Educational Module for Nursing Assistants in Long-term Care Facilities:
Antibiotic Use and Antibiotic Resistance

Minnesota Department of Health
Infectious Disease Epidemiology, Prevention, and Control Division
PO Box 64975, Saint Paul, MN 55164-0975
651-201-5414 or 1-877-676-5414 www.health.state.mn.us
Antibiotic Use and Antibiotic Resistance Pre-test

1. Define the term “antibiotic resistance.”

2. Describe at least one way germs become resistant to antibiotics.

3. Define at least three factors that can lead to antibiotic resistance in long-term care facility residents.

4. List at least three action steps that you can take to prevent antibiotic resistance and the spread of antibiotic-resistant germs in long-term care facilities.
Learning Objectives

• Define antibiotic resistance
• Describe ways that germs become resistant to antibiotics
• Define factors that can lead to antibiotic resistance
• List at least 3 action steps to prevent antibiotic resistance and the spread of antibiotic-resistant germs
Introduction

• Antibiotic resistance is one of the most important public health threats that we face today

• Infections caused by antibiotic-resistant bacteria (germs) require treatment with more toxic and expensive antibiotics

• Antibiotic use is the biggest driving factor in the development of antibiotic-resistant germs

• Antibiotic resistance is of concern in long-term care facilities (LTCF) where antibiotic use is very common
Antibiotic Resistance
Antibiotic Resistance

• What is antibiotic resistance?
  – The ability of a germ to mutate or change so that antibiotics can’t kill it
How Bacteria Become Resistant to Antibiotics

• Ways that bacteria become resistant are different depending on the germ

• Two ways that bacteria become resistant
  – Mutations: changes in genes
  – Gene transfer: new genes picked up from other bacteria

• Antibiotic use is the biggest reason that bacteria become resistant to (unable to be killed by) antibiotics
**Consequences of Antibiotic Resistance**

- Antibiotics are the most important tool we have to fight life-threatening bacterial infections

- Antibiotics may kill susceptible bacteria, but resistant bacteria continue to survive and multiply

- If antibiotic-resistant bacteria cause an infection, the infection may be more serious and difficult to treat with routine antibiotics
Diagram of How Antibiotic Misuse Can Cause Antibiotic-resistant Bacteria to Multiply

Here are the players:

- Sun: Virus
- Purple: Naturally Resistant Bacteria
- Yellow: Susceptible Bacteria

Taking antibiotics for a viral infection:

- A resident takes antibiotics for a viral infection.
- Susceptible bacteria are killed off by the antibiotics, but the resistant bacteria and the viruses survive.
- The immune system fights off the viruses while the resistant bacteria multiply—waiting for an opportunity to cause infection.
Diagram of How Antibiotic Misuse Can Cause Antibiotic-resistant Bacteria to Multiply

Here are the players:

- Virus
- Naturally Resistant Bacteria
- Susceptible Bacteria

Not finishing the full course of antibiotics can also lead to antibiotic resistance:

Day 1: A person is sick with a bacterial infection.

Antibiotics are prescribed. Susceptible bacteria are killed.

Day 4: Person feels better and stops taking antibiotics...

...meanwhile resistant and susceptible survivors multiply

Day 14: The infection is not cured and is harder to treat
Examples of Antibiotic Misuse

• Taking antibiotics when not needed
  – For asymptomatic bacteriuria (bacteria in the urine without the presence of clinical symptoms)
  – For a resident with green or yellow nasal discharge – without other symptoms, this does not mean that the resident has a bacterial infection

• Not finishing an antibiotic prescription
  – Example: A person stops taking the antibiotic when he feels better instead of when his prescription is gone
Examples of Antibiotic Misuse (cont.)

• Inappropriate prescribing
  – Prescribing antibiotics for too many days
    • Example: Prescribing a 14-day course when a 7-day course is sufficient
  – Use of broad-spectrum antibiotics when a narrow-spectrum antibiotic would be effective
    • Example: Prescribing ciprofloxacin (broad-spectrum) when lab results show that penicillin (narrow-spectrum) can be used
Examples of Antibiotic Misuse (cont.)

• Antibiotics do not work against viral infections!

• Antibiotics will not:
  – Cure viral infections
  – Stop the spread of viruses
  – Improve symptoms of viral infections
Consequences of Antibiotic Misuse

• Taking antibiotics when not clinically needed can result in:
  – Drug-drug interactions
  – Medication side effects
  – Increased health costs

• Antibiotic misuse can lead to resistant bacteria

• When antibiotics are misused, they will not be able to fight infections they were meant to treat

The way we use antibiotics today or in one patient directly impacts how effective they will be tomorrow or in another patient; they are a shared resource.
Antibiotic Use in LTCF

- 40% of all prescriptions written in LTCF are antibiotics

- Up to 70% of LTCF residents receive at least one systemic antibiotic every year
  - 25-75% are not needed

- Infections are common among LTCF residents

- LTCF residents are at higher risk of infection
Infections in Long-term Care
Burden of Infections in Long-term Care

- 27,000 have antibiotic-resistant infections
- 2 out of every 3 nursing home residents receive at least one course of antibiotics annually
- 250,000 nursing home residents have infections
- 1.6 million people live in nursing homes

www.cdc.gov
Centers for Medicare & Medicaid Services, Long Term Care MDS, Resident profile table as of 5/2/2005.
Common Infections in LTCF Residents

- Urinary tract infections
- Respiratory infections
- Skin and soft tissue infections
- Gastroenteritis

Indications for Antibiotic Use

- UTI: 41%
- Respiratory: 35%
- Skin/soft tissue: 14%
- Other: 10%

The Iceberg Effect

- Infected
- Colonized
Colonization versus Infection

• Colonization ("carrier")
  – Presence of bacteria (such as in urine or on skin) without signs or symptoms of illness

• Infection
  – Presence of disease-causing bacteria that results in symptoms of infection

Bacteria can be transmitted if the person is colonized or infected
Increased Infection Risk in LTCF Residents

Facility Factors

- Close contact with other individuals
- Transfers to and from hospitals
- Staffing issues
- Inadequate hand hygiene
- Low flu vaccination rates in staff

Resident Factors

- Older age
- Decreased immune function
- Functional impairment
- Use of invasive devices
- Chronic and degenerative diseases
Prevent Antibiotic-resistant Infections in Long-term Care
Steps to Prevent the Spread of Antibiotic-resistant Bacteria in LTCF

- Practice excellent hand hygiene – clean your hands every time you provide care for a resident

- Follow recommended infection prevention and control practices

- Use antibiotics wisely

- Stay home from work when you’re sick

- Get a flu shot every year

- Cover your cough or sneeze with a tissue or use your sleeve (near the shoulder or elbow)
Steps to Reduce the Risk of Infection Among LTCF Residents

• Use your familiarity with the resident’s usual condition to accurately recognize a change in condition and notify the resident’s nurse

• Limit the use of invasive devices like urinary catheters

• Limit the contact of healthy residents to infected residents by cohorting (grouping or rooming residents with the same illness or infection together)

• Use excellent infection control practices – especially hand hygiene

• Always use Standard Precautions – gowns, gloves, masks, etc. as needed according to symptoms (coughing, incontinence) and the care given (change a dressing or perform tracheostomy care)
Effective Diagnosis and Treatment

• Obtain microbiology cultures whenever possible to guide appropriate antibiotic use
  – Collect specimens *prior to* initiating antibiotic therapy

• Do not request antibiotics for:
  – Viral infections
  – Asymptomatic bacteriuria
  – Change in condition not likely due to bacterial infection (such as falls, confusion)
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
Principles of Antibiotic Stewardship

- Use antibiotics only when they are prescribed
- Assist residents in managing symptoms of non-bacterial infections
- Use evidence-based guidelines to guide decisions about antibiotic therapy
Prevent Transmission of Infections
Prevent Transmission of Infections

• Stopping the spread of germs from one person to another is a critical way to control antibiotic resistance

• The World Health Organization (WHO) has promoted the “My 5 Moments for Hand Hygiene” approach:
Prevent Transmission of Infections (cont.)

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

• Hand hygiene

• Gloves when you expect to have contact with blood, body fluids, secretions, excretions, and contaminated items

• Gown to protect clothing against contact with resident blood, body fluids, secretions, excretions or contaminated items

• Mask and eye protection (goggles) if spraying or splashing is anticipated
Prevent Transmission of Infections (cont.)

Contact Precautions – use for any resident that:

- Has a wound or skin lesion that cannot be covered fully or has drainage that cannot be completely contained by dressings
- Is incontinent of urine and/or stool that cannot be contained by incontinence products
- Has a tracheostomy with secretions that cannot be contained
- Has been epidemiologically linked to infections caused by antibiotic-resistant organisms in other residents

Cohorting – if private rooms are not available, room residents known to be colonized or infected with the same organism together
Prevent Transmission of Infections: Contact Precautions (cont.)

- Gloves upon room entry, especially when providing direct care to residents and when handling potentially contaminated items

- Gowns upon room entry and especially:
  - When providing direct care to residents with antibiotic-resistant or other disease-causing germs (such as performing ADLs) or if having contact with blood, body fluids, secretions, or excretions (such as linen changes, incontinence care)
  - When having contact with items or surfaces potentially contaminated with antibiotic-resistant or other disease-causing germs (like those close to or used by the resident)

- Resident care equipment (glucose monitors, etc.): dedicate to a single resident
Educate Residents, Family and Visitors

- Infection prevention and control recommendations for residents in LTCF differ from those for patients in hospitals

- Contact Precautions are generally implemented for all patients known to have antibiotic-resistant bacteria while they are in the hospital because:
  - People in hospitals are sicker, more vulnerable
  - Frequent use of invasive devices like urinary catheters

- Assure family members that you are providing appropriate care to their loved one
Antibiotic Resistance Affects Everyone

• Antibiotic resistance threatens the use of antibiotics for people of all ages
  – Everyone is at risk for getting an antibiotic-resistant infection

• Antibiotics are necessary to treat some infections, but also can produce harmful side effects
  – Upset stomach
  – Rashes
  – Interactions with other medications
  – Diarrhea (such as Clostridium difficile infection)

• Antibiotic resistance increases healthcare costs (hospitalizations, doctor visits, expensive treatments)
Summary
Summary

• Antibiotic resistance is the ability of bacteria to survive the antibiotic intended to kill it
  – Mechanisms: genetic mutation, gene transfer

• Antibiotic resistance is an increasing health threat to LTCF residents, healthcare workers, and communities

Source: CDC
Factors that can lead to antibiotic resistance:

- Treating viral infections or bacterial colonization with antibiotics
  - Antibiotics do not work against viruses – and cannot cure or ease the symptoms of viral infections
- Not finishing the entire prescription
  - This allows remaining bacteria – often those that are antibiotic resistant – to multiply and cause another infection
- Use of a broad-spectrum drug when a narrow-spectrum drug would work
You can – and must – take steps to help prevent the development and spread of antibiotic-resistant bacteria

- Use your familiarity with the resident’s usual condition to accurately recognize a change in condition
- Document your observations; communicate clearly and thoroughly to the resident’s nurse
- Recognize resident risk factors for developing an infection (compromised immune system, age, chronic conditions)
- Implement comfort measures and further observation if recommended
Summary (cont.)

• Avoid demanding antibiotics if the provider does not determine it is needed

• Remember that antibiotics are never effective against viral infections

• Educate residents and family about antibiotic resistance and infection prevention measures

• Practice excellent hand hygiene and use Standard Precautions in the care of all residents

• Prevent the spread of antibiotic-resistant or other disease-causing germs by following infection prevention and control guidelines
Glossary, part 1

**Antibiotic-resistant bacteria** – Bacteria that have mutated, or changed, so that they develop the ability to survive when exposed to antibiotics that are intended to kill them.

**Bacteria** - Bacteria are single-celled life forms. Bacteria are present in soil, water, and all living organisms. Many disease-causing organisms are bacteria; however, not all bacteria cause disease. Some bacteria are necessary for essential functions like digestion.

**Broad-spectrum antibiotics** – Antibiotics that target a wide range of bacteria. They often cause more side effects than narrow-spectrum antibiotics. Broad-spectrum antibiotics may be prescribed to treat an infection when the disease-causing organism is not yet known; the antibiotic can be targeted to the organism once the lab results are available.
Colonization – The presence of bacteria, or other microorganism, without symptoms of disease.

Infection - The presence and multiplication of microorganisms (germs) that are causing symptoms (like fever, redness, wound drainage). Infection generally implies that the person has signs or symptoms of a disease.

Mutation - A permanent change in genetic make-up of an organism.

Narrow-spectrum antibiotics – Antibiotics that target a small, specific range of bacteria.
Glossary, part 3

**Normal flora bacteria** - Many bacteria are found in the body and provide useful and even essential functions to aid human survival. These bacteria, which under usual circumstances are present but do not cause disease, are called normal flora bacteria.

**Virus** - A submicroscopic (very small) particle that can reproduce only if it is inside the cell of a living organism. Viruses cannot be killed by antibiotics.
For more information

- MDH Infection Prevention and Control
  www.health.state.mn.us/divs/idepc/dtopics/infectioncontrol/guidelines.html

- Guideline for the Management of Antimicrobial Resistant Microorganisms in Minnesota Long-Term Care Facilities:
  www.health.state.mn.us/divs/idepc/dtopics/infectioncontrol/ltcguideline.html

- Minnesota Antibiotic Resistance Collaborative
  www.minnesotaarc.org/

- CDC Campaign to Prevent Antibiotic Resistance
  www.cdc.gov/getssmart/index.html

- Alliance for the Prudent Use of Antibiotics
  www.tufts.edu/med/apua/
References


