Impact of Antimicrobial Stewardship on Outcomes Related to Pneumonia

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Abstract

Objectives:
- Pneumonia is a common cause of hospitalisation. The purpose of this study is to evaluate the impact of an antimicrobial stewardship (ASP) program on outcomes for inpatients with pneumonia including length of stay, treatment duration, and 30-day readmission rates.
- Bivariate analysis of baseline characteristics and comorbid conditions were analyzed.
- Inclusion Criteria:
  - Pneumonia diagnosis was based on ICD 9 codes 518.1, 518.2, 518.8, 518.9.
  - 86 patients in the pre-ASP period and 88 patients in the ASP period.
  - 30-day readmission data were available for all patients.

Methods:
- Retrospective chart review of patients admitted with pneumonia between 2006 and 2007 and after implementation of an ASP from 2013 to 2014.
- Length of hospital stay, time to intravenous (IV) to oral (PO) antibiotic conversions, and duration of antibiotic use were calculated for each patient.

Conclusions:
- The ASP program was able to provide interventions, which resulted in shorter durations of hospital stay, time to IV to PO antibiotic conversions, and duration of antibiotic use.
- In the pre-ASP period, 51% of patients were discharged within 3 days of admission, compared to 36% in the ASP period.
- The odds of 30-day readmission decreased from 2.78 to 0.36 after implementation of the ASP program.

Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cohort (n=174)</th>
<th>Pre-ASP (n=86)</th>
<th>ASP (n=88)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>75.0 (61.1 ± 11.26)</td>
<td>74.7 (61.1 ± 11.58)</td>
<td>75.03 (61.1 ± 10.97)</td>
<td>0.45</td>
</tr>
<tr>
<td>Race (%)</td>
<td>Hispanic: 10 (5.8%) White: 89 (51.1%) African-American: 27 (15.6%) Other: 38 (21.8%)</td>
<td>Hispanic: 8 (9.3%) White: 76 (88.2%) African-American: 2 (2.3%) Other: 1 (1.2%)</td>
<td>Hispanic: 7 (9.6%) White: 76 (86.8%) African-American: 2 (2.3%) Other: 3 (3.3%)</td>
<td>0.79</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>158.9 (±3.15)</td>
<td>158.6 (±3.09)</td>
<td>158.0 (±2.41)</td>
<td>0.14</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>85.72 (±25.29)</td>
<td>83.19 (±21.27)</td>
<td>86.20 (±30.34)</td>
<td>0.21</td>
</tr>
<tr>
<td>BMI</td>
<td>25.7 (±5.87)</td>
<td>24.1 (±4.43)</td>
<td>26.6 (±6.01)</td>
<td>0.15</td>
</tr>
<tr>
<td>SCr (mg/dL)</td>
<td>0.97 (±1.32)</td>
<td>0.94 (±1.19)</td>
<td>1.02 (±2.10)</td>
<td>0.11</td>
</tr>
<tr>
<td>C-reactive protein (mg/dL)</td>
<td>10.4 (±7.1)</td>
<td>8.9 (±6.9)</td>
<td>13.66 (±7.1)</td>
<td>0.0005</td>
</tr>
<tr>
<td>Urinalysis abnormalities (%)</td>
<td>3.45 (4%)</td>
<td>4.65 (4%)</td>
<td>2.27 (2%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Type of Pneumonia</td>
<td>Overall: 56 (66%)</td>
<td>Overall: 46 (53%)</td>
<td>Overall: 50 (57%)</td>
<td>2.03</td>
</tr>
<tr>
<td>Service</td>
<td>Medical: 39 (46%)</td>
<td>Medical: 34 (39%)</td>
<td>Medical: 45 (51%)</td>
<td>0.13</td>
</tr>
<tr>
<td>Sputum culture</td>
<td>56.6%</td>
<td>54.6%</td>
<td>58.7%</td>
<td>0.63</td>
</tr>
<tr>
<td>Blood culture</td>
<td>45.1%</td>
<td>45.6%</td>
<td>46.8%</td>
<td>0.63</td>
</tr>
<tr>
<td>Death on discharge (%)</td>
<td>2.9%</td>
<td>1.2%</td>
<td>4.5%</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Odds Ratio of Treatment Outcomes

Variable | Pre-ASP | ASP | p-value |
<table>
<thead>
<tr>
<th></th>
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<tr>
<td>Length of stay (days)</td>
<td>8.07 (±4.44)</td>
<td>6.86 (±4.00)</td>
<td>0.02</td>
</tr>
<tr>
<td>Duration of antibiotics (days)</td>
<td>11.93 (±4.45)</td>
<td>8.45 (±4.41)</td>
<td>0.0002</td>
</tr>
<tr>
<td>IV to PO conversion</td>
<td>3.32 (±1.90)</td>
<td>2.32 (±1.90)</td>
<td>0.0003</td>
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</tbody>
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Conclusion: The implementation of an ASP has improved pneumonia management through -decreased length of stay -decreased duration of treatment -decreased time to conversion from IV to PO therapy -increased the number of blood and sputum cultures obtained -decreased admission rates

ASP provides an important role in improvements in patient care.
Antimicrobial Stewardship Pharmacist
Accepted Recommendations

- Dose optimization
- Drug change due to QTc prolongation
- Cultures
- Labs/PCR/V antigen
- Descalation
- IV->PO
- Duration of Therapy
- Escalation
Retrospective Review of the Impact of Antimicrobial Stewardship on Outcomes Related to Pneumonia

Kari Kurtzhalts, Pharm.D., Christine Ruh, Pharm.D., BCPS, Emily Oberist, Pharm.D., Kari Mergenhagen, Pharm.D., BCPS AQ-ID, VA Western New York Healthcare System, Buffalo, NY

Abstract

Background:
- In 2010, pneumonia became the 5th leading cause of death in the US, accounting for a death total of about 50,000 Americans each year.
- Inappropriate use of antibiotics has led to development of multidrug resistant pathogens (MDROs) which increases morbidity, drug related adverse events, length of hospital stay, length of antibiotic use, and Clostridium difficile infections.
- Antimicrobial stewardship programs (ASP) hope to control inappropriate antimicrobial therapy and MDRO development.
- In 2007 the Infectious Disease Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA) published guidelines stating the necessity for collaboration among an infection disease (ID) physician and ID-specialist pharmacist in order to create an effective ASP.
- The VA of Western New York has created a well-established ASP, consisting of a ID physician and full-time clinical pharmacist.

Methods:
- Quality improvement study evaluating the impact of an antimicrobial stewardship program on pneumonia treatment at the VHA WNY.

Primary Outcomes:
- Length of hospital stay
- Duration of antibiotic use
- Causative pathogens identified
- Clostridium difficile occurrence
- Readmission rate

Electronic medications records were reviewed between the following time frames:

Conclusion:
- Improvement in duration of therapy
- Improvement in length of stay
- Improvement in number of appropriate doses

Data collection is still on going.

Disclosures
- No financial relationships with commercial companies
- No financial support from non-governmental organizations
- No other relationships

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