Self-Instructional Packet (SIP)

Advanced Infection Prevention and Control

Training Module 2
The Chain of Infection
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 TWO – The Chain of Infection

1) Introduction
   A) The Chain of Infection refers to the process by which infections spread and proliferate. They are able to do so as long as six essential elements (or links) are present. Figure 1 illustrates these links and the cyclic nature of this process.

2) The Links in the Chain of Infection
   A) The following is a description of the six essential links that are necessary for infections to spread and proliferate:
      1) An Infectious Agent or pathogen.
      2) A Reservoir or location where pathogens can inhabit, such as people, environmental surfaces, medical equipment, food, and water.
      3) A Portal of Exit or outlet through which pathogens can exit the reservoir; such as through blood/ body fluids, respiratory droplets/ particles, secretions, and excretions.
      4) A Mode of Transmission or means by which pathogens can travel to a potential host; such as by direct and indirect contact, respiratory droplets, and airborne particles.
      5) A Portal of Entry through which pathogens can enter the blood stream or other tissues of a potential host; such as broken skin, mucous membranes, the respiratory tract, and the gastrointestinal (GI) tract.
      6) A Susceptible Host or person who is lacking the resistance to defeat the invading pathogens; such as those with suppressed immune systems, those...
recovering from surgery or major burn injuries, and those with chronic illnesses such as diabetes.

3) Potential for Healthcare Associated Infections (HAIs)

A) The risk of contracting healthcare associated infections (HAIs) is ever present in many hospitals and other healthcare facilities (HCFs). Unfortunately this is true because the elements or links that are necessary for infections to spread and proliferate are often present. For example; many hospitals and other healthcare facilities (HCFs);

1) Harbor indigenous pathogens that can serve as the “Infectious Agent”.
2) Serve people who are colonized by pathogens or suffer from chronic infections that can serve as the “Reservoir”.
3) Provide intimate and at times invasive procedures that can serve as the “Portal of Exit” if proper technique is not followed.
4) Have physical limitations that can serve as the “Mode of Transmission”. For example:
   (a) People served are often in close proximity, sometimes having two or more individuals sharing the same room and breathing the same potentially contaminated air.
   (b) People served often share restrooms and bathing areas that can spread infections if not properly cleaned and disinfected.
   (c) People served often share a laundry service that can spread infections if contaminated items are not properly handled and sanitized.
5) Serve people having compromised skin integrity that can serve as the “Portal of Entry”. For example:
   (a) Persons with surgical wounds
   (b) Persons with major burn injuries
   (c) Persons with areas of non-intact skin such as those with:
      (i) Decubitus ulcers
      (ii) Indwelling catheters
      (iii) Enteral feeding tubes
      (iv) Tracheotomies
6) Serve people who have compromised resistance to infectious agents that can serve as the Susceptible Host. For example:
   (a) The elderly
   (b) Persons with chronic illness such as diabetes, liver disease, and chronic cardiopulmonary disease
   (c) Persons with suppressed immune systems such as those caused by Acquired Immunodeficiency Syndrome (AIDS), some malignant diseases, radiation treatments, and certain drug therapies.

4) Breaking the Chain of Infection

A) Breaking the chain of infection requires a concerted team effort. Figure 2 illustrates a strategy based on science and epidemiology that can help prevent healthcare associated infections (HAIs) when applied correctly and consistently. Additional
information regarding this strategy, including Standard and Transmission-Based Precautions, is covered in later modules.

- Recognize high risk patients
- Treatment of underlying illness
- HBV vaccine and other adult immunizations

- Aseptic Technique including:
  - Catheter care
  - Wound care
  - Trach care

- The use of proper:
  - Attire (PPE)
  - Hand hygiene
  - Cough/ Sneeze Etiquette
  - Sharps and Waste Management

- Rapid ID and elimination of pathogens
- Employee Health/ Screen
- Environmental sanitation
- Sterilization/ Disinfection

Figure 2

Infection Cycle

Susceptible Host
Immunosuppression
Diabetes – Recent surgery
Cardiopathy – Major Burns

Reservoir
People – Equipment
Food - Water

Portal of Entry
Mucous membrane
GI tract - Broken skin
Respiratory tract

Mode of Transmission
Contact – Airborne
Droplet – Bloodborne

Portal of Exit
Excretions - Secretions
Droplets - Particles
Body Fluids

Infectious Agent
Bacteria - Viruses
Fungi – Protozoa
Rickettsia

- Standard Precautions
- Transmission-Based Precautions
- Proper sterilization/ disinfection
- Proper hand hygiene
Module Two – Competency Exam

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<td>Portal of Exit</td>
<td>Portal of Entry</td>
<td>Susceptible Host</td>
<td>Infectious Agent</td>
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Select the best match from the choices above (each choice is used only once)

___ 1. Outlet through which pathogens can leave a reservoir
___ 2. A place where pathogens can inhabit
___ 3. A person who is lacking the resistance to defeat invading pathogens
___ 4. Pathogenic microorganisms
___ 5. Means by which pathogens can travel to a potential host
___ 6. Inlet through which pathogens can enter the tissues of a potential host

True or False

___ 7. Fortunately for infection control professionals, the necessary elements for the spread of infection are not readily available in most hospitals and other healthcare facilities (HCFs)
___ 8. Standard Precautions and Transmission-Based Precautions are intended to help stop the spread of infections in hospitals and other healthcare facilities (HCFs)
___ 9. The elderly who are in poor health are at increased risk of contracting an infection
___ 10. A recent surgery can make a person more resistant to infection

Multiple Choice (select the best answer)

___ 11. Which of the following conditions does not place an individual at increased risk of contracting an infection?
   a. Decubitus ulcers
   b. Indwelling catheters
   c. Type AB blood (the universal infection fighter)
   d. Feeding tubes
   e. Surgical wounds

___ 12. Which of the following medical conditions and/or treatments can compromise a person’s immune system, making them more at risk of contracting an infection?
   a. AIDS
   b. Radiation treatments
   c. Chemotherapy
   d. a and b
   e. a, b, and c

___ 13. Which of the following is not a necessary element or link in the Chain of Infection?
   a. Portal of Entry
   b. Susceptible Host
   c. Cellar door
   d. Reservoir
   e. Mode of Transmission