Evaluation of Appropriate Antibiotic Usage in Community-Acquired Pneumonia in Hospitalized Pediatric Patients: A Quality Improvement Project
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Background and Introduction

Background:
- In 2011, the Infectious Diseases Society of America (IDSA) released clinical practice guidelines for the treatment of Community-Acquired Pneumonia (CAP) in pediatric patients. These guidelines recommend ampicillin as the preferred parenteral therapy and azithromycin as the preferred oral therapy for the treatment of non-complicated pneumonia due to Streptococcus pneumoniae.
- Adherence to evidence-based guidelines has been shown to decrease mortality and morality.1
- This project focused on the prescribing portion of the medication use process at The University of Arizona Medical Center (UAMC)-Diamond Children’s, a teaching hospital in Tucson, Arizona and Diamond Children’s Medical Center treats pediatric patients with a variety of conditions.

Supportive Research:
- Newman et al. found that implementation of clinical practice guidelines and an antimicrobial stewardship program in a children’s hospital led to a significant increase in use of ampicillin for the treatment of uncomplicated CAP and speculated that this has the potential to minimize the development of resistant strains of bacteria.2
- McCabe et al. examined the use of CAP guidelines in adults and discovered that adherence to evidence-based guidelines has been shown to decrease 30 day mortality, length of stay, and readmission rates in CAP hospital patients.3
- Smith et al. analyzed the importance of education and the use of guidelines in the treatment of uncomplicated pneumonia in pediatric patients.4
- In 2011, the Infectious Diseases Society of America (IDSA) released clinical practice guidelines for the treatment of community-acquired pneumonia: Playing by the rules.5

Objectives
- Examine prescribing patterns for the treatment of CAP in pediatric patients in comparison to the IDSA treatment guidelines.

Methods

Patient Population: Pediatric patients admitted to the 5th floor of UAMC Diamond Children’s Medical Center between January 22, 2013 and April 4, 2013 were evaluated.

Inclusion Criteria:
- Positive chest x-ray for pneumonia
- No indication for antibiotic therapy
- Age > 3 months and < 18 years

Exclusion Criteria:
- Aspiration pneumonia
- History of antibiotics for the treatment of pneumonia within the previous month
- Cystic fibrosis
- Viral pneumonia

Procedures:
Data Collection:
- Electronic medical records of patients admitted to the 5th floor of UAMC Diamond Children’s Medical Center were evaluated.
- For patients who met the inclusion criteria, the following information was collected: sex, allergies, weight, age, antibiotic prescribed (date and dose), history of lung diseases, chest x-ray results, and history of readmission due to pneumonia.

Pre-intervention data collection was conducted January 22, 2013 to February 14, 2013. Post-intervention data collection was conducted March 7, 2013 to April 3, 2013.

Intervention:
- A brief presentation on the pre-intervention results and the IDSA pediatric CAP guidelines was given to pediatric medical residents at teaching day on March 6, 2013.
- Pediatric residents were provided with a laminated reference card containing guideline recommendations on antibiotic selection and dosing to attach to their laptops [Figure 1].

Statistical Methods:
- CHI-square test, a priori alpha < 0.05

Results

Adherence to evidence-based guidelines has been shown to decrease mortality and morbidity.1
- This project focused on the prescribing portion of the medication use process at The University of Arizona Medical Center (UAMC)-Diamond Children’s, a teaching hospital in Tucson, Arizona and Diamond Children’s Medical Center treats pediatric patients with a variety of conditions.

Adherence to the IDSA CAP guidelines for ampicillin varied throughout the study period.

Conclusion and Discussion
- Adherence to the IDSA CAP guidelines for ampicillin varied throughout the study period.
- Educational interventions improve adherence and may improve outcomes.

Table 1. Patient Characteristics (n=45)

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 months</td>
<td>6 (20)</td>
<td>6 (20)</td>
</tr>
<tr>
<td>2-5 months</td>
<td>10 (40)</td>
<td>10 (40)</td>
</tr>
<tr>
<td>6-10 months</td>
<td>14 (56)</td>
<td>14 (56)</td>
</tr>
<tr>
<td>10-14 months</td>
<td>5 (20)</td>
<td>5 (20)</td>
</tr>
<tr>
<td>&gt;14 years</td>
<td>3 (12)</td>
<td>3 (12)</td>
</tr>
</tbody>
</table>

Table 2. Antibiotic Usage in Pediatric Pneumonia Patients (n=45)

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
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</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>20 (89)</td>
<td>7 (25)</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>10 (40)</td>
<td>3 (12)</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>1 (4)</td>
<td>2 (8)</td>
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<tr>
<td>Amoxicillin</td>
<td>11 (44)</td>
<td>9 (33)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (17)</td>
<td>5 (19)</td>
</tr>
</tbody>
</table>

* ampicillin P value = 0.015

References