Antibiotic Stewardship and Its Role in Dialysis

Jason G. Newland MD, MEd
@JasonGNewland
@sharpsgroup

Disclosures

• Merck - grant and industry funded clinical trials

OBJECTIVES

• Describe the history of antibiotic use.
• List the reasons for antibiotic stewardship.
• List strategies for antibiotic stewardship in children requiring dialysis.
Pre-Antibiotic Era

- 1921 - 13yo develops choreiform movements
- 1931 as a 4th year Harvard Medical student noted petechiae on his wrist
  
  "I shall be dead in 6 months..."
- Blood cultures were positive for *S. viridans*
  
  "I could always find a loophole in the evidence here and there... but now I was confronted with the dictum ultimatum from which there was no escape."

---

"The greatest possibility of evil in self-medication is the use of too small doses so that instead of clearing up infection the microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out which can be passed to other individuals and from them to others until they reach someone who gets a septicaemia or pneumonia which penicillin cannot save."

Alexander Fleming, New York Times 1945
Carbapenem-Resistant Enterobacteriaceae (CRE)

February 2015

Carbapenem-Resistant Enterobacteriaceae in Children

PD associated Peritonitis Pathogens

Inadequate Antibiotic Therapy Increases Mortality

CDC Threat Report

- 23,000 Americans die annually from an antibiotic resistant infection
- 2 million Americans are infected annually with an antibiotic resistant infection
- 250,000 Americans suffer from *C. difficile* infection
  - 19,000 die from *C. difficile* infection

http://www.cdc.gov/drugresistance/threat-report-2013/

Washington University Physicians • St. Louis Children’s Hospital

Department of Pediatrics
Division of Infectious Diseases
Deaths Attributable to AMR

Based on:
- Malaria
- TB
- HIV
- S. aureus
- E. coli
- K. pneumoniae

$100 Trillion Dollars

Antibiotic-Associated Adverse Events

*Clostridium difficile*
- Increasing in hospitalized children
- 10 fold increase in community-onset
- Hospital-onset C. difficile infections associated
  - Increased risk of mortality OR 6.73 (3.77-12.02)
  - Increased length of stay - 5.5 days (4.5-6.5 days)
  - Increased hospital costs - $93K (80-107,200)


Solutions

- New antimicrobial development
- Antimicrobial stewardship programs
- Better diagnostics
- Know best lengths of therapy
- Reduction of hospital acquired infections
- Vaccines
- Decrease antimicrobial use in agriculture
Antimicrobial Stewardship

“optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection with minimal toxicity to the patient and minimal impact on subsequent resistance”

Gerding DN. Joint Commission J Qual Improv 2001

CDC 7 Core Elements for Antimicrobial Stewardship

• Leadership Commitment
• Accountability
• Drug Expertise
• Actions
• Tracking
• Reporting
• Education

ASP Strategies

• Guideline(s)/Pathways
  • Consensus Guidelines for the Prevention and Treatment of Catheter-related Infections and Peritonitis in Pediatric Patients Receiving Peritoneal Dialysis: 2012 Update
• Prospective-audit with feedback
• Prior-approval
• Communication and Collaboration

http://www.qualityforum.org/Publications/2016/05/National_ Quality_Partners_Playbook__Antibiotic_Stewardship_in_Acute_Care.aspx
Empiric Antibiotic Recommendation
- Base on antibiogram data
- Cefepime
- Vancomycin if history of MRSA or high institution rate of MRSA

Duration of therapy
- Gram positive and most Gram negatives: no recommendations
- Pseudomonas: 3 weeks
- Culture negative: 2 weeks

Peritoneal Dialysis Concensus Guideline

Prospective-Audit with Feedback
- Review antimicrobials after prescribed
- Dosing, appropriateness and duration determined
- Discuss with teams and physicians about recommendations of ASP
- Daily Rounding- Handshake Stewardship
Prospective Audit with Feedback

Additional ASP Strategies

- De-escalation based on culture results
  - Stopping vancomycin for MSSA
- Antibiotic Time-out
  - Clinicians discuss antibiotics daily
- Intravenous to Oral transition
  - Quinolones, Linezolid, Clindamycin, Fluconazole
- Stop Antibiotics with negative cultures and no evidence of infection

Diagnostics

- Rapid identification systems
  - Molecular based
  - MALDI-TOF
  - Phenotypic susceptibility methods
- Next Generation Sequence based assays
  - Serum
  - 16S Ribosomal assays
Nudge

- RCT 5 outpatient adult clinics in LA
- Signed commitment letter with photo in exam rooms

Slide from Matt Kronman
Meeker, JAMA Int Med 2014

Outpatient Stewardship- Behavioral Economics

- Cluster randomized approach among 47 adult primary care practices in Boston and Los Angeles
- Randomized to 0 or 3 of the following:
  - Suggest alternatives
  - Accountable justification
  - Peer comparison
  - All received education

Meeker D et al. JAMA 2016
The Future

Regulations

- Joint Commission Standards
- Eight elements of practice
  - Patient/family education no longer required
- Effective January 1, 2017
- CMS condition of participation
  - Long term Care Facilities
  - Acute Care Facilities on hold
- Missouri State Law
  - Requiring stewardship in all facilities
  - Antimicrobial use submitted to the CDC
Impact of a National Effort

- Implementation of infection control and antibiotic stewardship will in 5 years:
  - Reduce MDR HAIs or CDI deaths by 37,000
  - Reduce MDR HAIs or CDI infections by 619,000
- Effective national, state, community wide collaboration is essential!

Thank You
SHARPS Collaborative

• SHaring Antimicrobial Reports for Pediatric Stewardship
• Quality improvement collaborative of over 45 children’s hospitals
• Utilizing PHIS/data reports on antibiotic use to help develop best interventions
• Social media presence: @Sharpsgroup and http://sharpsgroup.tumblr.com/