“Superbugs 4.0”: New Perspectives in the Fight Against Resistant Infections

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Disclaimer

• This presentation is intended strictly for educational purposes for the benefit of AFSCME members. It is not intended to provide medical advice or diagnosis. All images were found on public websites.
Workshop Objectives

• During this workshop participants will:
  – Discuss latest data on antibiotic use
  – Review guidance documents
  – Explore new methods and products for treating and preventing MRSA, *Clostridium difficile* and other resistant organisms
  – Discuss resistant organisms case studies in the news
  – Discuss current practices in participant’s workplaces
The Impact of Drug Resistance

- Drug resistant pathogens are a growing threat to ALL people
- Every year, nearly 2 million people in the US are sickened with antibiotic-resistant infection; at least 23,000 die as a result of their infection
- More the 70% of the bacteria that cause HAIs are resistant to at least one drug commonly used to treat
- Linked to longer hospital stays, use of more toxic drugs, poorer patient outcomes, more expense
- Antibiotic resistance has become critical-affecting outcomes of routine surgeries and health care procedures
Antibiotic Use in Animals Linked to Antibiotic Resistance

- Increasing amount of data that links use of antibiotics in agriculture to resistant organisms
- 80%-nearly 30 million pounds-of antibiotic consumed by livestock farms
- FDA “guidelines on judicious use” not enforceable
- Danish study concluded MRSA strains circulating among livestock before jumping to humans

Credit: George Chriss
What’s Going On In Your State?

Antibiotic prescribing rates by state across the U.S. (2012/13)*

*Prescribing data from July 2012 through June 2013; population data from 2012.
What Does the Future Hold?

Credit: Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations 12/2014
CDC-Four Core Actions to Fight Resistance

1. PREVENTING INFECTIONS, PREVENTING THE SPREAD OF RESISTANCE
   Avoiding infections in the first place reduces the amount of antibiotics that have to be used and reduces the likelihood that resistance will develop during therapy. There are many ways that drug-resistant infections can be prevented: immunization, safe food preparation, handwashing, and using antibiotics as directed and only when necessary. In addition, preventing infections also prevents the spread of resistant bacteria.

2. TRACKING
   CDC gathers data on antibiotic-resistant infections, causes of infections and whether there are particular reasons (risk factors) that caused some people to get a resistant infection. With that information, experts can develop specific strategies to prevent those infections and prevent the resistant bacteria from spreading.

3. IMPROVING ANTIBIOTIC PRESCRIBING/STEWARDSHIP
   Perhaps the single most important action needed to greatly slow down the development and spread of antibiotic-resistant infections is to change the way antibiotics are used. Up to half of antibiotic use in humans and much of antibiotic use in animals is unnecessary and inappropriate and makes everyone less safe. Stopping even some of the inappropriate and unnecessary use of antibiotics in people and animals would help greatly in slowing down the spread of resistant bacteria. This commitment to always use antibiotics appropriately and safely—only when they are needed to treat disease, and to choose the right antibiotics and to administer them in the right way in every case—is known as antibiotic stewardship.

4. DEVELOPING NEW DRUGS AND DIAGNOSTIC TESTS
   Because antibiotic resistance occurs as part of a natural process in which bacteria evolve, it can be slowed but not stopped. Therefore, we will always need new antibiotics to keep up with resistant bacteria as well as new diagnostic tests to track the development of resistance.

Credit: Antibiotic Resistance Threats in the United States, 2013
The National Strategy for Combatting Antibiotic Resistant Bacteria

• Outlines 5 Interrelated goals:
  1. Slow the emergence of Resistant Bacteria and prevent the spread of resistant infections
  2. Strengthen national one-health surveillance efforts
  3. Advance development and use of rapid and innovative diagnostic tests
  4. Accelerate basic and applied R & D for new antibiotics, other therapeutics, and vaccines
  5. Improve International collaboration

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We will discuss all three

Clostridium difficile (C. difficile), Carbapanem-resistant Enterobacteriaceae (CRE), Drug-resistant Neisseria gonorrhoeae (cephalosporin resistance)

We will discuss MRSA
C. Difficile by the numbers

- 1 in 3 infections in persons 65 or older
- >100,000 C. Difficile found in nursing homes
- 94% of C. Difficile infections are connected to getting medical care.
- # of hospitalizations has tripled, number of deaths up 400%
Deaths Related to *C. Difficile*
Why? Research on C. Diff suggests...

• Overuse and misuse of antibiotics
• Increase use of broad spectrum antibiotics, such as Ciprofloxacin when a narrower spectrum antibiotic could be used*
• Increase use of alcohol-based hand sanitizers rather than soap and water use (alcohol doesn’t kill the spores)
• New, more resistant strain of *C. difficile releases more toxins, making patient sicker
• Spores can be shed before, during and after CDI treatment has begun
• Spores can live for up to 70 days
Finding Solutions for C. Diff

- Strong emphasis on environmental cleaning, especially high touch areas
- Include stethoscopes, blood pressure cuffs, other patient items
- Hand washing and proper glove donning, doffing
- New FDA approved test that rapidly detects the toxin B gene
- Isolation of positive CDI patients
- Improved patient bathing
- Strong patient education
- Fecal Transplants
- DIFICID (fidaxomicin) approved 2011
Carbapenem-resistant Enterobacteriaceae (CRE)

- 4% of US acute care hospitals had 1 patient w/ CRE
- 18% of long-term facilities
- CRE kill up to half of patients who get bloodstream infections

44 States w/ confirmed CRE
CRE in the News: Endoscopes

• **What Happened:**
  - February 2015, UCLA Medical Center: discovers 7 hospital patients were infected with CRE between October and January, 2 deaths
  - 179 others who had endoscopic procedures were contacted and tested
  - On March 4th, Cedars-Sinai Medical Center in Los Angeles discovered that four patients were infected with CRE, and 67 others may have been exposed.
  - Investigation: Manufacturers recommendations for sterilizing were followed—but not adequate

(AP Photo/U.S. Food and Drug Administration, File)
The Dirty Little Secret - Antibiotic Resistant N. Gonorrhoeae

- Resistance of Concern
  - Cefixime (oral)
  - Ceftriaxone (injection)
  - Azithromycin
  - Tetracycline

- Huge public health threat
- Easily transmitted; severe reproductive complications
- New protocols
Methicillin-Resistant Staph (MRSA)

• Good News! Invasive MRSA rates are declining
• Better News! New drugs approved to fight MRSA!
Recognizing MRSA

• Most common complaint-mistaken spider bite
• Soft tissue infections: sores that start out looking like spider or insect bites
  – has been mistaken for a brown recluse spider bite

• Sores that become red, puffy, blister and ooze
• Wounds that will not heal, even with antibiotics
• Red streaks
• Fever, chills
Pictures of MRSA Infection
Pictures of MRSA Infection

Photo Credit: Major Kirk Waibel, MD
MRSA is Seasonal?

The Seasonality of MRSA Infections

Studies, Protocols and Guidance

• Study: nursing and physician attire can be a source of infection
• Hydrogen Peroxide Vapor protocol study
• Discharge tracking to prevent readmissions
• Guidance for CRE-2013
• C. Diff ISDA update 2016
• New drug protocols for resistant TB
HAIs and Catheters

• Intravenous catheter use has been linked to high incidence of bloodstream infections in patients

• Starting in 2011, hospitals throughout the country must track and report CLABSIs in intensive care units in order to get an annual 2% Medicare payment increase.

• Growing evidence that HAIs dramatically decrease w/frequent cleaning of catheters and other protocols

• Recent project* shows 35% decrease in infections

• CDC 2011 Guidance
New Strategies, New Drugs

• Robots!
  – One study showed 53% drop in C. Diff rates

• Approvals for new drugs for MRSA
  – Sivextro™

• Back to the Soil-unique way of developing antibiotics. Most promising: teixobactin

• New blood test* may make it possible to determine viral from bacterial infections early

*experimental phase reported in PLOS ONE 3/15
Last Thoughts

• Researchers continue to find resistant genes and organisms
• Antibiotic use and misuse continue
• To stop the next “superbug,” frontline workers must protect and educate themselves and the public
Links-Resources

- Get Smart Campaign: http://www.cdc.gov/gets smart/specific-groups/hcp/index.html
- EPA website: http://www.epa.gov/oppad001/list_h_mrsa_vre.pdf
- PLOS ONE article: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0120012