Background

Approximately 10% of patients in the United States report having an allergic reaction to penicillin (PCN), although < 1% are truly allergic to PCN. Roughly 80% of patients with IgE-mediated PCN allergy will lose their sensitivity after 10 years. 1, 2

Cross-reactivity rates to PCN are < 3% and < 1% for cephalospors and carbapenems, respectively. The major determinant is similarity in side chains, with the first- and second-generation cephalospors being more cross-reactive. 3, 4

Providers at KMC are hesitant to order beta-lactam (BL) antibiotics in PCN allergic, despite clinical pharmacy services recommendations. As a result, second-line treatment regimens are often selected. This increases risks of treatment failure, as cephalospors are utilized as first-line agents in a variety of common infections. 5

Objectives

1. To determine the safety outcomes of patients with a previously documented BL allergy who were challenged with BL therapy at a small community hospital in Brooklyn, New York.
2. To provide support for the implementation of PCN skin testing at KMC to improve patient outcomes and alleviate provider concern with utilizing BL antibiotics in this patient population.

Methods

Original Design: retrospective chart review of clinical success rates in BL allergic patients receiving BL vs. non-BL therapy for empirical treatment of bacteraemia.

Primary outcome: clinical failure rates at 72 to 96 hours

Sample size calculation: based upon a 15% difference in cure rates. With a standard deviation of 0.5, 80% power and alpha of 5%, 175 patients were needed per group. Information Technology provided a list of patients with a documented BL allergy and patients with a BL order. After review, it became evident power would not be reached because too few BL allergic patients were treated with a BL.

Modified Design: retrospective chart review from January 2014 – July 2017 with data from the original proposal. Researchers cross referenced the two lists to only include BL allergic patients.

Primary outcome: rate of allergic reaction in BL allergic patients challenged with a BL. Descriptive statistics utilized for analysis.

Allergy definition: pharmacist or discharge summary note indicating patient did not tolerate the BL and new orders for steroids and/or antihistamines with intravenous (IV) fluids after administration of at least 1 dose of a BL.

Inclusion criteria: patients admitted with a documented BL allergy that were administered ≥ 1 dose of a BL.

Exclusion criteria: Patients with skin rash prior to antibiotic exposure or an allergic reaction attributed to another drug during this admission

Results

Allergic reaction – no. (%)

Primary Outcome (N = 72)

2 (2.77)

Patient Characteristics

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Documented Allergy</th>
<th>Other Allergies</th>
<th>Antibiotic Regimen</th>
<th>Allergic Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>66 M</td>
<td>Black</td>
<td>Beta-lactams &amp; rash</td>
<td>No</td>
<td>Ceftriaxone 1 g IV QAM x 3 days</td>
<td>Rash – moderate</td>
<td></td>
</tr>
<tr>
<td>55 M</td>
<td>Black</td>
<td>Penicillins &amp; Unknown</td>
<td>Yes (non-allergic)</td>
<td>Cefepime 1 g IV Q6H x 3 days</td>
<td>Angioedema and rash – severe</td>
<td></td>
</tr>
</tbody>
</table>

Both patients were treated with diphenhydramine, methylprednisolone, and IV NS

Neither patient required epinephrine and recovered within 72 hours

Disclosures

The authors of this study have no personal or professional interests to disclose.

Subgroup Analysis

Patients with Documented Severe BL Anaphylaxis (N = 5)

<table>
<thead>
<tr>
<th>BL Lactam Regimen</th>
<th>Frequency</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meropenem 500 mg IV</td>
<td>Q12H</td>
<td>7 Days</td>
</tr>
<tr>
<td>Meropenem 500 mg IV</td>
<td>Q8H</td>
<td>14 Days</td>
</tr>
<tr>
<td>Piperacillin/tazobactam 3.375 mg IV</td>
<td>x 1 dose</td>
<td>x 1 dose</td>
</tr>
<tr>
<td>Cefepime 200 mg PO</td>
<td>Q12H</td>
<td>3 Days</td>
</tr>
<tr>
<td>Meropenem 500 mg IV</td>
<td>Q12H</td>
<td>11 Days</td>
</tr>
</tbody>
</table>

None of these patients experienced an allergic reaction

Discussion

Many patients had documented allergies with unknown severity or type of reaction. Approximately 1/3 of patients did not receive BLs after order validation, likely due to their allergy. None of the patients receiving carbapenem therapy experienced an allergic reaction. Interim third- and fourth-generation cephalospors were responsible for the two allergic reactions.

The primary strength of this study was that it assessed acute care patients at a community teaching hospital. The primary outcome was consistent with cross-reactivity rates reported in recent literature. This study was limited, as the original research proposal was not feasible. Due to restrictions accessing the electronic health record, there was a small sample size. There may have been information bias, since the majority of the patients had an unknown allergy and if the allergy was severe, it may be more accurately documented.

Providers should be less hesitant to challenge patients with a documented PCN allergy with BL antibiotics. It is crucial to properly document allergic reactions. This supports the implementation of PCN skin testing at KMC, as the majority of the patients had unknown severity and type of BL reaction.

Conclusion

There is a low risk of utilizing BL in patients with a reported PCN allergy. With these findings, clinical pharmacy services aim to further discuss the implementation of PCN skin testing at our institution.

References