Antibiotic Resistance in the Post-Acute and Long-Term Care Settings: Strategies for Stewardship


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About our speaker

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Disclosures

• Opinions and positions expressed by the speaker are solely those of the speaker and do not necessarily reflect the views, opinions or positions of Nutricia North America or any employee thereof.
Objectives

- Discuss the impact of antimicrobial and antibiotic resistance in long-term care settings.
- Review the CDC core elements of the Antibiotic Stewardship Program.
- Discuss strategies to ensure success in the implementation and maintenance of an Antibiotic Stewardship Program and achieving productive collaboration between nursing and providers.
Why the Concern?

• 1 to 3 million serious infections occur every year in these facilities.
• Infections include urinary tract infection, diarrheal diseases, antibiotic-resistant staph infections and many others.
• Infections are a major cause of hospitalization and death; as many as 380,000 people die of the infections in LTCFs every year.

Source: Centers for Disease Control and Prevention
Times are Changing

Community Pathogens

→

Healthcare Pathogens
Changing Landscape of Healthcare

- Organizational factors affect HAI prevention
  - Administrative policies
  - Antimicrobial utilization
  - Staffing
  - Education
- Organism adaptation to its environment
- Increased prevalence of antimicrobial-resistant pathogens
New CDC Estimates

NATIONAL SUMMARY DATA

Estimated minimum number of illnesses and deaths caused by antibiotic resistance*

At least 2,049,442 illnesses,
23,000 deaths

*Virtually and fungi are included in this report

Estimated minimum number of illnesses and death due to Clostridium difficile (C. difficile), a unique bacterial infection that, although not significantly resistant to the drugs used to treat it, is directly related to antibiotic use and resistance:

At least 250,000 illnesses,
14,000 deaths

WHERE DO INFECTIONS HAPPEN?

Antibiotic-resistant infections can happen anywhere. Data show that most happen in the general community, however, most deaths related to antibiotic resistance happen in healthcare settings, such as hospitals and nursing homes.

Source: Centers for Disease Control and Prevention
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MDRO’s are Epidemiologically Important Pathogens

- Options for treatment are limited

- MDRO’s are associated with:
  - Increased lengths of stay
  - Increased costs
  - Increased morbidity and mortality

- Can be transmitted in healthcare facilities and affect younger adult residents

Source: Centers for Disease Control and Prevention Guideline for Control of Multidrug-Resistant Organisms in Healthcare Settings, 2006.

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Key Definitions

• Antibiotic
• Antimicrobial
• Antiseptic
• Antisepsis
• Disinfectant
• Sanitizer
• Antibiotic Stewardship
Resistance in Action

How a resistance gene moves between bacteria

The cells come in contact, a process called conjugation, and the plasmids move from one to another, taking the resistance gene with them and making the new bacterial cell drug-resistant as well.

Conjugation

Antibiotic-resistant cell

Plasmid

Antibiotic-sensitive cell

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SUPER BUGS...

“Survival of the fittest”

Realize they are here to stay

➢ In the environment
➢ In all healthcare facilities
➢ In or on ourselves

Practice Prevention Methods

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Introduction

• The modern age of antibiotic therapeutics was launched in the 1930s with sulfonamides and the 1940s with penicillin
• Since then, many antibiotic drugs have been developed, most aimed at the treatment of bacterial infections
• These drugs have played an important role in the dramatic decrease in morbidity and mortality due to infectious diseases
• While the absolute number of antibiotic drugs is large, there are few unique antibiotic targets
Untoward Effects of Antibiotics

• Antibiotic resistance
• Adverse drug events (ADEs)
  – Hypersensitivity/allergy
  – Drug side effects
  – Diarrheal Infections
  – Antibiotic-associated diarrhea/colitis
• Increased healthcare costs

Ohl CA, Luther VP. J. Hosp. Med. 2011;6:S4
MDRO’s are Epidemiologically Important Pathogens

Options for treatment are limited

MDRO’s are associated with:

- Increased lengths of stay
- Increased costs
- Increased morbidity and mortality

Can be transmitted in healthcare facilities

Source: Centers for Disease Control and Prevention Guideline for Control of Multidrug-Resistant Organisms in Healthcare Settings, 2006.
Active surveillance helps identify not only infected but also colonized persons.

Source: Hand Hygiene Core-Supplemental Slides, Centers for Disease Control and Prevention, 2005. Copyright 2017 Infection Prevention Institute
Evolution of Drug Resistance in *S. aureus*

- **Penicillin**
  - 1950s: *S. aureus* → Penicillin-resistant *S. aureus*

- **Methicillin**
  - 1970s: *S. aureus* → Methicillin-resistant *S. aureus* (MRSA)

- **Vancomycin**
  - 1997: Vancomycin-intermediate-resistant *S. aureus* (VISA)
  - 2002: Vancomycin-resistant *S. aureus* (VRSA)

- **Vancomycin-resistant enterococci (VRE)**
  - 1990s

Examples of How Antibiotic Resistance Spreads

Animals get antibiotics and develop resistant bacteria in their guts.

Drug-resistant bacteria can remain on meat from animals. When not handled or cooked properly, the bacteria can spread to humans.

Fertilizer or water containing animal feces and drug-resistant bacteria is used on food crops.

Drug-resistant bacteria in the animal feces can remain on crops and be eaten. These bacteria can remain in the human gut.

Simply using antibiotics creates resistance. These drugs should only be used to treat infections.

George gets antibiotics and develops resistant bacteria in his gut.

George stays at home and in the general community. Spreads resistant bacteria.

Resistant germs spread directly to other patients or indirectly on unclean hands of healthcare providers.

Patients go home.

Resistant bacteria spread to other patients from surfaces within the healthcare facility.

George gets care at a hospital, nursing home or other inpatient care facility.
Resistance in Action

How Antibiotic Resistance Happens

1. Lots of germs. A few are drug resistant.

2. Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection.

3. The drug-resistant bacteria are now allowed to grow and take over.

4. Some bacteria give their drug-resistance to other bacteria, causing more problems.

Source: Centers for Disease Control and Prevention
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Time Above the Mean Inhibitory Concentration (MIC)

- Therapeutic levels of drug
- Prescribed time
- Correct dosing for body weight
SUPER BUGS?

- MRSA (Methicillin Resistant *Staph aureus*)
- CRE (Carbapenem-Resistant Enterobacteriaceae)
- ACINETOBACTER sp.
- NORO VIRUS
- *CURRENT ORGANISMS OF CONCERN ??*
ESBL and CRE

**ESBL**: Extended-Spectrum Beta Lactamase-Producing gram-negative bacteria

**CRE**: Carbapenem Resistant Enterobacteriaceae

**Cause variety of infections:**
- Pneumonia
- Bloodstream Infections
- Wound infections
- Resistant to many antibiotics and difficult to treat

Source: APIC Text, Association for Professionals In Infection Control and Epidemiology, 2009.
ESBL

- Gram negative organisms that produce an enzyme called beta-lactamase that causes resistance to these antibiotics:
  - Penicillins
  - Cephalosporins (1st, 2nd, 3rd & 4th generation) (Keflex, cefepine)
  - Monobactams (Azactam)
  - One or more Carbapenem

- Can usually be treated with one of the Carbapenems:
  - Meropenem, Imipenem, Ertapenem, Doripenem

- Commonly isolated from:
  - Abscesses, blood, catheter tips, lungs, sputum, peritoneal fluid

- Risk factors include:
  - Recent surgery or instrumentation, admission to ICU, recent Abx therapy (esp. Beta lactams), prolonged hospital stay

Source: APIC Text, Association for Professionals In Infection Control and Epidemiology, 2009.
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CRE

- Gram negative organisms that produce one type of beta-lactamase enzyme called carbapenemase
- Occurs typically in the Enterobacteriaceae family of bacteria
- Confers resistance to all currently available antibiotics, including Carbapenems
- Carbapenem Resistant Enterobacteriaceae
- Most common CRE is:
  - Klebsiella pneumoniae - KPC

Source: CDC MMWR, Vol. 58 No. 10 3/20/09

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CDC Core Elements for Antibiotic Stewardship

- Leadership Commitment
- Accountability
- Drug Expertise
- Take Action Through Policy & Practice Change to Improve Antibiotic Use
- Tracking and Reporting Antibiotic Use & Outcomes
- Education

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Leadership Commitment

Write statements in support of improving antibiotic use to be shared with staff, residents and families.

Include stewardship-related duties in position descriptions for the medical director, clinical nurse leads, and consultant pharmacists in the facility.

Communicate with nursing staff and prescribing clinicians the facility’s expectations about use of antibiotics and the monitoring and enforcement of stewardship policies.

Create a culture, through messaging, education, and celebrating improvement, which promotes antibiotic stewardship.

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Empower the Medical Director to set standards for antibiotic prescribing practices for all clinical providers credentialed to deliver care in a nursing home and be accountable for overseeing adherence.

Empower the Director of Nursing to set the practice standards for assessing, monitoring and communicating changes in a resident’s condition by front-line nursing staff. Nurses and nurse aides play a key role in the decision-making process for starting an antibiotic. The knowledge, perceptions and attitudes among nursing staff of the role of antibiotics in the care of nursing home residents can significantly influence how information is communicated to clinicians who are deciding whether to initiate antibiotic therapy.

Therefore the importance of antibiotic stewardship is conveyed by the expectations set by nursing leadership in the facility.

Engage the consultant pharmacist in supporting antibiotic stewardship oversight through quality assurance activities such as medication regimen review and reporting of antibiotic use data.

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Additional Responsibilities

**Infection Prevention Program Coordinator:** Infection prevention coordinators have key expertise and data to inform strategies to improve antibiotic use. This includes tracking of antibiotic starts, monitoring adherence to evidence-based published criteria during the evaluation and management of treated infections, and reviewing antibiotic resistance patterns in the facility to understand which infections are caused by resistant organisms.

**Consultant laboratory:** Nursing homes contracting laboratory services can request reports and services to support antibiotic stewardship activities. Examples of laboratory support for antibiotic stewardship include developing a process for alerting the facility if certain antibiotic-resistant organisms are identified, providing education for nursing home staff on the differences in diagnostic tests available for detecting various infectious pathogens, and creating a summary report of antibiotic susceptibility patterns from organisms isolated in cultures.

**State and local health departments:** Nursing homes benefit from the educational support and resources on antibiotic stewardship and infection prevention which are provided by the Healthcare-Associated Infection (HAI) Prevention programs at state and local health departments.
Drug Expertise

• Work with a consultant pharmacist who has received specialized infectious diseases or antibiotic stewardship training. Example training courses include:
  – Making a Difference in Infectious Diseases (MAD-ID) antibiotic stewardship course: [http://mad-id.org/antimicrobial-stewardship-programs/](http://mad-id.org/antimicrobial-stewardship-programs/)
  – The Society for Infectious Diseases Pharmacists antibiotic stewardship certificate program: [http://www.sidp.org/page-1442823](http://www.sidp.org/page-1442823)

• Partner with antibiotic stewardship program leads at the hospitals within your referral network.

• Develop relationships with infectious disease consultants in your community interested in supporting your facility’s stewardship efforts.

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Take Action: Policy & Practice Change

• **Develop policies that support optimal antibiotic use:** Ensure that current medication safety policies, including medication regimen review, developed to address Centers for Medicare and Medicaid Services (CMS) regulations are being applied to antibiotic prescribing and use.

• **Broad interventions to improve antibiotic use:** Standardize the practices which should be applied during the care of any resident suspected of an infection or started on an antibiotic.

• **Infection and syndrome specific interventions to improve antibiotic use:** Identify clinical situations which may be driving inappropriate courses of antibiotics such as asymptomatic bacteriuria or urinary tract infection prophylaxis and implement specific interventions to improve use.

➢ These practices include improving the evaluation and communication of clinical signs and symptoms when a resident is first suspected of having an infection, optimizing the use of diagnostic testing, and implementing an antibiotic review process, also known as an “antibiotic time-out,” for all antibiotics prescribed in your facility.
Tracking and Reporting

Process Measures: Tracking how and why antibiotics are prescribed

Antibiotic Outcomes Measures: Tracking the adverse outcomes and costs from antibiotics

Antibiotic Use Measures: Tracking how often and how many antibiotics are prescribed
Education

- Provide antibiotic stewardship education to clinicians, nursing staff, younger adult residents, and families
- Provide education and feedback to providers and staff
- Engage residents and their families in stewardship educational efforts
Monitoring and Compliance

• Develop measures
  – Observation of adherence to protocols and practice, contact precautions, hand hygiene
  – New infections
  – Organism prevalence
  – Microbiological antibiograms resistance trends

• Collect data
• Analyze data
• Present findings
• Develop strategies for improvement


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Collaboration Creates Success

Resident/Patient

Pharmacist

Provider

Nurse

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Conclusion

• The therapeutic benefit of antibiotics should be balanced with their unintended adverse consequences
• Inappropriate antibiotic use is associated with increased antibiotic resistance, adverse drug effects and other infection
• Antibiotic stewardship is important for preserving existing antibiotics and improving patient outcomes
• Antibiotic prescribing should be prudent, thoughtful and rational
References

• WHO Patient Safety Curriculum for Medical Schools, electronically accessible from: http://www.who.int/patientsafety/activities/technical/medical_curriculum_slides/en/


• 10 Things You Can Do to Be a Safe Patient, electronically accessible from: http://www.cdc.gov/features/patientsafety/
Questions and Answers

• Contact Information:
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