Best Practices: Goals of Antimicrobial Stewardship

Gail Scully, M.D, M.P.H. and Elizabeth Radigan, PharmD, BCPS
UMass Memorial Medical Center
Division of Infectious Disease
Department of Medicine
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Goal: Optimize Clinical Outcomes of treating infection

– For current and future patients!
Goal: Antimicrobial Resistance don’t create it, It’s Hard to Reverse

Less Resistance: Infection Control and spread MRSA
Less Resistance: Pneumococcal Vaccination (duration of benefit unclear)

No improvement:
  High rates of resistance to TMP in UTI;
  Trimethoprim utilization targeted, decrease use by 85% over 2 years,
  no diminution of resistance in E Coli and Klebsiella*

What we do not want: Patient Isolate 3/2011

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<th>1. KPN</th>
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<td>NITROFURANTOIN</td>
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<td>TRIMETH-SULFA</td>
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Goal: Avoid adverse outcomes from unnecessary antimicrobials
Goal: Cost Control: Clinical and Pharmacologic History can save $$

- Aztreonam: Gram negative agent safe in (most) penicillin allergy
- Penicillin allergy: 10% patients report
- True penicillin allergy: 10-15% of the above

↓ Aztreonam use by taking detailed history from patient and pharmacy records: annual savings $300,000
UMass Memorial Medical Center

• Academic medical center
  – Level 1 trauma center
  – 2 inpatient campuses: University & Memorial
  – 800+ inpatient beds
  – 7 adult ICUs

• Stewardship team
  – Infectious Disease MD: 24 hrs/wk
  – ID PharmD
Antimicrobial Stewardship Program (ASP)

• Formal ASP started in November 2008
  – Prior: Restricted antimicrobials
• Current program
  – Antimicrobial Review
    • Targeted daily antimicrobial review for acute care areas
    • Antimicrobial review with ICU pharmacists twice weekly
  – Point Prevalence
  – Education
Antimicrobial Review: Our program

- Targeted daily antimicrobial review for acute care areas
- Utilize Theradoc to identify:
  - Piperacillin-tazobactam
  - Quinolones
  - Vancomycin: focus on dosing/adjusting level
  - Aztreonam
  - Any positive blood cultures
- Immediate feedback to primary team
- Focus: Avoid unnecessary antibiotics, use narrow spectrum, de-escalate
Antimicrobial Review: Data

• Data from over 2000 antimicrobials reviewed (~1500 patients)
• Interventions in 40%, with 65% “acceptance” rate
  – How do you define acceptance?
• Cost savings
  – Piperacillin-tazobactam (extended infusion, antimicrobial review, and generic):
    • Annualized savings for FY2011 $1,075,000
  – Aztreonam (restriction and antimicrobial review):
    • Annualized savings for FY2011 $313,000
Point Prevalence

• Review every inpatient to determine percent on antimicrobials
  – Exclude: ER, Pediatrics, BMT

• For those on antimicrobials, further examine use
  – Appropriate
  – Indication
  – Service based opportunities (surgery, medicine, oncology)
  – Identify opportunities and direct future initiatives
Half of Inpatients at UMass Receive Antimicrobial Therapy on Any Given Day

![Bar chart showing the number of inpatients on antimicrobial therapy at two hospitals: University and Memorial. The chart indicates that University has a significantly higher number of patients on antimicrobial therapy compared to Memorial.](image-url)
Point Prevalence: Antibiotic Use

- **December 2010**
  - 204 patients receiving antimicrobials
  - average 1.7 antibiotics/patient
  - 63 of 334 (19%) antibiotics unnecessary

- **March 2011**
  - 217 patients receiving antimicrobials
  - average 1.7 antibiotics/patient
  - 77 of 353 (22%) of antibiotics unnecessary
Reasons for Unnecessary Antibiotics

- ASX bacteruria
- No indication
- Double coverage
- No de-escalation
- Too broad
- Bug-drug mismatch
- Excess lot
Education

• Guidelines
  – HAP/HCAP, VAP (emphasis on De-escalating AT)
  – CAP – with an emphasis on CMS core measures
  – *C. difficile colitis* diagnosis and therapy, Reduction of catheter-associated UTIs in adult ICU patients

• Lecture pearls
  – Don’t treat asymptomatic bacteriuria (except…)
  – Where was the infection acquired?
    • Community vs. healthcare-associated/hospital-acquired
  – FQs not useful for empiric double gram-negative coverage

• Tools
  – Antibiogram Card, Common Infectious Disease and Empiric Antibiotic Recommendation Card
Education: HAP/HCAP

• Don’t “double cover” gram negatives unless risk for MDR organism

• Use your antibiogram to support recommendations!
  – *Pseudomonas aeruginosa* in HAP, VAP, and HCAP
    • Ciprofloxacin S: 44% (ICU), 65% (non-ICU)
    • piperacillin/tazobactam R isolates, cipro susceptibility ~10%

• Correctly classify CAP vs. HCAP
  Group homes and assisted living CAP, NOT HCAP

• Get a sputum and de-escalate!
Education: CAP

- CMS Core Measure and reimbursement
- Antibiotic Selection!
  - Must be IV for patients going to the ICU
  - No Need to include coverage for pseudomonas when treating community acquired pneumonia (CAP) (unless a risk factor for pseudomonas is present)
Education: Common Infectious Diseases and Empiric Antibiotic Recommendations Card

• Adult Emergency department and Inpatients
• Multidisciplinary collaboration
• Recommendations based on UMass antibiogram, antimicrobial cost, guidelines and expert opinion
# Education: Common Infectious Diseases and Empiric Antibiotic Recommendations Card

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<tr>
<th>SITE/Infection</th>
<th>Preferred*</th>
<th>Alternatives*</th>
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<tr>
<td><strong>URINARY/KIDNEY</strong></td>
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<td>Asymptomatic bacteriuria</td>
<td>No treatment is indicated unless patient is pregnant or will undergo invasive urologic intervention(s) (if pregnant consider amoxicillin, nitrofurantoin, TMP-SMX OK IN 2ND TRIMESTER PREGNANCY)</td>
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<td>Symptomatic cystitis, Uncomplicated (Women only)</td>
<td><strong>Ciprofloxacin 250 mg PO q12h OR Nitrofurantoin 100 mg PO q6h x 5d (NOT in CrCl &lt; 60 ml/min; For uncomplicated, females only) - Consider macrobid for outpatients</strong></td>
<td><strong>Bactrim 1DS tablet PO q12h (caution in elderly, renal insufficiency) OR Cefpodoxime 200 mg PO BID</strong></td>
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<td>Symptomatic cystitis, Complicated (with anatomic abnormality, indwelling foley cath., recent instrumentation, men, diabetes/other immunosuppression)</td>
<td><strong>Ciprofloxacin 500 PO q12h vs. 400mg IV q12h OR Ceftriaxone 1 gm IV q24h</strong></td>
<td><strong>Gentamicin: Maximum of 3-5 mg/kg/day per pharmacy protocol</strong></td>
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<td>Acute pyelonephritis</td>
<td><strong>Ceftriaxone 1-2 gm IV q24h (not for Enterococcus)</strong></td>
<td><strong>Gentamicin: Maximum of 3-5 mg/kg/day per pharmacy protocol OR Below agents, only if susceptibility known</strong></td>
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<tr>
<td>Nosocomial UTI</td>
<td><strong>Ceftazidime 1 gm IV q8h</strong></td>
<td><strong>Gentamicin: maximum of 3-5 mg/kg/day per pharmacy protocol</strong></td>
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| LUNG | Community-acquired pneumonia (CAP)                                                                 | Azithromycin 500mg PO/IV q24 **PLUS** Ceftriaxone 1 q IV q24h (step down to PO cefpodoxime)  
For severe CAP or risk for MRSA: Consider adding Vancomycin 15 mg/kg IV q8-12h to target troughs of 15-20 mcg/ml  
**NOTE:** If CAP patient is at risk for pseudomonas, consider: Piperacillin-tazobactam PLUS Ciprofloxacin | Only if PCN/Ceph allergy: Levofloxacin 750mg PO/IV q24h x 5 days OR 500 mg PO/IV x 7-10days  
**NOTE:** If CAP patient with PCN/CEPH allergy is at risk for pseudomonas, consider: Aztreonam** 2gm IV q8h **PLUS** Levofloxacin |
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<td>Early-onset HAP/VAP (within days 1-3 of admission)</td>
<td>As CAP above</td>
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|      | HCAP† and Late-onset HAP (day 4 or later): FLOOR admission                                      | Piperacillin/tazobactam 4.5g IV q8h E1 over 4 hrs **OR** Ceftazidime 2 gm IV q8h (replaces pip/tazo) **PLUS** Vancomycin with target trough 15-20 mcg/ml  
+/- Gentamicin if risk for multi-drug resistant (MDR) pathogens (see risk below ▲) | Obtain sputum cultures for gram stain, Culture and Sensitivity  
If severe PCN/CEPH allergy: Aztreonam** 2gm IV q8h (replaces pip/tazo) **PLUS** Vancomycin with target trough 15-20 mcg/ml |
|      | Late-onset VAP/HAP (day 4 or later): ICU admission                                              | Piperacillin/tazobactam 4.5g IV q8h E1 over 4 hrs **OR** Ceftazidime 2 gm IV q8h (replaces pip/tazo) **PLUS** Vancomycin with target trough 15-20 mcg/ml  
+/- Amikacin if risk for MDR pathogens (see below ▲) | Note: Amikacin does not require ID approval when used in ICUs |

**Risk for Pseudomonas in CAP:** [COPD or Interstitial lung disease (eg pulmonary fibrosis) AND current or recent (within 3 mos): corticosteroid (>10 mg prednisone daily) or antibiotic therapy or malnutrition] OR Structural lung disease (eg bronchiectasis)

† HCAP: Hospitalized for 2+ days in the past 90 days OR Resided in a nursing home or long term (acute) care facility (LTCF/LTAC) OR Attended hemodialysis/Received recurrent IV antibiotic therapy, chemotherapy or wound care in the past 30 days

▲ Risk factors for MDR organisms: Previous Pseudomonas pneumonia OR History of MDR organism only sensitive to aminoglycosides OR Received piperacillin-tazobactam/3rd or 4th gen. cephalosporin/carbapenem in past 45 days OR Mechanical ventilation in past 30 days OR structural lung disease
Additional points and Future Plans

- Always look for new opportunities
- Learn and use your internal data
- Collaborate with other disciplines
- Be available to help, not just to request
- Future plans
  - Campaign to Decrease treatment of asymptomatic bacteriuria
  - Repeat Point prevalence
  - Re-assess current strategies