Antibiotic Stewardship and Community Challenges

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Leading infection prevention education across the Rocky Mountain Region.

Nothing to disclose

Objectives

- Discuss the emergence of antibiotic resistant pathogens and their impact to the individual the provider, and the health care system.
- Discuss the national response to antibiotic resistant infection emergence
- Understand and apply the Core Elements of Antibiotic Stewardship in all healthcare settings.
- Discuss the role of the patient and the community in antibiotic stewardship.
Antibiotic Stewardship

Why stewardship

“Without urgent, coordinated action by many stakeholders, the world is headed for a post-antibiotic era, in which common infections and minor injuries which have been treatable for decades can once again kill,”

Dr. Keiji Fukuda, WHO’s Assistant Director-General for Health Security.

Settings of focus

- Acute care facilities - Hospitals
- Long-term care (nursing homes and skilled nursing facilities)
- Outpatient settings (physician clinics)
- Dental offices
Why antibiotic stewardship in hospitals

- 50% of hospital patients receive an antibiotic
- About one third of antibiotics prescribed in hospitals for urinary tract infections (UTIs) include a potential error:
  - Given for too long
  - Given without proper evaluation
  - Antibiotic wasn’t necessary at all

Right antibiotic, at the right dose, for the right length of time, and via the right route


Why Antibiotic Stewardship in Nursing Homes

So essentially, 5 of the 7 patients are being prescribed antibiotics incorrectly


Antibiotic stewardship in nursing homes

20% of providers account for 80% of antibiotics prescribed
40-75% of antibiotics are prescribed incorrectly
Nearly 50% of antibiotics prescribed in NHs may be given for longer than necessary
Monitoring and reviewing antibiotic prescribing is key

Why antibiotic stewardship in outpatient settings

- Over 60% of all antibiotic expenditures are associated with the outpatient setting.
- An estimated 60-90% of the volume of human antibiotic use occurs in the outpatient setting.
- At least 30% of antibiotic courses prescribed in the outpatient setting are unnecessary, meaning that no antibiotic is needed at all. Most of this unnecessary use is for acute respiratory conditions, such as colds, bronchitis, sore throats caused by viruses, and even some sinus and ear infections.
- Total inappropriate use, which includes unnecessary antibiotic use plus inappropriate antibiotic selection, dosing, and duration, may approach 50% of all outpatient antibiotic use.
- Antibiotics are the most common cause of adverse drug events (ADEs) in children, accounting for 7 of the top 10 drugs leading to pediatric ADE-related emergency room (ER) visits. Antibiotics are in the top three drug classes leading to ADE-related ER visits for all ages.
- Improving antibiotic prescribing can reduce harm. A 10% decrease in inappropriate prescribing in the community can result in a 17% reduction in Clostridium difficile infection (CDI).

National data

Available resources
CDC Tools

- Brief explanation to their patients what antibiotics are for
- Briefly explains the risk and side effects associated with antibiotic use
- Addresses symptom management
- Pledge to provide the best possible treatment based on condition

Outpatient education tools

What's got you sick?

Provide patient education:
- On appropriate antibiotic use
  - When to ask/expect an antibiotic
  - Use CDC tools
- On preventing infections
  - Up-to-date vaccinations
  - Hand hygiene
  - Cough etiquette

https://www.cdc.gov/antibiotic-use/week/promotional-materials/print-products.html

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Antibiotic stewardship in dentistry

The goals for antibiotic stewardship in dentistry mirrors the goal of antibiotic stewardship overall:

- Reduce risk of infections
- Reduce adverse drug events related to antimicrobial use
- Reduce antibiotic resistance
- Promote patient safety and reduce morbidity and mortality
- Cardiac indications
- PJ indications

Antibiotic prescribing in dental offices

- Pretreatment:
  - Know when pretreatment is appropriate

- Prescribing:
  - Follow current, evidence-based guidelines

- Patient Education:
  - Provide antibiotic education at every opportunity - written, online, and real-time

- Staff Education:
  - Must be on-going using current, evidence-based guidelines

Role of the patient

- Protect yourself
  - Clean your hands
  - Stay up-to-date with vaccinations

- Use antibiotics the right way
  - Take only when indicated
  - Take as prescribed - finish full course

- Learn when treatment with antibiotics is appropriate
  - Awareness of difference between viral and bacterial infections
  - Provide written, evidence-based information (respiratory infections, sore throats, bronchitis, some ear infections)

- Feel better with symptom relief
  - Provide “prescription” on symptom relief and when follow up is necessary

- Stay home when sick
  - Don’t play a role in spreading infections

https://www.cdc.gov/drugresistance/protecting_yourself_family.html
Core Elements

Leadership Commitment:
- Dedicating necessary human, financial, and information technology resources
- Appointing a single leader responsible for program outcomes
- Experience with successful programs show that a physician leader is effective

Accountability:
- Appointing a single pharmacist leader responsible for working to improve antibiotic use

Drug Expertise:
- Appointing a single pharmacist leader responsible for working to improve antibiotic use

Action:
- Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. “antibiotic time out” after 48 hours)

Tracking:
- Monitoring antibiotic prescribing and resistance patterns

Reporting:
- Regular reporting information on antibiotic use and resistance to doctors, nurses, and relevant staff

Education:
- Educating clinicians about resistance and optimal prescribing

https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html

Core Elements of Hospital Antibiotic Stewardship
More Core Elements

Core Elements of Outpatient Antibiotic Stewardship

Core elements for dental practices

1. Make a commitment
   • Display a recognizable commitment letter/poster

2. Act(ion)
   • Use evidence-based diagnostic criteria and treatment recommendations to improve prescribing

3. Track and report
   • Implement at least one strategy to track and report antibiotic prescribing

4. Educate
   • Educate patients about appropriate antibiotic use and the potential harms of antibiotic treatment with use identified resources

Antibiotic Resistance

Antibiotic resistance (AR), when germs do not respond to the drugs designed to kill them, threatens to return us to the time when simple infections were often fatal.

CDC

Resistance in the United States

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
- Nursing homes

https://www.cdc.gov/drugresistance/about.html
Antibiotic resistance

- The use of antibiotics is the single most important factor leading to antibiotic resistance around the world
- Antibiotics are the most commonly prescribed drugs used in human medicine
- Up to 50% of the time, antibiotics are inappropriately prescribed

Timeline of antibiotic development

http://www.pewtrusts.org/en/research-and-analysis/reports/2016/05/a-scientific-roadmap-for-antibiotic-discovery

New classes of antibiotics

http://www.pewtrusts.org/en/research-and-analysis/reports/2016/05/a-scientific-roadmap-for-antibiotic-discovery
Emerging Threats Due to Resistance

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CDC Identified Threat Levels

High-consequence antibiotic-resistance threats
- Clostridium difficile
- Carbapenem-resistant Enterobacteriaciae (CRE)

The CDC states that urgent threats require urgent public health attention to identify infections and to limit transmission.

Clostridium difficile (C. diff)


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Carbapenem-Resistant Enterobacteriaceae

Multidrug-resistant organisms on the horizon

- mcr-1 resistant gram negatives
  - Discovered in China in 2015
  - Has the ability to confer its resistance to other gram negatives
  - Can make bacteria resistant to Colistin

- Candida auris
  - Isolated in Midwest and North Eastern part of the US
  - Clinical cases significantly increased in July, 2017
  - High mortality rate - about 33%
  - Can colonize the skin and stay in the environment for longer than other Candida species, it seems to spread easily in healthcare settings.

Deadly Superbug

Resistant E. coli
- mcr-1 gene
  - Identified in China in 2015
  - Has been identified with E. coli, Klebsiella, Salmonella, and Shigella
  - Like CRE, mcr-1 freely shares its resistance gene; the mcr-1 gene is on a plasmid, a small piece of DNA that is able to move from one bacterium to another; this “jumping” gene has the potential to quickly spread its resistance to other bacteria
  - Can make bacteria resistant to Colistin

Immune To Antibiotics: Deadly Superbug That Scientists Have
Worst-case scenario

A real “superbug” that is an imminent threat to public health

- Carries both the hypervirulence and hyper-resistance gene
- Causes severe, quick-developing and deadly infections
- Highly transmissible

CDC mcr-1 tracking 2017

https://www.cdc.gov/drugresistance/tracking-mcr1.html

CDC mcr-1 tracking 2018
Candida auris (C. auris)

Candida auris is a fungus that causes serious infections.
- It was discovered in 2009 in Japan.
- It causes serious illness.
  - 1 in 3 patients with invasive infection will die.
  - Often difficult to identify.
  - Often misidentified as other types of fungi.
  - Specialized laboratory technology must be used.
  - Misidentification leads to misidentification.
- Resistant to medications.
- Resistant to the common antifungal treatments.
- Can be resistant to all 3 types of fungal medications.
- Transmission occurs via contact.
- Use Standard and Contact precautions.
- Maintain patient in private room.
- Daily and terminal cleaning with a disinfectant active against C. diff spores.

Tackling Candida auris

Cases are identified as either confirmed or probable:
- Confirmed clinical cases = 340
- Probable clinical cases = 39
- Probable clinical cases = 29

In addition to the clinical cases, an additional 643 patients have been identified as colonized by targeted screening in 4 states with clinical cases.

A National Response
Federal Engagement in Antimicrobial Resistance

In 2016, the CDC:
1. Awarded $26 Million to Academic Centers, Drives Innovation to Protect Patients
2. Funded accelerated antibiotic resistance efforts
3. Funded 34 innovative projects to combat antibiotic resistance

National Action Plan for Combating Antibiotic-Resistant Bacteria

Goals include:
1. Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections
2. Strengthen National One-Health Surveillance Efforts to Combat Resistance
3. Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria
4. Fast-Track Development and Deployment of New Antibiotics, Other Therapeutics, and Vaccines
5. Improve International Collaboration and Capabilities for Antibiotic Resistance Prevention, Surveillance, Control, and Antibiotic Research and Development

National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination

Leaders from across the country

Phased-in approach
1. Phase 1: Acute Care Hospitals
2. Phase 2: Outpatient Settings and Influenza Vaccination of Health Care Personnel
3. Phase 3: Long-Term Care (LTC) Facilities
4. Phase 4: Antibiotic Stewardship
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2020 National Acute Care Hospital HAI Metrics

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<thead>
<tr>
<th>Metric</th>
<th>Targeted Setting</th>
<th>Targeted Setting 2018</th>
<th>Targeted Setting 2019</th>
<th>ABC Reporting 2019</th>
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<tbody>
<tr>
<td>HAIs (including C. diff)</td>
<td>1% reduction</td>
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A national focus on antibiotic resistance

CDC is leading efforts to:
- Tackle the threat to antibiotic resistance
- Drive aggressive action with healthcare, veterinary, and agriculture partners nationwide
- Empower the nation to respond comprehensively, efficiently, and effectively

They work towards their efforts through:
- Detect, Respond, and Contain
- AR Lab Network
- Whole Genome Sequencing
- Prevent
- Education & guidance
- Rapid detection, tracking, and treatment
- Innovate
- AR isolate bank
- Microbiome & environment (water, soil, research) to understand resistance

National CDC funded efforts

Since 2016, CDC's AMR Solvers Initiative has supported comprehensive AMR work nationwide:
- $5.4 million to 25 state and local health departments
- $76.1 million for public health innovations
- 45 public/private institutions
- 14 applied public health research projects
Wyoming funding

Wyoming used $187,918 of their CDC funding to build testing capacity at their state public health lab to detect “nightmare bacteria” CRE. The lab can now receive and confirm CRE isolates from clinical laboratories, positioning them to better track and contain any outbreaks.

A Coordinated (community) Approach

Lack of prevention coordination between facilities can put patients at increased risk of infection. Work together to better detect outbreaks, prevent infections, and improve prescribing.

The coordinated approach:

- Public health departments
  - Use HAI/AR data to target IP & outbreak control
  - Enhance communication b/w facilities

- Healthcare facilities
  - Use NHSN data to track resistance, antibiotic use, and to target prevention
  - Share information and work with LPH
  - CDC
    - Detect, track, and control outbreaks
    - Promote IP and AU

A coordinated approach

More patients get infections when facilities do not work together.

https://www.cdc.gov/vitalsigns/stop-spread/infographic.html
Key points of a coordinated approach

- About 2 million illnesses and 23,000 deaths are caused by antibiotic resistant infections annually in the United States
- About 250,000 people are hospitalized for C. difficile infections annually, typically caused by antibiotic use
  - If best practice for infection prevention and antimicrobial stewardship were adopted nationally, more than 600,000 infections and 37,000 deaths could be prevented over a 5 year period
- If healthcare sites coordinated their patient infection information to guide interventions, an estimated 74% fewer patients would be infected by highly-resistant carbapenem-resistant Enterobacteriaceae (CRE)

U.S. Antibiotic Awareness Week

U.S. Antibiotic Awareness Week  
November 12-18, 2018

- Annual one-week observance of the threat of antibiotic resistance and the importance of appropriate antibiotic prescribing
- An opportunity to promote a facilities commitment to their patients about antibiotics
- An opportunity for real-time, face-to-face education for those seeking care in a healthcare setting
For a long time, there have been newspaper stories and covers of magazines that talked about "The end of antibiotics, question mark?" Well, now I would say you can change the title to "The end of antibiotics, period. We're here. We're in the post-antibiotic era."

Post-antibiotic era

There are patients for whom we have no therapy, and we are literally in a position of having a patient in a bed who has an infection, something that five years ago even we could have treated, but now we can't…

Arjun Srinivasan, MD, Associate Director for Healthcare-Associated Infection Prevention Programs at the CDC

Resources

1. Antibiotic Resistance Threats in the United States, 2013 [Visit CDC webpage]
2. Morbidity and Mortality Weekly Report; Vol. 64, No. 30 August 7, 2015: 826-831 [Visit CDC webpage]
3. CDC, 2015 [Visit CDC webpage]
5. Executive Order - Combating Antibiotic-Resistant Bacteria [Visit CDC webpage]
6. Antibiotic Resistance Threats in the United States, 2013 [Visit CDC webpage]
7. Antibiotic Resistance Threats in the United States, 2013 [Visit CDC webpage]
11. Federal Engagement in Antimicrobial Resistance [Visit CDC webpage]
12. Protecting Yourself and Your Family [Visit CDC webpage]
13. U.S. Antibiotic Awareness Week [Visit CDC webpage]
14. Antibiotic Prescribing and Use in Hospitals and Long Term Care [Visit CDC webpage]
15. Antibiotic Prescribing and Use in Hospitals and Long Term Care [Visit CDC webpage]
17. Precious Drugs & Scary Bugs Antibiotic Stewardship Toolkit for Dental Providers [Visit IDPH website]
18. 2017 Antibiotic Use in the United States: Progress and Opportunities [Visit CDC webpage]
19. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
21. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
22. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
24. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
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28. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
29. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
30. Antibiotic Stewardship Programs Vary in U.S. Hospitals [Visit The Daily Beast webpage]
31. Making A Difference In Infectious Diseases MAD-ID [Visit mad-id webpage]
32. Society Of Infectious Diseases Pharmacists (SIDP) [Visit SIDP webpage]
Thank you