A Systematic Review of Antimicrobial Stewardship Interventions in the Emergency Department

Emily Black,¹ Tasha Ramsey,¹,² Mia Losier,¹ Kyle Wilby³
¹ Dalhousie University, ²Nova Scotia Health Authority, ³Qatar University

Background

- Infections are one of the most common reasons patients present to the emergency department (ED) and often result in antimicrobial prescribing
- Antimicrobial stewardship programs (ASPs) have been recommended to improve antimicrobial use and decrease antimicrobial resistance in the ED

Objective(s)

- The primary objective of this study was to characterize ASPs in the ED and to identify interventions that decrease consequences of antimicrobial use and improve patient outcomes
- The secondary objectives were to evaluate impact of pharmacists participating in ASPs in the ED and to identify facilitators and barriers to implementing ASP in this setting

Methods

- Medline, EMBASE, Cumulative Index to Nursing and Allied Health Literature, Scopus, and Web of Science were searched from inception through June 2015. An update was completed November 2016.
- A broad search including terms for antimicrobial stewardship were combined with terms for emergency department and antimicrobial agents (Table 1)
- All studies evaluating an antimicrobial stewardship intervention in the ED were considered for inclusion
- Manuscripts published in languages other than English were excluded
- Outcomes of interest included: patient outcomes, quality metrics, and antibiotic use
- Two investigators independently screened titles and abstracts for inclusion and completed data extraction and bias assessment
- Disagreements were resolved by consensus

Table 1: Search Terms

<table>
<thead>
<tr>
<th>Stewardship</th>
<th>Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>stewardship or program or policy or pathway or audit or formular or guideline or order form or order forms or streamlined or educat or optimiz or optimiz or quality improvement or quality assurance or quality indicator or quality indicators</td>
<td></td>
</tr>
<tr>
<td>Emergency Department</td>
<td>Emergency Treatment or Emergency Medicine or emergency medical services or emergency service, hospital or trauma centers or triage or exp Evidence-Based Emergency Medicine or exp Emergency Nursing or Emergencies or emergencient or emergencem or (emergenc* or ED) adj (room* or accident or ward or wards or unit of of units of department* or physician* or doctor* or nurs* or pharmacist* or treat* or visit*) or (triage or critical care or (trauma adj (cent* or care*)))</td>
</tr>
<tr>
<td>Antimicrobial</td>
<td>(antibiotic* or antimicrobi* or bacteri* or antibiotic* or anti-bacterial* or anti-microbial* or anti-biotic* or anti-infective* or anti-infect)</td>
</tr>
</tbody>
</table>

Figure 1: Study Inclusion

- Records identified through database searching: June 2015 (N = 5706) November 2016 (N = 1720)
- Records screened after duplicates removed: June 2015 (N = 4425) November 2016 (N = 1453)
- Full-text articles assessed for eligibility: June 2015 (N = 111) November 2016 (N = 12)
- Studies included in qualitative synthesis: June 2015 (N = 37) November 2016 (N = 6)
- Full-text articles excluded, with reasons: (N = 80)
- Language (N=3)
  - No intervention or outcome of interest (N=40)
  - Setting outside ED (N=22)
  - Descriptive report, commentary or review (N=10)
  - Wrong study design (N=1)
  - Other (N=4)
- Additional records identified through hand searching (N = 1)
- Records excluded (N = 5755)

Table 2: Pharmacist Culture Review and Follow up

<table>
<thead>
<tr>
<th>Appropriateness of Therapy</th>
<th>Time to follow up</th>
<th>Frequency of intervening</th>
<th>ED Re-admission rates</th>
<th>Admission to hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randolph</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Baker</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Miller</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dumkow</td>
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<tr>
<td>Davis</td>
<td></td>
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<tr>
<td>Santiago</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kujawski</td>
<td>✓</td>
<td></td>
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</tr>
</tbody>
</table>
| Pharmacist intervention compared to another healthcare provider: ✓ = significant improvement, ✗ = no significant improvement

Results

- 43 studies met inclusion criteria (Figure 1)
  - Majority of studies were uncontrolled before and after studies with unclear or high risk of bias
  - Most common interventions alone or in combination with others were education and clinical pathway or guideline implementation
  - Improved adherence to guidelines, appropriateness of prescribing, and decreased antimicrobial utilization observed
  - Few studies reported improvement in clinical outcomes
  - 6 studies evaluated audit and/or feedback and primarily demonstrated improved adherence to guidelines or appropriateness in prescribing
  - Pharmacists participated in 13 studies. Involvement in culture review and follow up was compared to other healthcare providers in 7 studies. (Table 2)
  - Most publications did not specifically report barriers and facilitators to ASP implementation. Need for dedicated personnel was reported in some studies.

Conclusion

- ASPs in the ED may improve patient care however the preferred combination of interventions is unclear.
- Additional studies with more rigorous design evaluating core ASP interventions are needed

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Disclosures:

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Kyle Wilby – Nothing to disclose