Educational Module for Nursing Assistants in Long-term Care Facilities: Preventing and Managing *Clostridium difficile* Infections

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Preventing and Managing *Clostridium difficile* Infections

**Pre-test**

1. List at least two characteristics of the *Clostridium difficile* bacterium.

2. Define the term *C. difficile* infection (CDI).

3. Identify at least one important risk factor for the development of CDI in long-term care residents.
Preventing and Managing *Clostridium difficile* Infections

**Pre-test**

4. State the difference between colonization and infection with *C. difficile* bacteria.

5. Describe at least three ways to prevent the spread of *C. difficile* bacteria in long-term care facilities.
Learning objectives

• List characteristics of *Clostridium difficile* bacteria

• Define the term *C. difficile* infection (CDI)

• Describe one important risk factor associated with the development of CDI
Learning objectives

• State the difference between colonization and infection with *C. difficile* bacteria

• Describe at least three ways to prevent the spread of *C. difficile* bacteria in long-term care facilities (LTCF)
Introduction

• Many pathogens (germs) can cause diarrhea in humans; the most important to healthcare facilities are:
  – Norovirus
  – *E. coli* O157:H7 and other types of *E. coli* that make toxins (substances that are harmful to the cells around them)
  – Rotavirus
  – *Clostridium difficile* (also known as *C. diff* or *C. difficile*)
Introduction

• *C. difficile* bacteria can cause *C. difficile* infection (CDI)

• CDI is a major cause of antibiotic-associated and healthcare-associated diarrhea

• Elderly (>65 years) are at highest risk for death and serious disease from CDI
Introduction

- *C. difficile* bacteria can cause a wide range of symptoms

- CDI is occurring more frequently than in the past and its seriousness has increased
C. difficile bacteria

- A type of bacteria that can’t survive in oxygen, and can turn itself into a spore to protect itself outside of the human body – while inside the body, it lives as a vegetative form that can reproduce, “eat”, and potentially cause illness

- C. difficile spores are difficult to remove from environmental surfaces (commode, door knob, bed rail, etc.)

- Can be part of the normal bowel flora (a group of bacteria that live in the gut and are helpful to people)
**C. difficile** bacteria

- *C. difficile* causes disease by producing two toxins
  - Toxins are substances that bacteria release which destroy other cells nearby
  - When cells in the gut are destroyed, the gut isn’t able to function as it normally does, resulting in disease

- Not all strains of *C. difficile* produce toxins
  - A toxin-producing (toxigenic) strain must be present to cause disease
How *C. diff* Infects the Body

- Antibiotics disrupt normal bowel flora, allowing *C. difficile* bacteria to overgrow

- CDI can occur if all of the following occur:
  - Decrease in healthy gut bacteria, most commonly due to the resident taking antibiotics
  - Contact with spores or vegetative bacteria of a toxin-producing *C. difficile* strain
  - Individual resident factors (old age, chronic illness) or strain virulence (ability of the bacteria to cause serious infection) are present
How *C. diff* Infects the Body

Toxin-producing *C. difficile* bacteria invade a healthy colon, causing pseudomembranous colitis.
CDI Symptoms

• Symptoms begin during or shortly after a course of antibiotics – can be delayed as long as 8 to 12 weeks following antibiotic use

• *C. difficile* can cause different effects for different people, ranging from asymptomatic colonization (being a carrier) to severe infection and death
Clostridium difficile bacteria will thrive in a colon that has had the good bacteria destroyed by the action of antibiotics.
CDI Symptoms

• Clinical symptoms
  – Watery diarrhea (most common symptom)
  – Fever
  – Abdominal cramps

• Severe disease
  – Pseudomembranous colitis
  – Toxic megacolon
  – Perforation of the colon
  – Sepsis
  – Elevated WBC count
  – Death
The Iceberg Effect

Infected

Colonized
**Infection vs Colonization**

- **Colonization ("carrier")**
  - Presence of *C. difficile* bacteria in the gut without signs or symptoms of illness

- **Infection**
  - Presence of toxin-producing *C. diff* that results in symptoms of infection

*C. diff* can be spread if the resident is colonized or infected
Risk factors for CDI

- Antibiotic use!
  - More than 90% of all CDI occur during or after taking antibiotics

- All antibiotics can increase risk, but broad-spectrum antibiotics (those that kill both harmful and helpful bacteria) are more likely to be associated with CDI

- A resident can be at risk for CDI up to 12 weeks after the antibiotic is stopped
  - It can take a long time for normal bowel flora to return!
Other risk factors for CDI

- Advanced age (>65 years)
- Use of nasogastric (NG) or gastrostomy (GT or G-tube) feeding tubes
- Use of antacids or other medications that decrease stomach acid
- Severe underlying medical conditions that make it harder to fight infection
Rates of CDI

- Rates of CDI are increasing in both hospitals and LTCF
- This increase may be due to:
  - Strains of *C. difficile* bacteria that cause more severe disease
  - Inadequate infection prevention and control practices in healthcare facilities
  - Overuse and misuse of antibiotics
Rates of CDI

Clostridium Difficile Infection (CDI) Hospitalizations, 1998-2011

Rate per 100,000 population

- CDI as a principal or secondary diagnosis
- CDI as a principal diagnosis

NOTES: The CDI hospital stays include hospitalizations with a principal or secondary diagnosis of CDI.
SOURCE: National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), AHRQ
Rates of CDI

**Clostridium Difficile Infection (CDI) Hospitalizations, 2011**

Rate per 100,000 population

NOTES: Rate of CDI stays per 100,000 population. The CDI hospital stays include hospitalizations with a principal or secondary diagnosis of CDI.

SOURCE: National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), AHRQ
Diagnosis of CDI

- Symptoms and lab test results
- How to obtain stool specimens:
  - Fresh, unformed stool only
  - Use a clean, watertight container
  - Refrigerate immediately after collection
    - Provide fresh stool to resident’s nurse as soon as possible
    - *C. diff* toxin breaks down at room temperature in as short as 2 hours
    - Testing errors can happen if specimen is not refrigerated
    - Do not place stool in refrigerator where food is stored
## Diagnosis of CDI

### Bristol Stool Chart

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Separate hard lumps, like nuts (hard to pass)</td>
</tr>
<tr>
<td>2</td>
<td>Sausage-shaped but lumpy</td>
</tr>
<tr>
<td>3</td>
<td>Like a sausage but with cracks on its surface</td>
</tr>
<tr>
<td>4</td>
<td>Like a sausage or snake, smooth and soft</td>
</tr>
<tr>
<td>5</td>
<td>Soft blobs with clear-cut edges (passed easily)</td>
</tr>
<tr>
<td>6</td>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
</tr>
<tr>
<td>7</td>
<td>Watery, no solid pieces. Entirely Liquid</td>
</tr>
</tbody>
</table>
Treatment of CDI

Treating *C. difficile*

**Asymptomatic colonization**
1. No treatment needed
2. May protect against disease

**Diarrheal illness**
1. Stop inciting antibiotics
2. Metronidazole or oral vancomycin
3. Supportive care—fluid and electrolytes
4. Avoid opiates, antiperistaltic agents

**Pseudomembranous colitis**
**Toxic megacolon**
Consider surgical intervention
Treatment of CDI

• Stop the antibiotic!
  – 15-20% of CDI cases resolve after stopping the antibiotic

• Medication
  – It seems unusual since CDI is often caused by antibiotic use, but treatment usually is with a different type of antibiotic
    • Metronidazole – oral or intravenous (IV)
    • Vancomycin – oral
Treatment of CDI

• Rehydration
  – Provide water, broth, and electrolyte-rich liquids etc. if okay with resident’s nurse

• Avoid anti-diarrheals

• Probiotics
  – Dietary supplements that contain potentially helpful bacteria and yeast intended to help the body
  – It is not known if probiotics are effective
Treatment of CDI

• Monitor resident for status changes and notify resident’s nurse right away if the following symptoms are found
  – Cramping abdominal pain that comes and goes
  – Abdominal bloating
  – Dramatic decrease in bowel movements (from 10 per day to 0 per day)

• Recurrent CDI
  – Occurs in 6-35% of patients
Transmission of *C. difficile*

- *C. diff* is spread through the fecal-oral route.

- *C. diff* spores remain on surfaces and objects in the environment for long periods of time.

- *C. diff* bacteria can be spread to other residents, even if they have not had antibiotic exposure.
Transmission of *C. difficile*

- **Mode of Transmission of *C. difficile***
  - Colonized or infected patient with diarrhea, incontinence, or decreased hygiene
  - Skin
  - Hands
  - Environment
  - Wounds or devices
  - Susceptible patients

Two major reservoirs:
- Infected humans (symptomatic or colonized)
- Inanimate objects
Infection Prevention and Control

• Prevent residents from coming into contact with *C. difficile*
  – Always use good infection prevention and control practices, including good hand hygiene

• Prevent development of CDI
  – Antibiotic stewardship (only giving residents antibiotics when they are really needed)
Infection Prevention and Control

• Hand hygiene
  – Clean hands with soap and warm water for 15-20 seconds
  – Before and after entering rooms of, and caring for residents with CDI
  – Before and after wearing gloves and/or gowns
  – Alcohol-based hand rubs do not kill the spores of *C. diff* bacteria
Infection Prevention and Control

• Standard Precautions – for all residents, all of the time

• Contact Precautions – for residents with CDI symptoms
  – Gloves and gown for resident care
  – Dedicated equipment (commodes, blood pressure cuffs, stethoscopes, etc.)
    • Clean and disinfect shared equipment immediately after use by a resident with CDI and before use by any other resident
Infection Prevention and Control

- Isolation Precautions
  - Private room, if possible or room CDI positive residents together
  - If incontinent of stool or unable to perform appropriate hand hygiene, resident may be excluded from common areas, social activities

- Continue Contact and Isolation Precautions until diarrhea is resolved for 48-72 hours
  - Isolation Precautions may be discontinued before diarrhea has resolved if stool can be contained, resident can follow instructions, and can perform (or be assisted with appropriate hand hygiene
Environmental Cleaning and Disinfecting

- Cleaning must be done *before* disinfecting
  - Cleaning removes food, dirt, organic matter
  - Disinfection kills bacteria and their spores
- Use EPA-registered, hospital-grade products
  - Spore-killing disinfectant or bleach solution
  - Follow manufacturer recommendations for use; make sure you are properly trained
Environmental Cleaning and Disinfecting

• Daily cleaning and disinfection of at least:
  – Bedrails, furniture, bedside commodes
  – Bathroom sink, floor, tub/shower, toilet
  – Frequently touched surfaces (light switches, door knobs, call bells, TV remotes, etc.)

• Terminal cleaning and disinfection after resident is discharged or transfers from the room
  – Regardless of how long ago diarrhea occurred
  – Include bed frame, mattress, pillows, curtains
Antibiotic Stewardship

- Using antibiotics only when prescribed is an important key to preventing CDI

- Antibiotic use is high in LTCFs
  - 40% of all systemic medications (medications taken by mouth or IV) prescribed
  - 25-75% of LTCF residents receive at least one antibiotic each year
    - Up to 75% of those are not needed
Antibiotic Stewardship

• Reasons for unnecessary antibiotic prescriptions include:
  – Inability of LTCF residents to communicate symptoms to healthcare personnel
  – Treating colonization, not just infection
  – Pressuring providers for antibiotics

• Nursing assistant observations and communication of resident changes in condition are essential to assist nurses’ communication with providers about antibiotics
Antibiotic Stewardship

• Stewardship definition: “the careful and responsible management of something entrusted to one's care” – Merriam-Webster Dictionary

• In other words, “stewardship” is about taking care of something valuable
Antibiotic Stewardship

• Antibiotic stewardship prevents misuse, enabling the benefits of antibiotics to outweigh the risks

• Ingredients for successful stewardship include:
  – Education for healthcare providers
  – Accurate observation of resident changes in condition
  – Accurate, timely communication and documentation of resident changes in condition
  – Participation of all care providers within the LTCF
Cytotoxicity - The quality of being harmful to cells. Examples of toxic agents are chemical substances or an immune cell.

Diarrhea – At least six watery stools over 36 hours, three unformed stools in 24 hours.

Enterotoxin – A toxin (harmful substance) produced by bacteria that acts on the gut to cause diarrhea.

Fecal incontinence – Inability to prevent the discharge of feces (stool).

Ileus – Bowel blockage; severe pain, abdominal bloating, vomiting, absence of passage of stool, and often fever and dehydration may also be present.
**Glossary, part 2**

**Normal bowel flora** – A population of organisms that live in the bowel that normally do not cause infection.

**Probiotics** – Dietary supplements containing potentially helpful bacteria or yeast that are intended to assist the body’s naturally occurring flora within the digestive tract.

**Pseudomembranous colitis (PMC)** – Severe swelling and pus production in the intestine caused by the body’s response to the *C. difficile* toxins. This condition can be very painful.

**Sepsis** – The presence of pus-forming and other disease-causing organisms or their toxins in the blood or body tissues.
Glossary, part 3

**Spores** – The dormant stage of some bacteria, like *Clostridium difficile*.

**Toxic megacolon** – Severe swelling in the intestines that may cause the intestine to stop eliminating gas and waste, leading to a lot of built up pressure, which may be a result of a *C. difficile* infection.

**Toxigenic** – Cells that make toxins

**Virulence** – The power of a germ to cause disease
Antibiotic Stewardship Resources

- http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/
- http://www.cdc.gov/getssmart/healthcare/
- http://www.cdc.gov/longtermcare/
- http://www.minnesotaarc.org/
C. difficile Resources

- http://www.health.state.mn.us/divs/idepc/diseases/cdiff/
References, part 1


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