Trinity Health
Mid-Atlantic

# Antimicrobial Stewardship

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# Antimicrobial Stewardship

- "…coordinated interventions designed to improve and measure the appropriate use of [antibiotic] agents by promoting the selection of the optimal [antibiotic] drug regimen including dosing, duration of therapy, and route of administration"

# Goals of Antimicrobial Stewardship Programs

- Ensure all patients requiring an antibiotic receive the right drug at the right dose and for the right duration
- To improve antimicrobial usage patterns
- To reduce unnecessary or inappropriate antimicrobial use

# The Seven Core Elements of Hospital Antibiotic Stewardship Programs


CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Available at https://www.cdc.gov/antibiotic-use/core-elements/hospital.html.

# Antimicrobial Resistance as a Global Threat

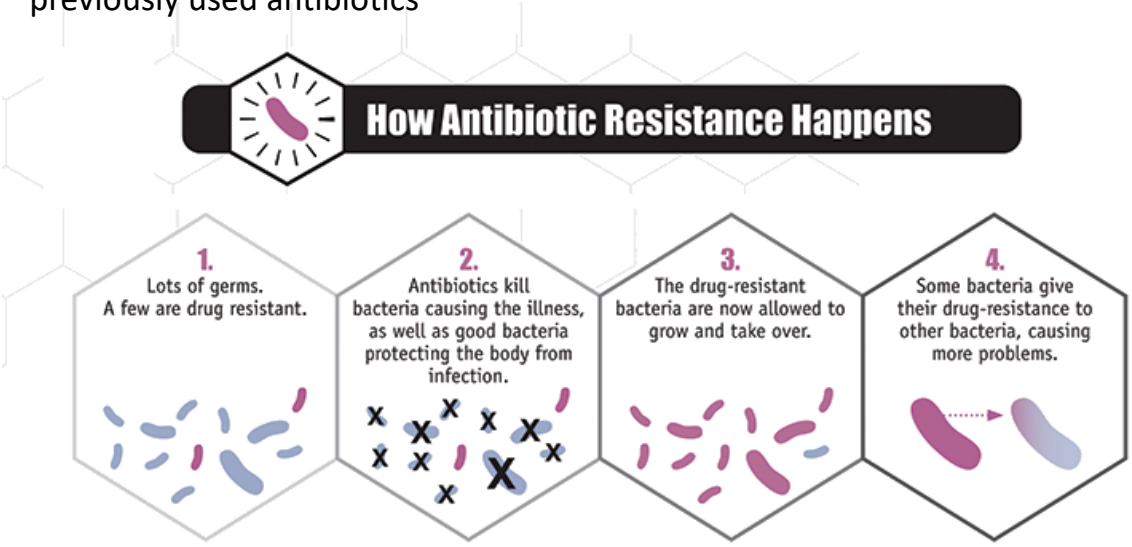
- The WHO has declared antimicrobial resistance to be one of the top 10 global threats to public health
- In the United States, over 2.8 million antimicrobial-resistant infections occur annually
  - As a result, over 35,000 deaths occur annually

- CDC's urgent threats include
  - Carbapenem-resistant *Enterobacterales*
  - Carbapenem-resistant *Acinetobacter*
  - *Clostridoides difficile*
- CDC's serious threats include
  - Extended spectrum beta-lactamase (ESBL) producing *Enterobacterales*
  - Multidrug-resistant *Pseudomonas*
  - Methicillin-resistant *Staphylococcus aureus*
  - Vancomycin-resistant *Enterococcus*

CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019.

# How Antibiotic Resistance Develops

- Exposure to antibiotics leads to exertion of selective pressure on bacteria
  - Susceptible bacteria are eradicated while those that were resistant are left behind
    - The resistant bacteria proliferate. In some cases, resistant bacteria can spread resistance mechanisms they have acquired to other bacteria
      - As a result, subsequent infection caused by these organisms will no longer be susceptible to previously used antibiotics




CDC. Antibiotic Resistance. Atlanta, GA. Last reviewed July 20, 2022. Available at: https://www.cdc.gov/narms/faq.html

# *Clostridioides difficile*

- *C. difficile* infection occurs after exposure to antibiotics which alter the gut microbiota leading to overgrowth of *C. difficile*
  - Although resistance of *C. difficile* to antibiotics is not currently a problem, its occurrence in most cases is a result of antibiotic use


CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019. Available at: https://www.cdc.gov/drugresistance/pdf/threats-report/clostridioides-difficile-508.pdf

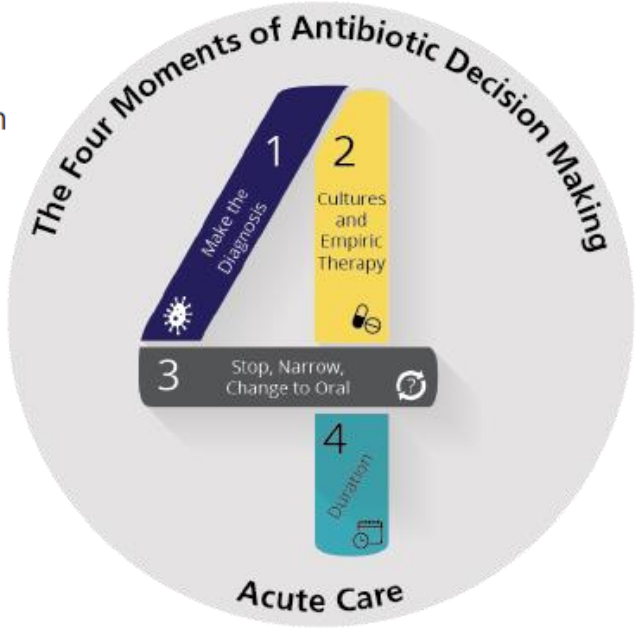
# The Four Moments of Antimicrobial Stewardship

**Moment 1** occurs at the time initiation of antibiotic therapy is considered:
**Ask**, "Does my patient have an infection that requires antibiotics?"

**Moment 2** occurs when the decision is made to start antibiotics:
**Ask 2 questions**, "Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?"

**Moment 3** occurs every day of antibiotic therapy:
**Ask 3 questions**, "Can I stop antibiotics? Can I narrow therapy? Can I change from IV to oral therapy?"

**Moment 4** occurs when the infectious process is clear and the patient responds to therapy:
**Ask**, "What duration of antibiotic therapy is needed for my patient's diagnosis?"




Four Moments of Antibiotic Decision Making. Agency for Healthcare Research and Quality, Rockville, MD. Available at: https://www.ahrq.gov/antibiotic-use/acute-care/index.html

# Ways to Positively Impact Antimicrobial Stewardship

- Avoid prescribing antibiotics in the absence of true bacterial infection
  - Examples include most cases of asymptomatic bacteriuria, acute bronchitis and gastroenteritis
- Use the narrowest effective antibiotic, for the shortest effective duration
  - Guidelines are available for treatment recommendations of most common infectious syndromes including UTI, pneumonia, skin and soft tissue infections
    - Many hospitals have institution-specific guidelines to guide decision making

# Ways to Positively Impact Antimicrobial Stewardship

- Investigate penicillin allergies
  - Often reported penicillin allergies are not true allergies
    - Less than 1% of those evaluated have a true penicillin allergy
  - Antibiotics that are used as alternatives in the setting of penicillin allergies are often broader, more expensive and less favorable to the beta-lactam class

- Ask the following questions before proceeding to prescribing alternative antibiotics
  - What specific antibiotic elicited the reaction?
  - What was the reaction and the severity of that reaction?
    - Intolerance or true allergy?
      - True IgE-mediated reactions include hives, shortness of breath or wheezing, angioedema, anaphylaxis
  - When did the reaction occur?
    - About 80% of patients with IgE-mediated reactions lose their sensitivity after 10 years
  - How was the reaction treated?
  - Has the patient tolerated other beta-lactams previously
    - Helpful to provide examples of other beta-lactams when discussing with patient

"Is It Really a Penicillin Allergy?" Centers for Disease Control and Prevention. Atlanta, GA. Available at: https://www.cdc.gov/antibiotic-use/community/pdfs/penicillin-factsheet.pdf

# Examples of Antimicrobial Stewardship Activities

- **Antimicrobial restrictions**
  - Formulary restrictions help preserve broad anti-infectives from inappropriate use and development of resistance
    - Restriction criteria can include criteria for appropriate use that is evaluated by pharmacy on order verification OR can be restricted to authorizing providers, such as Infectious Diseases specialists
- **Prospective audit with intervention and feedback**
  - Targeted patients are reviewed by an Infectious Diseases pharmacist and/or physician, and recommendations are made directly to the primary physician caring for the patient to optimize therapy (i.e. de-escalation or streamlining, broadening, discontinuation of therapy, etc.)
- **Optimized dosing of antibiotics**
  - Prolonged infusion of beta-lactams such as piperacillin-tazobactam and meropenem
  - Extended interval dosing of aminoglycosides

# Examples of Antimicrobial Stewardship Activities

- **Automatic pharmacist-driven renal dosing of select antibiotics**
- **Automatic pharmacist-driven IV to oral conversion of select antibiotics**
- **Pharmacokinetic dosing and monitoring of anti-infectives**
  - Most frequently done for antibiotics such as vancomycin and aminoglycosides
  - In some hospitals, this can be done per protocol by pharmacists
    - A prescriber can place an order for a pharmacy consult to dose and monitor the desired antibiotic
      - This gives the pharmacist the authority to adjust the dose of the antibiotic and order labs necessary for monitoring the medication (i.e. serum drug levels, serum creatinine)
      - A pharmacist cannot discontinue an antibiotic automatically – discussion regarding streamlining and/or treatment duration would have to take place with a provider

You have now completed the reading portion of this module. Please proceed to the test portion. You will have completed the module in its entirety when you achieve a score of 80%. When you have passed the test, please continue to “My Assigned Training” to view any additional modules that need to be competed