Inadequate Double-Pseudomonal Coverage with Ciprofloxacin versus Aminoglycosides

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Introduction / Rationale

- *Pseudomonas aeruginosa* is an important gram-negative bacilli often implicated in serious hospital and healthcare-associated infections, is often antibiotic resistant, and is associated with a high mortality rate
- In the absence of acquired additional antibiotic resistance, there are limited antimicrobial agents with reliable activity against pseudomonas isolates
  - Antipseudomonal penicillins
  - Antipseudomonal cephalosporins
  - Monobactam
  - Fluoroquinolones
  - Carbapenems
  - Aminoglycosides
- Although controversial, combination antimicrobial therapy with two different classes is likely indicated in certain high-risk patients and severe infections to increase the likelihood of effective empiric antibiotic therapy
- Combinations utilized in our intensive care units for empiric double coverage of pseudomonas includes an antipseudomonal beta-lactam plus either ciprofloxacin or an aminoglycoside
- ICU antibiograms suggest ciprofloxacin to have a higher rate of resistance compared to aminoglycosides and beta-lactams at our institution
- It is unknown at our institution if ciprofloxacin or the aminoglycosides add additional coverage to patients with pseudomonas isolates resistant beta-lactams

Objectives

1. Determine the rate of ciprofloxacin resistance to pseudomonas isolates that are resistant to piperacillin-tazobactam and/or cefepime
2. Determine the rate of aminoglycoside (gentamicin, tobramycin) resistance to pseudomonas isolates that are resistant to piperacillin-tazobactam and/or cefepime
3. Compare the rates of resistance between ciprofloxacin and the aminoglycosides to pseudomonas isolates that are resistant to piperacillin-tazobactam and/or cefepime

Methods

- Study Design
  - Single center, retrospective and prospective, observational chart review
  - Approved by the Institutional Review Board at Beaumont Health
  - Data will be collected from the electronic medical record

Figure 1: Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
• Adult patients (≥ 18 years) • Admission to any intensive care unit at Beaumont Hospital – Royal Oak from 1/1/2011 through 12/31/2012 • Positive Pseudomonas culture from any source	• Age < 18 years • Susceptibility data not available

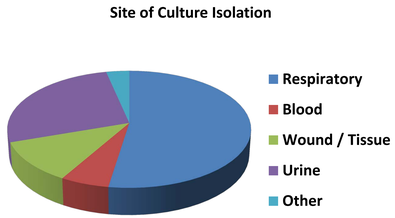
Methods (continued)

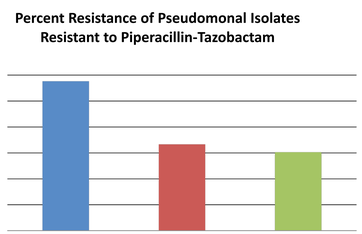
Table 1: Data Collection

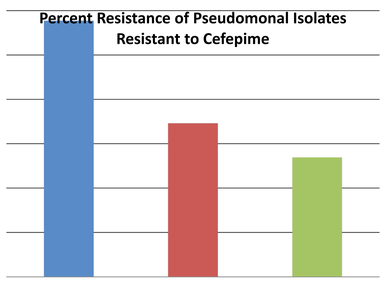
- Demographic information
- ICU Location
- Date of culture
- Source of culture:
  - Respiratory
  - Blood
  - Wound / Tissue
  - Urine
  - Other
- Antibiotic course of therapy at time of pseudomonas culture
- ICU and hospital mortality
- Antibiotic sensitivities:
  - Cefepime
  - Ciprofloxacin
  - Gentamicin
  - Tobramycin
  - Piperacillin-tazobactam

Results

- Total of 324 pseudomonas cultures were isolated
- Total of 323 sensitivities were able to be evaluated
- Other isolation sites:
  - Cerebrospinal fluid
  - Bile fluid
  - Ascites fluid
  - Peritoneal fluid
  - Pelvic fluid
  - Lung autopsy







Limitations

- **Retrospective chart review**
- **Correlation between colonization and infection was absent**
- **Sensitivity data limited to piperacillin-tazobactam, cefepime, gentamicin and tobramycin**
- **Pseudomonal isolate speciation was not recorded**

Discussion / Conclusions

- The rate of ciprofloxacin resistance to pseudomonas isolates resistant to piperacillin-tazobactam or cefepime approached 58 percent
- The rate of aminoglycoside (gentamicin, tobramycin) resistance to pseudomonas isolates resistant to piperacillin-tazobactam or cefepime was between 27 and 34 percent
  - Gentamicin: 33-34%
  - Tobramycin: 27-30%
- There is roughly a 2-fold increase in ciprofloxacin resistance to pseudomonas isolates as compared to aminoglycoside resistance.
- When utilizing double gram(-) coverage for infections in the critically ill patient, aminoglycosides should be favored over ciprofloxacin in the absence of contraindications.

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Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

- All authors have nothing to disclose