D. Education Module 2 - Chain of Transmission of Infection

TIP Study Module 2: The Chain of Transmission of Infection

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The Infectious Disease Model
On Cross Transmission Of Microbes [Germs]
Or...

Risk Factors For LTCF Resident

How Microbes Move around

LTCF = long-term care facility
The Chain of Infection

- Each link represents a component or element in the cycle, and must be present in sequential order for infection transmission to occur.
- Understanding the characteristics of each link and the relation to the other links is important to determine interventions and strategies to break the chain and prevent infection.
- Breaking the chain of infection is the responsibility of every healthcare professional.

1. The Infectious Agent or Microbe

- **Exogenous flora**: from outside the body
  - Example: bacteria = methicillin-resistant *Staph. aureus* [MRSA] is carried to the resident via hands of healthcare workers (HCW)
- **Endogenous flora**: from inside or on the body

- **Bacteria**
  - Bacilli
  - Cocci
  - Spirochetes
- **Virus**
- **Fungi**
- **Rickettsia**
- **Protozoa**
2. The Reservoir

- Place where microbe (germ) grows and reproduces
  - **Humans**: Resident’s own microbial flora – transient (temporary) or resident (more permanent)
  - **Other sources**: healthcare workers, family, visitors
  - **Animals**: pet therapy program
  - **Environment**: (food, beverages, soil, healthcare equipment)
    - Contaminated
    - Handling
    - Storage

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The “TIP” of the Iceberg

- This iceberg represents colonization versus infection.
- Residents may carry organisms that could be transferred to another person, even if they do not show signs or symptoms of infection
Colonized or Infected
What is the Difference?

- **Colonization**: bacteria is present without evidence of infection (e.g. fever, increased white blood cell count)
- **Infection**: active process where the bacteria is causing damage to cells or tissue;
  - example purulent drainage from an open wound on the resident’s skin.
  - UTI: resident has new fever and complains of burning pain when urinating plus frequency and urgency
- If an infection develops, it is usually from bacteria that colonize residents, e.g. their endogenous microbial flora, but can also be an exogenous source, e.g. transmitted by hands of HCW

~ Bacteria can be transmitted even if the resident does not have an active infection ~

3. The Mode of Exit

- **Microbe leaves the Reservoir**
  - Respiratory tract
    - Cough, sneeze, talking
  - Gastrointestinal tract
    - vomitus, feces
  - Skin, mucous membranes
  - Genitourinary tract
    - Urine, semen, vaginal secretions
  - Blood: from a cut through the skin or contaminated needle
  - Artificial openings, e.g. tracheostomy or feeding tube inserted through the skin
4. Mode of Transmission

- Contact
  - Direct
  - Indirect
- Droplet
- Airborne

- Other sources of infection
  - Example: food-borne from contaminated food

5. The Mode of Entry

- Infectious agent enters the new host (resident)
  - Respiratory tract
    - Breathing contaminated air droplets
  - Gastrointestinal tract
    - Eating, drinking, hand-to-mouth (fecal-oral route)
  - Skin, mucous membranes
    - Non-intact skin
    - Hand-to-eye and nose
  - Genitourinary tract
    - Urinary catheter is present; bacteria move up catheter into the bladder
  - Blood
    - Contaminated lancet used for blood glucose
6. Resident Risk Factors

They increase risk for infection

- Functionally dependent: resident needs lots of help with activities of daily living
- Immune system: e.g. does not work as well as one gets older
- Barrier Compromised:
  - Fragile skin: tear, burn injury, chronic wound
  - Device use: indwelling urinary catheter (Foley); feeding tube
- Additional factors:
  - Admission to acute care hospital
  - Antibiotic use

Breaking the Chain

Preventing Cross Transmission & Infection
Example: A Completed Chain of Cross Transmission & Infection

- **Infectious agent** – methicillin-resistant Staphylococcus aureus (MRSA)
- **Reservoir** - skin
- **Exit** – open, draining wound on Resident A
- **Transmission** – HCW picks up MRSA on hands & does not use hand hygiene before contact with Resident B
- **Entry** – HCW contaminates indwelling urinary catheter tubing during manipulation of catheter… MRSA ascends to meatus and then into the bladder
- **Resident risk factor**: indwelling urinary catheter
- **Infection**: UTI develops in Resident B

Chain is complete – how can we break this chain?

THREE WAYS TO BREAK THE CHAIN

- **Prevent Entry**
  - Remove Foley cath if possible

- **Prevent Transmission**
  - Use hand hygiene

- **Contain Drainage**
  - from wounds

Targeted Infection Prevention (TIP) Study

Available in TIP Toolkit, pg. 25-35
Targeted Infection Prevention (TIP) Program
Module 2: The Chain of Transmission of Infection

PRE/POST-TEST       DATE: _______________

Please check one answer for each of the following questions.

1. The best way to break the chain of infection and prevent transmission of infections is:
   □ a. Using proper hand hygiene
   □ b. Wearing gloves
   □ c. Getting a flu shot
   □ d. Disinfecting dinner tables

2. Microbes (germs) can exist on a person, in food, or on contaminated equipment.
   True □   False □

3. Most resident infections are acquired through airborne transmission.
   True □   False □

4. Colonization is bacteria (germs) that are present but do not cause signs or symptoms of an active infection.
   True □   False □

5. A risk factor that puts residents at higher risk for an infection is a(n):
   □ a. Dependence on nurse aides for activities of daily living
   □ b. Immune system not working properly
   □ c. Skin that is easily cut or bruised
   □ d. Recent admittance to an acute care hospital
   □ e. All of the above

6. Each link in the infectious disease model or chain of infection must be present for transmission to occur.
   True □   False □
7. Infection prevention and breaking the chain of infection is the responsibility of:
   □ a. Administration
   □ b. Physicians
   □ c. Nurses
   □ d. Every employee

8. An infectious agent (microbe or germ) can leave a resident (Mode of Exit) in a body fluid; for example in urine, stool, or wound drainage.
   True □ False □

9. One way an infectious agent can enter a resident (Mode of Entry) is through or around an indwelling urinary (Foley) catheter.
   True □ False □
Module 2: PRE/POST-TEST ANSWER KEY

1. The best way to break the chain of infection and prevent transmission of infections is:
   - [ ] a. Using proper hand hygiene
   - [ ] b. Wearing gloves
   - [ ] c. Getting a flu shot
   - [x] d. Disinfecting dinner tables

2. Microbes (germs) can exist on a person, in food, or on contaminated equipment.
   - [x] True  [ ] False

3. Most resident infections are acquired through airborne transmission.
   - [ ] True  [x] False

4. Colonization is bacteria (germs) that are present but do not cause signs or symptoms of an active infection.
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