Antimicrobial Resistance in the Community

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Objectives

• Review data on emerging antimicrobial resistant bacteria in the outpatient practice.
• Discuss the extent and clinical implications of antimicrobial resistance in the community.
• Apply strategies that promote good antibiotic stewardship in the outpatient setting.

E. coli susceptibilities, Miami VA

- 384 patients with staphylococcal SSTI in Atlanta
  - 72% MRSA
  - 87% CA-MRSA
- Inadequate initial antibiotic
  - 65% MRSA
  - 1% MSSA
Gonorrhea

- In 2013, 333,004 cases of gonorrhea were reported in the U.S.
  - *N. gonorrhoeae* has progressively developed resistance to each of the antimicrobials used for treatment of gonorrhea.
  - Only recommended regimen is ceftriaxone PLUS either azithromycin or doxycycline
  - 16% of isolates resistant to fluoroquinolones
  - No longer recommended: oral cephalosporins (cefixime), doxycycline, fluoroquinolones

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**Streptococcus pyogenes**

- Uniformly susceptible to penicillin
- Uniformly resistant to sulfonamides
- Variable resistance to macrolides, tetracycline

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**EMERGENCE AND SPREAD OF ANTIMICROBIAL RESISTANCE**

Role of antibiotics in the emergence of AMR organisms

- Antibiotics apply selective pressure on bacteria and encourage or select those with mutations that confer resistance.
- Antibiotics may change the colonization density of existing AMR organisms.
- Antibiotics may allow the colonization of the patient by AMR/pathogenic organisms.
Selective Pressure

“...individuals in every species tend naturally to vary from the norm, and when there are so many members of a species sharing an ecological niche that they are competing for survival, only those whose variations give them decisive advantages will survive. They will pass these characteristics on to their descendants…”

Charles Darwin. *The Origin of the Species*

**Effect of Antibiotics on Colonization Density...the case of VRE**

**Clonal Spread**

**Global Spread of Carbapenemase-producing *Enterobacteriaceae***

Patrick Nordmann, Thierry Naas, and Laurent Poirot

*Emerging infectious Diseases* • www.cdc.gov/edic • Vol. 17, No. 10, October 2011

Global dissemination of a multidrug resistant *Escherichia coli* clone

Nina K. Pethiyagoda<sup>1</sup>, Hee J. Kim<sup>1</sup>, Ben Zakken<sup>1</sup>, Mitchell Sharpton-Cook<sup>2</sup>, Elizabeth Stuppler-Herzog<sup>3</sup>, Melissa Yendik<sup>2</sup>, Brian M. Curtis<sup>2</sup>, Mel-Duy Phan<sup>4</sup>, Guido Sones Mancini<sup>5</sup>, Kate R. Peters<sup>6</sup>, Mark Gevers<sup>1</sup>, Benjamin A. Rogers<sup>2</sup>, Gordon Dougan<sup>4</sup>, Jesus Rodriguez-Baño<sup>7</sup>, Alekszandra Puskás<sup>6</sup>, Christian P. Hoiby<sup>1</sup>, Matthew Venter<sup>1</sup>, David L. Paterson<sup>6</sup>, Timothy A. Walsh<sup>6</sup>, Mark A. Schell<sup>6</sup>, and Scott A. Brueckner<sup>6</sup>

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**Preventing infections**

- Vaccinate!
- Minimize catheter use
  - Intravenous
  - Urinary
- Prevent aspiration
- Skin care

**Decreasing Antimicrobial Resistance**

- Prevent infections
- Optimize the treatment of infections
- Decrease use of antimicrobials
- Prevent transmission of pathogenic organisms

**HOW CAN WE PREVENT ANTIMICROBIAL RESISTANCE?**

- Prevent infections
- Optimize treatment of infections
- Decrease antimicrobial use
- Prevent transmission of microbes
Optimize treatment of infections

- Drain pus and necrotic material
- Send cultures
- Use antimicrobials properly
  - Right doses
  - Duration/discontinuation
  - Beware of interactions with food or other drugs
- De-escalate antibiotics early
- Use your specialists

Minimizing antibiotic utilization

- Do not treat colonization
- Do not treat contamination
- Do not treat viral URIs
- Do not treat “fever”

Asymptomatic bacteriuria

- Asymptomatic bacteriuria or funguria should not be screened for or treated in patients with an indwelling urethral catheter
  - ~100% colonization rate
  - Treatment does not decrease number of subsequent infections
  - High risk of progressive resistance in colonizing organisms

Antibiotics for The Common Cold

9 Controlled Trials

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<th>Study, year</th>
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<th>Conclusion</th>
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<td>amx/clv vs pbo, '96</td>
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<td>benefit in 30 with pathogen</td>
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Prescribed antibiotics

- ~ 3 million lb. of antibiotics are prescribed each year.
- Most are prescribed in the outpatient setting.
- ~50% of outpatient antimicrobials are prescribed for inappropriate indications.

Main Messages

- Antimicrobial resistance in the community setting is a big problem and getting worse.
- Prevention trumps treatment.
- Culture early, but only for clinical illness
- Use antibiotics judiciously and appropriately.

Furuyo, Nature Reviews 2006;4:36-45

IDSA Guidelines for Asymptomatic Bacteriuria • CID 2005:40 (1 March).