Targeted Infection Prevention Program Study: The Infectious Disease Process & Chain of Cross Transmission

Module # 2

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

How Microbes Move around

Risk Factors For LTCF Resident

LTCF = long term care facility
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 worker (HCW)

- **Endogenous flora:** from inside or on the body

- **Bacteria**
  - Bacilli
  - Cocci
  - Spirochetes

- **Virus**

- **Fungi**
  - Rickettsia
  - Protozoa
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
The Iceberg Effect: Much larger proportion of microbes are present but not causing 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 patients, e.g. their endogenous microbial flora, but can also exogenous source, e.g. transmitted by hands of HCW

~ Bacteria can be transmitted even if the resident does not have active infection ~
**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
Mode of Transmission

- Contact
  - Direct
  - Indirect
- Droplet
- Airborne

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

Infectious agent enters the new host (resident or patient)

- 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
Resident Risk Factors: 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?
Infectious Agent
Reservoir
Risk Factors
Exit

Chain of Infection

- Contain drainage From wound
- Use hand hygiene

Entry
Transmission

Remove Foley cath. If possible

Risk Factors For LTCF Resident

- Extraluminal
  - Early, at insertion
  - Late, by capillary action

- Intraluminal
  - Break in closed drainage
  - Contamination of collection bag urine
Coming Attractions: Standard Precautions & Hand Hygiene Next Module

Any Questions?