Evaluation of the clinical impact of a penicillin allergy pharmacy assessment on non-preferred antimicrobial use in a community hospital

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BACKGROUND

- True IgE-mediated reactions to penicillin are uncommon among inpatients.
- Those at high risk of a true penicillin reaction experience anaphylaxis, positive skin testing, recurrent reactions, and reactions to multiple beta-lactam antibiotics.
- A change from guideline-directed therapy due to reported beta-lactam allergies to non-preferred agents may lead to increased risk of Clostridioides difficile, methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant Enterococcus (VRE).
- Non-preferred agents include: aminoglycosides, carbapenems, daptomycin, fluoroquinolones, linezolid, and vancomycin.
- Evidence supports evaluation of reported allergies to impact guideline-directed therapy.

OBJECTIVES

- Evaluate the reliability of documented penicillin allergies in the community hospital setting
- Optimize antimicrobial use by limiting non-preferred agents in patients with a documented penicillin allergy
- Determine areas for improvement utilizing a pre- and post-implementation technique

METHODS

- Quasi-experimental
- Implementation: Vigilanz® alert for pharmacy assessment fired for patients with a listed beta-lactam allergy and who were on non-preferred therapy
- Pre-Implementation: December 1, 2019 – February 29, 2020
  - n = 181
- Post-Implementation: December 1, 2020 – February 28, 2021
  - n = 169

Inclusion Criteria

- ≥18 years of age with a documented penicillin allergy
- Individuals receiving non-preferred antibiotic therapy
- Inpatient units at Olathe Medical Center and Miami County Medical Center, including procedural areas
- Olathe Health clinics

Exclusion Criteria

- Patients having received preferred and non-preferred antibiotic therapy with a reported beta-lactam allergy
- Number of patients having received preferred and non-preferred antibiotic therapy with a reported beta-lactam allergy
- Non-preferred antibiotic therapy documented, assess use alternative therapies, assess cost of non-preferred therapies
- Statistical analysis: chi-squared analysis

RESULTS

Demographics

Table 1.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Implementation</th>
<th>Post-Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age (years)</td>
<td>65.9</td>
<td>66.1</td>
</tr>
<tr>
<td>Male (%)</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Average Weight (kg)</td>
<td>91</td>
<td>88</td>
</tr>
<tr>
<td>Average Length of Stay (days)</td>
<td>4.44</td>
<td>4.90</td>
</tr>
<tr>
<td>Top Indications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Respiratory</td>
<td>Prophylaxis</td>
<td>Prophylaxis</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>Prophylaxis</td>
<td>Prophylaxis</td>
</tr>
<tr>
<td>Secondary Indications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>Prophylaxis</td>
<td>Prophylaxis</td>
</tr>
<tr>
<td>Skin or soft tissue infection</td>
<td>Prophylaxis</td>
<td>Prophylaxis</td>
</tr>
<tr>
<td>Infection of Nosocomial Services</td>
<td>Prophylaxis</td>
<td>Prophylaxis</td>
</tr>
</tbody>
</table>

Primary Endpoint

Table 2.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Implementation</th>
<th>Post-Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Therapy</td>
<td>71</td>
<td>133</td>
</tr>
<tr>
<td>Non-Preferred Therapy</td>
<td>80</td>
<td>29</td>
</tr>
<tr>
<td>Unable to Assess Appropriateness</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>Totals (n)</td>
<td>181</td>
<td>169</td>
</tr>
</tbody>
</table>

Secondary Endpoints

- 82% of post-implementation patients reported beta-lactam allergies that were clinically non-relevant
- Only 3% of beta-lactam allergies reported as anaphylactic between pre- and post-data sets
- Pharmacy alert documentation indicated 16 of 18 chart allergies were updated by pharmacy while 87% were marked as “accepted”

Days of Therapy for Non-Preferred Agents

- Days of therapy analyzed for all non-preferred therapies
- Favorable trends for both ertapenem and fluoroquinolones
- Primarily female
- Indications ranked the same across periods
- Slight deviations in length of stay and Infectious Disease consults
- Statistical significance seen with implementation of pharmacy beta-lactam implementation assessment
- p-value = 0.0029
- “Unable to Assess Appropriateness” is excluded from statistical analysis

CONCLUSIONS

- A statistically significant difference was found after the implementation of a pharmacy-driven beta-lactam allergy assessment
- Literature supports these findings
- Appropriately assessing antibiotic allergies leads to guideline-directed therapy changes
- Days of non-preferred therapy can be limited, reducing likelihood of more severe infections
- Reduced costs are favorable with guideline-directed therapy

LIMITATIONS

- Lack of direct interaction with patients for assessment
- Post-implementation data set heavy with Infectious Diseases consults
- Census and disease state differences from COVID-19 may contribute to change in prescribing patterns

FUTURE CONSIDERATIONS

- Update allergies with “reaction symptoms” since this field is viewable to providers
- Implement a standardized allergy assessment at admission for pharmacy/nursing at Olathe Health
- Determine appropriateness of allergy skin testing in a community hospital
- Disseminate educational materials to interdisciplinary teams to promote antimicrobial stewardship

References