- 4. staff and visitors must wear masks
- 5. if staff has more direct prolonged contact with the patient, it is advisable to wear gloves, gown, hair covering, depending on the activity
- 6. patients should leave the room as little as possible and wear a mask if they do leave

G. How droplet precautions work

- 1. similar to airborne, but droplet travels no more than three feet
- 2. therefore room should be private or people with same diseases
- 3. if patients with different diseases are placed in the same room, they should be separated by at least three feet
- 4. staff and visitors within three feet of patient need to wear masks
- 5. if staff has more direct prolonged contact with the patient, it is advisable to wear gloves, gown, hair covering, goggles, depending on the activity
- 6. patients should leave room as little as possible and wear masks when they leave

H. How contact precautions work

- 1. May be private or have people with same diseases together
- 2. Everyone entering the room must wear gloves and change them whenever soiled
- 3. Gowns, mask, goggles, hair covering, should be worn depending on length of contact and activity
- 4. All must wash their hands and avoid touching objects before leaving the room
- 5. Patients should leave the room as little as possible and avoid contact with other people or objects
- 6. Use biohazard waste bags to dispose of any trash or items leaving the room
- 7. Equipment such as thermometer, blood pressure equipment should remain in the room, and disinfected properly when precautions have been discontinued

I. Reverse Isolation

- 1. The health care provider puts on any necessary equipment to prevent exposing the compromised patient to any microorganisms

2. The equipment is determined by the care that is to be given
- II. Exposure
    - A. Should a known exposure occur to a microorganism, i.e. HIV, the exposure must be reported to the supervisor of the unit.
    - B. An incident report must be completed.
    - C. Depending on the exposure, the area should be cleaned with an antiseptic solution, and if necessary, appropriate blood tests should be completed.
    - D. Follow-up must be done as required by policy (either facility or CDC).
  - III. Application of personal protective equipment
    - A. Hands must be washed prior to application, according to protocol
    - B. This equipment is clean, not sterile
    - C. Order of application
      1. gown
      2. cap
      3. mask
      4. gloves – sterile gloves might be required depending on what care is to be given (e.g. assisting with some sterile procedure)
    - D. Order of removal
      1. Gloves first by never touching the outside of the glove
        - a. remove the first one by grabbing a place on the glove and removing
        - b. remove the second by hooking the finger inside the glove and removing
      2. Hook the finger inside the cap and pull cap off
      3. Reach behind the gown and untie, pulling the gown off and touching only the inside of the gown; roll it inside out as removing
      4. Finally pull ties of mask and removes, being careful to avoid touching the hair.
      5. In airborne transmission, the mask should be removed just before leaving the room (or if there is a outside foyer for application and removal of protective equipment it should be removed there)
      6. Lastly, hands should be washed according to protocol.
      7. When removing equipment, all should be placed in the proper biohazard container(s).
      8. When biohazard containers are full, they should be removed from the patient's room through double bagging. Two people should be doing this – one on the inside of the room, one on the outside to receive the contaminated items and help place them in the proper protective bags. The person inside the room only touches the inside of the receiving biohazard bag; the person outside the room only touches the outside of the receiving biohazard bag.

## Activity

- I. Apply and remove personal protective equipment in proper sequence. See Application and removal of personal protective equipment

**Teacher Note:** *Each student is given a disposable gown, cap, mask, and gloves. Have them apply them in this order: gown, cap, mask, and finally gloves. Have them remove them in this order and manner: gloves first by never touching the outside of the glove; then hooking the finger inside the cap and pulling the cap off; then reach to grasp ties of gown and untie, pulling the gown off and touching only the inside of the gown; and finally pulling the ties of the mask and removing the mask. The mask should be removed just before or after leaving the room of a patient with airborne transmission. It must be discarded in the proper biohazard container. Finally, hands should be washed according to protocol.*

- II. Instructor demonstrates proper handling of needles/sharps containers and proper handling of linen and trash that leaves the infectious patient's room.

**Teacher Note:** *Demonstrate with the aid of another student the bagging of trash and linen with one person in the room and another outside of the room holding the open biohazard bag. Emphasis should be made that the person within the room touches only the inside of the bag for trash and linen and the person on the outside only touches the outside of the bag.*

- III. Complete What Type of PPE Would You Wear?

## Assessment

Successful completion of Standard Precautions Quiz.

## Materials

Transparencies of precaution measures

**Teacher Note:** *Get examples of the hospital's/Nursing Home's signs for Transmission – Based Precautions and make transparencies to use in presentation of lesson)*

## Application and removal of personal protective equipment

Gowns

Caps

Masks

Gloves  
Biohazardous bags  
Syringe with needle  
Sharps container

<http://www.osha.gov/SLTC/bloodbornepathogens/index.html> Excellent source for latest guidelines related to blood borne pathogens.

<http://www.cdc.gov/ncidod/dhgp/ppe.html> Great resource for PowerPoint and posters to download for PPE.

### **Accommodations for Learning Differences**

For reinforcement the student will design a poster that shows the necessary protective equipment for each transmission mode.

For enrichment the student will watch the movie “The Band Played On” and develop a time line of the widespread transmission of AIDS.

### **National and State Education Standards**

National Health Science Cluster Standards

HLC06.01

Health care workers will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.

HLC06.02

Health care workers will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among their clients

TEKS

130.204 (c)(1)(G) research the global impact of disease prevention and cost containment;

130.204 (c)(11)(A) conform to governmental regulations and guidelines from entities such as the World Health Organization, Centers for Disease Control, Occupational Safety and Health Administration, Food and Drug Administration, and National Institute for Occupational Safety and Health; and

130.204 (c)(12)(A) research wellness strategies for the prevention of disease.

Texas College and Career Readiness Standards  
English Language Arts

- II. B. Understand new vocabulary and concepts and use them accurately in reading writing and speaking.
- III. B. Develop effective speaking styles for both group and one on one situations.
- IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.

Science

- I. A. 1. Utilize skepticism, logic and professional ethics in science

## What Type of PPE Would *You* Wear?

For each scenario, list the PPE required and describe the type of interaction that will occur between the healthcare worker and patient.

1. Giving a bed bath?
2. Suctioning oral secretions?
3. Transporting a patient in a wheel chair?
4. Responding to an emergency where blood is spurting?
5. Drawing blood from a vein?
6. Cleaning an incontinent patient with diarrhea?
7. Irrigating a wound?
8. Taking vital signs?

Adapted from:  
<http://www.cdc.gov/ncidod/dhqp/pdf/ppe/PPEslides6-29-04.pdf>



## Key: What Type of PPE Would *You* Wear?

1. Giving a bed bath? (generally none)
2. Suctioning oral secretions? (gloves and mask/goggles or a face shield) (Respondents may correctly note that this may depend on whether open or closed suction is being used)
3. Transporting a patient in a wheelchair? (generally none)
4. Responding to an emergency where blood is spurting? (gloves, fluid-resistant gown, mask/goggles or a face shield)
5. Drawing blood from a vein? (gloves)
6. Cleaning an incontinent patient with diarrhea? (gloves and generally a gown)
7. Irrigating a wound? (gloves, gown, and mask/goggles or a face shield)
8. Taking vital signs? (generally none)

Adapted from:  
<http://www.cdc.gov/ncidod/dhqp/pdf/ppe/PPEslides6-29-04.pdf>

## STANDARD PRECAUTIONS QUIZ

NAME: \_\_\_\_\_

For each of the following statements, write the word(s) that best completes the statement in the space provided.

\_\_\_\_\_ 1. If a patient with droplet precautions is placed in a semi-private room, the minimum distance between patients must be \_\_\_\_\_.

\_\_\_\_\_ 2. The last protective equipment that the health care provider removes before leaving a room observing air-borne precautions is/are the \_\_\_\_\_.

\_\_\_\_\_ 3. True/False. The type of protective equipment appropriate for a given task depends on the amount of anticipated exposure to blood and body fluids.

\_\_\_\_\_ 4. True/False. If a person is exposed to blood or body fluids, he/she should report the exposure after 14 days, or when symptoms are observed.

\_\_\_\_\_ 5. True/False. Using Standard Precautions means that the health care provider follows those guidelines only for people aged 18 – 65 years, since they are most likely to be exposed to a transmittable pathogen (i.e. a bloodborne pathogen).

\_\_\_\_\_ 6. True/False. It is imperative that gloves be worn in all Standard Precaution situations.

\_\_\_\_\_ 7. All needles, razors, and similar items should be disposed of in a puncture-proof \_\_\_\_\_.

\_\_\_\_\_ 8. All trash from a patient with Contact Precautions should be disposed of in a \_\_\_\_\_.

\_\_\_\_\_ 9. True/False. Linens from a room observing Airborne Precautions are not considered contaminated.

\_\_\_\_\_ 10. According to the CNA guidelines for the state of Texas, the minimum amount of time required to adequately wash hands is \_\_\_\_\_.

KEY: QUIZ ON STANDARD PRECAUTIONS

1. Three feet
2. Mask
3. True
4. False
5. False
6. True
7. Sharps Container
8. Biohazardous Bag
9. False
10. 20 seconds

## Application and Removal of Personal Protective Equipment

1. Hands must be washed prior to application, according to protocol
2. This equipment is clean, not sterile
3. Application:
  - A. gown
  - B. cap
  - C. mask
  - D. gloves – sterile gloves might be required depending on what care is to be given (e.g. assisting with some sterile procedure)
4. Removal:
  - A. Gloves first by never touching the outside of the glove
    - a. remove the first one by grabbing a place on the glove and removing
    - b. remove the second by hooking the finger inside the glove and removing
  - B. Hook the finger inside the cap and pull cap off
  - C. Reach behind the gown and untie, pulling the gown off and touching only the inside of the gown; roll it inside out as removing
  - D. Finally pull ties of mask and removes, being careful to avoid touching the hair.
  - E. In airborne transmission, the mask should be removed just before leaving the room (or if there is a outside foyer for application and removal of protective equipment it should be removed there)
  - F. Lastly, hands should be washed according to protocol.
  - G. When removing equipment, all should be placed in the proper biohazard container(s).
  - H. When biohazard containers are full, they should be removed from the patient's room through double bagging. Two people should be doing this – one on the inside of the room, one on the outside to receive the contaminated items and help place them in the proper protective bags. The person inside the room only touches the inside of the receiving biohazard bag; the person outside the room only touches the outside of the receiving biohazard bag.