"Where the rubber hits the road": Real-life Antibiotic Stewardship

Gerald A. Evans, MD FRCPC
IPAC Physician, Public Health Ontario

Chair, Division of Infectious Diseases
Professor of Medicine
Queen’s University
Director, Antibiotic Stewardship Program
Kingston General Hospital
Learning Objectives

At the end of this session the participant will be able to:

1. List common clinical presentations that lend themselves to ASP interventions.
2. Construct a practical toolbox of interventions to provide recommendations in Antibiotic Stewardship.
3. Recognize the limitations of Antibiotic Stewardship.
ASP Tools

• Prospective audit with intervention and feedback
• Formulary restriction and preauthorization for targeted antimicrobials
• Standardized order sets and clinical pathways that foster evidence-based prescribing
• Antimicrobial order forms
Prospective Audit & Feedback Tools

- Review of cultures to determine if:
  - Colonization vs. infection
  - Contamination

- Review of ancillary testing
  - e.g. CXR, other imaging, WBC, inflammatory markers

- Antibiotic choices, if and when allergies present

- Avoidance of specific agents. i.e. FQs, aminoglycosides

- Conversion to outpatient antimicrobial therapy
Prospective Audit & Feedback Tools

• De-escalation of therapy
  • Shorten duration
  • IV to oral dose conversion
  • Broad-to-narrow antibiotic coverage
  • Eliminate duplication of antibiotic coverage

• Dose optimization
  • Correct dose
  • Correct route of administration
  • Renal dose adjustment
Presentations that lend themselves to ASP Intervention

• Fever of unknown origin/?Sepsis
• The rapidly improving patient
• The elderly, confused patient
• Patients with penicillin and other so-called “allergies”
• Patients with positive urine or sputum cultures
• Patients with bacteremia/positive blood cultures
• Polymicrobial infections
Fever of Unknown Origin/?Sepsis

• Opportunities to:
  - Stop antibiotics
  - Shorten duration
  - Select best antibiotic choices

• Tools
  - Review of cultures
  - Review ancillary testing
  - Liaison with team on alternate diagnoses
The Rapidly Improving Patient

• Opportunities to:
  • Stop antibiotics
  • Shorten duration
  • IV-to-PO stepdown
  • Outpatient antibiotic therapy

• Tools
  • Review of cultures to ensure no microbiologically confirmed infection
  • Review ancillary testing
  • Liaison with team on clinical status
The Elderly, Confused Patient

• Most of these patients have drug-related causes not infection as the cause of their delirium

• Opportunities to:
  • Stop antibiotics or avoid some antibiotic choices
  • Shorten duration
  • Correct dose and route of administration
  • Renal dose adjustment

• Tools
  • Review of cultures
  • Review ancillary testing
  • Liaison with team on alternate diagnoses
Penicillin and other “allergies”

• Many allergies reported by patients are known AEs or intolerances

• Avoiding antibiotics that patients report allergies to, can lead to poor alternate antibiotic selections
  • FQs ➔ CDI
  • TMP-SMX ➔ Rash, cytopenias
  • Aminoglycosides ➔ Renal toxicity
The Positive Urine/Sputum Culture

• Most positive urines indicate asymptomatic bacteriuria not UTI
  • The only ASB that requires antibiotic therapy is when it occurs in pregnant women

• Sputum cultures are a dog’s breakfast
  • Invariably negative but a negative does not rule out either pneumonia or AECOPD
  • Positive sputum/ETT aspirates frequently represent colonization not infection
Bacteremia/Positive Blood Cultures

- Contamination of BCs is **common**
  - Typically skin organisms like coagulase-negative staphylococci, e.g. *S. epidermidis*, Bacillus sp., Corynebacterium sp., alpha-hemolytic streptococci “Viridans group streptococci”

- If positive, then antibiotic selection should be narrowed to cover the pathogen

- If negative, then sepsis due to bacteremia is less likely ➔ Stop antibiotics? or shorten duration
Polymicrobial Infections

• Opportunities to:
  • IV-to-oral dose conversion
  • Broad-to-narrow antibiotic coverage
  • Eliminate duplication of antibiotic coverage
  • Correct dose
  • Correct route of administration

• Tools
  • Review of cultures
Pitfalls and Perils of ASP

• Lack of most responsible physician buy-in
  • Obstructionism
  • Backlash

• Complexity of some cases

• Resources available to ASP
  • Information management
  • ID expertise

• Need for clinical feedback from attending team or MRP
Suggested Resources

• PHO ASP Website
  http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/AntimicrobialStewardshipProgram/Pages/Antimicrobial-Stewardship-Program.aspx#.U3JT7MYcubJ

• Canadian Guidelines from AMMI Canada
  http://www.pulsus.com/journals/tocGuideline.jsp?sCurrPg=journal&jnlKy=3&fold=Guidelines

• UK website for AS
  http://www.pause-online.org.uk/

• CDC AS Website
  http://www.cdc.gov/getsmtart/healthcare/learn-from-others/CME/antimicrobial-stewardship.html
Case #1

• An 84 year old woman is admitted for acute delirium. She is started on piperacillin-tazobactam for a possible infection. The next day her urine culture is reported to show $100 \times 10^6$ CFU/L of an *E.coli* that is pan-susceptible. You are reviewing her for the ASP program.

• What would you recommend?
Case #1 – Discussion Points

- This may be asymptomatic bacteriuria not a UTI
  - Narrow antibiotic coverage at the very least.
  - If no upper tract symptoms and BCs are negative, suggest a short course of 3-5 days

- Discuss whether the team has another diagnosis for her delirium
  - Stop all antibiotics if an alternate or better cause is found to explain her delirium
Case #2

- A 43 year old man is admitted with community-acquired pneumonia. The CXR shows a left lower lobe infiltrate and the WBC is 23,000. He is prescribed IV moxifloxacin and ceftriaxone. After 2 days he is clinically better. All cultures including blood and sputum are negative. His CXR looks worse. You are reviewing him for the ASP program.

- What would you recommend?
Case #2 – Discussion Points

• “Treat patients not lab results.”

• He is showing rapid clinical resolution so can be stepped down to oral antibiotic therapy and stop redundant coverage.
  • No need for both FQ AND a beta-lactam in a younger non-ICU hospitalized patient with CAP

• In most pneumonias, CXR resolution lags behind clinical resolution.
Case #3

• You are reviewing a 56 year old man post CABG on the Cardiac Surgery Unit. He was placed on IV vancomycin 2 days ago for a peripheral BC that grew *S. capitis* that is oxacillin-susceptible. Three other BCs drawn around the same time that day show no growth, including BCs drawn through a central venous line. He has been afebrile throughout his hospital course and his WBC is normal. He reports a rash to penicillin 25 years ago.

• What would you recommend?
Case #3 - Discussion Points

• This is almost certainly a false-positive BC
  • Although a central line associated bacteremia is a possibility, the lack of clinical signs & symptoms of infection and the negative central line BCs argue strongly against this

• Stop the vancomycin

• Get an accurate penicillin allergy history from the patient to determine if it represents a true allergy
  • Skin testing may be appropriate in this case
  • Durations of > 20 years from exposure to a prior allergen rarely result in anaphylaxis on re-challenge
Case #4

• In reviewing a 73 year old woman in the ICU who has been on IV vancomycin, meropenem and fluconazole for a ventilator-associated pneumonia for the last 3 days. In your review of her cultures, you come across a bronchial wash culture that shows normal respiratory flora with a few *C. albicans* and 2/4 BC sets from the patient are growing MSSA. She is slowly improving and is now afebrile, her WBC is normal and her ventilatory settings are improving.

• What recommendations if any would you make?
Case #4 - Discussion Points

• Broad coverage early is useful but now you have enough information to do the following:
  • Change vancomycin to an anti-staphylococcal beta-lactam like cloxacillin or cefazolin
  • Stop the meropenem as the VAP is likely due to the MSSA found in her blood
  • Stop the fluconazole as the bronchial wash recovery of yeast reflects contamination not infection

• Duration of therapy for VAP can be shortened to ≤ 7 days but in this case the MSSA bacteremia mandates 14 days
Case #5

• A previously healthy 38 year old man is admitted with a ruptured appendix and secondary peritonitis. He is currently on ertapenem and metronidazole. BCs are negative but culture of fluid from surgery shows growth of multiple organisms including *E. cloacae*, *B. fragilis* group and VRE. *The E.cloacae* is only resistant to ampicillin and cefazolin. The *B. fragilis* is a beta-lactamase producer. He is now eating, and his WBC is 12,500.

• What would you recommend?
Case #5 - Discussion Points

• **Stop the metronidazole** as it is redundant given the excellent anaerobic activity of carbapenems

• Since he is eating, a stepdown to oral therapy is a good idea. This will help facilitate discharge as well

• Oral FQs have high oral bioavailability and when combined with oral metronidazole provide excellent coverage for intra-abdominal infections

• In IAI, coverage of enterococci is **not** required unless it is a singular pathogen