Self-Instructional Packet (SIP)

Advanced Infection Prevention and Control

Training Module 5
Selected Pathogens

Learning Objectives

Module One – Introduction to Infection Prevention and Control

After completing Module One, the learner will be able to:

1. Explain the role of Infection Prevention and Control in DBHDD hospitals.
2. Define the term pathogen and explain what constitutes an infection.
3. Define the term healthcare associated infection (HAI) and explain the difference between these and community associated infections (CAIs).
4. Explain the potential impact on hospitalized individuals and hospital employees who contract healthcare associated infections.
5. Define the term colonization and explain the difference between colonization and infection.
6. Define the term asymptomatic infection and list two examples of pathogens that can result in asymptomatic infections in some individuals.
7. Define the term carrier and explain the infection risk that carriers bring to hospitalized individuals and hospital employees.
8. List five of the typical signs and symptoms of infections and describe the responsibility hospital employees have to report any of these signs.
9. Name two multi-drug resistant organisms (MDROs) that are tracked at DBHDD hospitals and explain why these pathogens pose a significant health risk to hospitalized individuals.
10. Name two bloodborne pathogens (BBPs) that are tracked at DBHDD hospitals and explain how these infections are typically transmitted.
11. Define the term true exposure and describe what action DBHDD hospital employees must take when a true exposure occurs.

Module Two – The Chain of Infection

After completing Module Two, the learner will be able to:

1. Explain the "Chain of Infection" and list at least three of the six essential elements or links in this chain.
2. Discuss at least three examples where the potential for the spread of infections exists at DBHDD hospitals and other healthcare facilities (HCFs).
3. Explain some of the actions and precautions taken by hospital and other healthcare facility (HCF) employees that can help break the chain of infection.

Module Three – Standard Precautions

After completing Module Three, the learner will be able to:

1. Explain the basic principles of Standard Precautions and when they should be used.
2. Explain the importance of hand hygiene in the prevention of healthcare associated infections (HAIs) and discuss proper hand hygiene techniques.
3. Explain the importance of Personal Protective Equipment (PPE) in the prevention of healthcare associated infections (HAIs).
4. List at least three examples of Personal Protective Equipment (PPE) used in DBHDD hospitals.
5. Define the term "Sharps" and can list at least two examples of sharps that can be encountered in DBHDD hospitals.

6. Explain why the handling and disposal of sharps are so important.
7. Discuss how sharps can be safely handled and explain the proper disposal method for sharps.
8. Explain what constitutes contaminated waste and the proper disposal method.
9. Explain the importance of adult immunizations in the prevention of healthcare associated infections (HAIs).
10. List at least two examples of adult immunizations that are available to individuals and employees in DBHDD hospitals.

Module Four – Transmission-Based Precautions

After completing Module Four, the learner will be able to:

1. Define the term "Transmission-Based Precautions" and explain the general indication for these groups of precautions.
2. Define the term "Contact Precautions" and explain when and how they are used.
3. Define the term "Droplet Precautions" and explain when and how they are used.
4. Define the term "Airborne Precautions" and explain when and how they are used.
5. Name at least one pathogen that was presented in this module for which Contact Precautions are indicated.
6. Name at least one pathogen that was presented in this module for which Droplet Precautions are indicated.
7. Name at least one pathogen that was presented in this module for which Airborne Precautions are indicated.

Module Five – Selected Pathogens

After completing Module Five, the learner will be able to:

1. Define the term "Bloodborne Pathogens" (BBPs) and name at least two examples of bloodborne pathogens presented in this module.
2. Name the infection control precautions indicated for bloodborne pathogens (BBPs).
3. Define the term "Contact Transmitted Pathogens" and name at least two contact transmitted pathogens presented in this module.
4. Name the infection control precautions indicated for contact transmitted pathogens.
5. Define the term "Droplet Transmitted Pathogens" and name at least two droplet transmitted pathogens presented in this module.
6. Name the infection control precautions indicated for droplet transmitted pathogens.
7. Define the term "Airborne Pathogens" and name at least two airborne pathogens presented in this module.
8. Name the infection control precautions indicated for airborne transmitted pathogens.
9. Explain the difference between tuberculosis (TB) infection and tuberculosis (TB) disease.

MODULE FIVE – Selected Pathogens

1) Bloodborne Pathogens

A) Human Immunodeficiency Virus (HIV)

HIV is a bloodborne pathogen that attacks the body's immune system, thereby reducing an individual's ability to fight infection.

1) Transmission
   (a) HIV is transmitted by way of a true exposure. (See Module One for information relating to true exposures)
2) Recommended Infection Control Precautions
   (a) Standard Precautions
3) Typical Signs and Symptoms include:
   (a) Fatigue, shortness of breath, and swollen lymph nodes
   (b) Unexplained weight loss, fevers, and night sweats
   (c) Rashes, other skin lesions, and unusual oral lesions such as red/ white spots

B) Acquired Immunodeficiency Syndrome (AIDS)

AIDS is an advanced stage of HIV infection. The diagnosis requires the presence of at least one opportunistic infection. An opportunistic infection is caused by pathogens that might not normally infect an individual, but are given the "opportunity" to do so because of the compromised immune system. Two examples of opportunistic infections common to AIDS patients are Pneumocystis Pneumonia that is caused by a yeast-like fungus and Kaposi's sarcoma that is caused by a virus. Infections such as tuberculosis (TB) are also considered opportunistic infections when making an AIDS diagnosis.

1) Transmission
   (a) HIV is transmitted by way of a true exposure. (See Module One for information relating to true exposures)
2) Recommended Infection Control Precautions
   (a) Standard Precautions
   (b) Any transmission based precaution that is indicated as a result of the opportunistic infection(s) that are present. For example, Airborne Precautions would be indicated if an individual with AIDS contracts tuberculosis (TB).
3) Typical Signs and Symptoms include:
   (a) The signs and symptoms listed for HIV; plus
   (b) Those that are exhibited by the opportunistic infection(s) that is present.

C) Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV)

HBV and HCV are bloodborne pathogens that attack the liver and can cause both acute and chronic infections.

1) Transmission
   (a) HBV and HCV are transmitted by way of true exposure. (See Module One for information relating to true exposures)

2) Recommended Infection Control Precautions
   (a) Standard Precautions
3) Typical Signs and Symptoms include:
   (a) Abdominal pain, loss of appetite, nausea, vomiting, and fever
   (b) Dark urine and jaundice (yellowing of the skin and white area of the eyes)

2) Contact Transmitted Pathogens

A) Methicillin-Resistant Staphylococcus Aureus (MRSA)

MRSA is the antibiotic resistant variety of staph aureus bacteria that has become a major health-risk for individuals in hospitals and other healthcare facilities (HCFs). Among the elderly and those in poor health, MRSA can produce potentially life-threatening infections involving skin, surgical wounds, bones, joints, heart valves, and the bloodstream. Although typically no more infectious or virulent than the antibiotic sensitive variety, persons contracting MRSA infections have a much poorer prognosis because MRSA is much more difficult to treat.

1) Risk Factors
   (a) Antibiotic exposure
   (b) Advanced age
   (c) Serious underlying medical conditions
   (d) A long-term stay in a healthcare facility (HCF)
2) Transmission
   (a) MRSA is typically spread by direct contact with infected or colonized skin lesions and indirectly through contact with environmental objects that have been contaminated by MRSA such as medical equipment, clothing, linens, used bandages, and other used individual care items.
3) Infection and Colonization
   (a) Persons with MRSA infection will test positive for the organism at the affected site and will show signs and symptoms of illness.
   (b) Persons with MRSA colonization will test positive for the organism at the affected site but will not show any signs of illness.
4) Recommended Infection Control Precautions
   (a) Standard Precautions plus Contact Precautions
   (b) Note: Individuals residing in long-term care facilities (LTCFs) who are colonized with MRSA may not require Contact Precautions. The decision should be made on a case by case basis. Consult with your infection control nurse (ICN).
5) Typical Signs and Symptoms
   (a) Are usually specific to the site of infection, for example:
      (i) Skin infections usually occur at sites of visible skin trauma and areas covered by hair such as the back of the neck, groin, and armpits. They usually start as small red bumps resembling pimples, boils, or spider bites. The infection site usually exhibits redness, warmth, and tenderness. There may be pus or other drainage and the individual

may have a fever. Skin infections can quickly progress into deep, painful abscesses that require surgical drainage.

(ii) Wound infections usually exhibit redness, warmth, and tenderness at the wound. There may be pus or other drainage and the individual may have a fever.

(iii) Systemic infections such as those of the bloodstream and lungs will have significant signs and symptoms characteristic of the type of infection.

B) Vancomycin Resistant Enterococci (VRE)

VRE is the antibiotic resistant variety of enterococcal bacteria that has become a major health-risk for individuals in hospitals and other healthcare facilities (HCFs). Normally, enterococci bacteria populate the gastrointestinal and female urogenital tracts without causing any harm; however, the elderly or those in very poor health can develop very serious infections from these bacteria. And when the antibiotic resistant variety (VRE) is responsible, the prognosis is often poor. Although typically no more infectious or virulent than the antibiotic sensitive variety, VRE is much more difficult to treat. As a result, the elderly and those in very poor health can develop potentially life-threatening VRE infections involving the gastrointestinal tract, the female urogenital tract, surgical wounds, chronic lesions, and the bloodstream.

1) Risk Factors
   (a) Antibiotic exposure
   (b) Advanced age
   (c) Serious underlying medical conditions
   (d) A long-term stay in a healthcare facility (HCF)
2) Transmission
   (a) VRE is usually spread directly by contact with an infection site and indirectly by contact with environmental surfaces, linens, clothing, patient care items, and medical equipment that have been contaminated. Common sources of contamination for these objects depend upon the infection site and may include urine, feces, wounds, lesions, and blood.
3) Infection and Colonization
   (a) Persons with VRE infection will test positive for the organism at the affected site and will show signs and symptoms of illness.
   (b) Persons with VRE colonization will test positive for the organism at the affected site but will not show any signs of illness.
4) Recommended Infection Control Precautions
   (a) Standard Precautions plus Contact Precautions
   (b) Note: Individuals residing in long-term care facilities (LTCFs) who are colonized with VRE may not require Contact Precautions. The decision should be made on a case by case basis. Consult with your infection control nurse (ICN).
5) Typical Signs and Symptoms
   (a) Are usually specific to the site of infection, for example:

(i) Urinary tract infections will usually cause back pain, a burning sensation when urinating, and the need to urinate more frequently.
(ii) Wound and other chronic lesion infections will usually cause redness, warmth, and tenderness at the site. There may be pus or other drainage and the individual may have a fever.
(iii) Gastrointestinal infection will usually cause diarrhea, abdominal pain, weakness, fever, and chills.

C) Clostridium difficile (C. diff)

C. diff are bacteria that can infect or colonize the intestinal tract and are shed in feces. It can cause what is referred to as antibiotic associated diarrhea because the infection often follows antibiotic treatments for other conditions. They produce hardy spores that can survive on environmental surfaces for weeks if not cleaned and disinfected properly.

1) Risk factors
   (a) Antibiotic exposure
   (b) Advanced age
   (c) Serious underlying medical conditions
   (d) A long-term stay in a healthcare facility (HCF)
2) Transmission
   (a) C. diff is shed in feces; therefore, it can be spread directly by contact with contaminated feces and indirectly by contact with items that have been contaminated by feces that contains C. diff, such as medical equipment, soiled clothing, and linen.
3) Infection and Colonization
   (a) Persons that are infected will test positive for the organism and the toxins they produce, and will have the usual signs and symptoms of infection.
   (b) Persons that are colonized will also test positive for the organisms and the toxins they produce; however, they will not have any of the usual signs or symptoms.
4) Recommended Infection Control Precautions
   (a) Standard Precautions plus Contact Precautions
   (b) Note: Individuals residing in long-term care facilities (LTCFs) who are colonized with C. diff may not require Contact Precautions. The decision should be made on a case by case basis. Consult with your infection control nurse (ICN).
5) Typical Signs and Symptoms include:
   (a) Watery diarrhea anywhere from 3 to 15 times a day for two or more days, possibly with blood or pus in stool.
   (b) Mild to severe abdominal cramping with anywhere from mild tenderness to considerable pain.
   (c) Fever, nausea, loss of appetite, dehydration, and weight loss.

3) Droplet Transmitted Pathogens

A) Seasonal Influenza

Seasonal influenza is a virus that is typically spread by large respiratory droplets that are generated when an infected person coughs, sneezes, laughs, or talks.

1) Recommended Infection Control Precautions
   (a) Standard Precautions plus Droplet Precautions
2) Typical Signs and Symptoms; include:
   (a) Fever (often high)
   (b) Headache
   (c) Extreme fatigue
   (d) Dry cough
   (e) Sore throat
   (f) Runny or stuffy nose
   (g) Muscle aches
   (h) Stomach symptoms such as nausea, vomiting and diarrhea

4) Airborne Pathogens

A) Tuberculosis (TB)

Tuberculosis (TB) is caused by a bacterium that is transmitted by small contaminated airborne particles that are generated when a person with tuberculosis disease coughs, sneezes, laughs, or talks. Inhaling contaminated particles can result in one of two clinical presentations:

1) Tuberculosis (TB) Infection

Persons with TB infection have the bacteria in their bodies and have positive skin tests; however, they are not sick and cannot infect others. TB Infection can progress to TB Disease over time if not properly treated.

(a) Infection Control Precautions
   (i) Standard Precautions
(b) Typical Signs and Symptoms
   (i) There are no signs or symptoms.

2) Tuberculosis (TB) Disease

Persons with TB disease have the bacteria in their bodies, have positive skin tests, are sick, and are able to infect others. Permanent damage and even death may occur if not properly treated.

(a) Infection Control Precautions
   (i) Standard Precautions plus Airborne Precautions
(b) Typical Signs and Symptoms include:
   (i) Productive cough with grey, black, or bloody sputum
   (ii) Night sweats, fever, and chills
   (iii) Chest pain and significant weight loss

A	MRSA	B	AIDS	C	VRE
D	HBV	E	C. diff	F	HIV

Select the best match from the choices above (each choice is used only once)

____ 1. A bloodborne pathogen that typically attacks the liver.
____ 2. An advanced stage of HIV infection having one or more opportunistic infection.
____ 3. An antibiotic resistant variety of the bacteria Staphylococcus Aureus.
____ 4. A bloodborne pathogen that attacks the body's immune system.
____ 5. An antibiotic resistant variety of the bacteria Enterococci.
____ 6. Bacteria that can infect or colonize the gastrointestinal tract, usually involving the elderly in nursing homes, especially following antibiotic treatments.

True or False

____ 7. MRSA skin infections usually start as small red bumps that can be mistaken for pimples, boils, and spider bites, but can penetrate into deeper body tissues.
____ 8. Standard Precautions and Contact Precautions are indicated when caring for persons with an active MRSA infection.
____ 9. Standard Precautions and Contact Precautions are indicated when caring for persons with an active VRE infection.
____ 10. VRE poses little risk to healthy individuals but can be responsible for very serious infections in the elderly and persons in poor health.
____ 11. Risk factors for VRE include antibiotic exposure, advanced age, underlying medical conditions, long-term stays in healthcare facilities, and tobacco use.
____ 12. C. diff is very infectious and produce hardy spores that can survive on surfaces for extended periods of time.
____ 13. Standard Precautions and Airborne Precautions are indicated when caring for persons with an active C. diff infection.
____ 14. An opportunistic infection is caused by pathogens that might not normally infect a person, but have the "opportunity" to do so because of a compromised immune system.

Multiple Choice (select the best answer)

____ 15. Which of the following are common signs and symptoms of a C. diff infection?
a. Mild to severe abdominal cramping
b. Watery diarrhea several times a day for two or more days
c. Fever
d. Nausea and loss of appetite
e. Dehydration and weight loss
f. All of the above
g. a and b

____ 16. Which of the following are typical signs and symptoms of a TB <u>Infection</u>?
a. Productive cough with grey, black, or bloody sputum
b. Night sweats, fever, and chills
c. Chest pain and weight loss
d. All of the above
e. None of the above

____ 17. Which of the following are typical signs and symptoms of a TB <u>Disease</u>?
a. Productive cough with grey, black, or bloody sputum
b. Chest pain and significant weight loss
c. Night sweats, fever, and chills
d. All of the above
e. None of the above

____ 18. Which of the following are common sites for VRE infection?
a. The gastrointestinal tract
b. Surgical wounds/other chronic lesions
c. The bloodstream
d. The female urinary/genital tract
e. All of the above
f. a and d