A Pharmacist-Driven Implementation of Carbapenem Antibiotic Timeouts

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Background

In 2013, the CDC emphasized the need for antibiotic use improvement strategies:
- 20%-50% of all antibiotics utilized are inappropriately or unnecessarily prescribed
- Antibiotic timeout - a period of evaluation where the medical team reassesses the continuing need and choice of antibiotics when more clinical information is available through four key clinical questions:
  - Does this patient have an infection that will respond to antibiotics?
  - If so, is the patient on the right antibiotic(s), dose, and route of administration?
  - Can a more targeted antibiotic be used to treat the infection (de-escalate)?
  - How long should the patient receive the antibiotic(s)?

At Regions Hospital in Saint Paul, MN, the overuse of carbapenems has led to a 9% decrease in antimicrobial sensitivities, specifically for Pseudomonas aeruginosa.

The antimicrobial stewardship team was implemented in October 2016.

ID service weekday rounding (Monday through Friday) began June 2018 for patients on broad-spectrum antibiotics or with infectious disease consult

Objectives

The objective of this study was to evaluate the impact of the implementation of a pharmacist-driven antibiotic timeout at 72-hours following initiation of carbapenem-based antibiotic therapy

Primary Aims

Duration of carbapenem therapy pre- and post-timeout implementation

Secondary Aims

Development of Clostridioides difficile infection

Re-escalation of antibiotic therapy due to worsening condition

Pharmacist time spent during the antibiotic timeout process

Methods

Inclusion
- Adults ≥18 years
- Treatment with carbapenem therapy (i.e., Meropenem, ertapenem, imipenem, doripenem)

Exclusion
- Hypersensitivity to carbapenems
- Pregnant women

Pre-Intervention Methodology

Retrospective data extracted from 03/05/2018 to 04/05/2018 via the McKesson Performance Analytics Platform

Patients excluded based on consent for research participation

Post-Intervention Methodology

Data collected prospectively from 03/05/2019 to 04/05/2019

Patient enrolled into Antibiotic Timeout following running of a daily report

Antibiotic Timeout

Assessment of patient clinical condition at 72-hours

Contacting primary team or attending physician

Continued use or de-escalation of therapy documented in chart

Follow-up continued for total duration of carbapenem therapy

Table 1. Baseline Comparison

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention N=107</th>
<th>Post-Intervention N=72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years*</td>
<td>59 (41.5, 68)</td>
<td>56.5 (46.25, 64)</td>
</tr>
<tr>
<td>Sex, female (%)</td>
<td>46 (48.6)</td>
<td>44 (61.1)</td>
</tr>
<tr>
<td>Hospital LOS, days*</td>
<td>4 (2, 9)</td>
<td>6 (3, 14)</td>
</tr>
<tr>
<td>Level of Care</td>
<td>General Care: 94</td>
<td>General Care: 41</td>
</tr>
<tr>
<td></td>
<td>Intensive Care: 8</td>
<td>Intensive Care: 23</td>
</tr>
<tr>
<td>Carbapenem Therapy</td>
<td>Ertapenem: 80</td>
<td>Ertapenem: 47</td>
</tr>
<tr>
<td></td>
<td>Meropenem: 27</td>
<td>Meropenem: 25</td>
</tr>
<tr>
<td>Exclusion</td>
<td>Pregnancy: 1</td>
<td>Pregnancy: 1</td>
</tr>
</tbody>
</table>

*represented as median (Interquartile Range)

Table 2. Primary Outcome – Continuation of Carbapenem Therapy

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention N=107</th>
<th>Post-Intervention N=72</th>
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</thead>
<tbody>
<tr>
<td>Continuation of Therapy, yes (%)</td>
<td>21 (19.6)</td>
<td>28 (38.9)</td>
</tr>
<tr>
<td>Duration of Therapy, median days (IQR)</td>
<td>1 (1, 3)</td>
<td>3 (2, 6)</td>
</tr>
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Results

Table 3. Secondary Outcomes – C. difficile Infection, Re-escalation of therapy

<table>
<thead>
<tr>
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<th>Pre-Intervention N=107</th>
<th>Post-Intervention N=72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridioides difficile infection tests, (%) negative</td>
<td>19 (73.7)</td>
<td>26 (84.6)</td>
</tr>
<tr>
<td>Re-escalation of therapy, (%)</td>
<td>0 (0)</td>
<td>2 (2.8)</td>
</tr>
</tbody>
</table>

Table 4. Secondary Outcomes – Pharmacist Time Spent

<table>
<thead>
<tr>
<th>Time for Chart Review, minutes</th>
<th>Median (Interquartile Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion with Team, minutes</td>
<td>3 (2, 5)</td>
</tr>
<tr>
<td>Documentation, minutes</td>
<td>2 (1, 2)</td>
</tr>
<tr>
<td>Total Time Spent, minutes</td>
<td>11 (9, 17)</td>
</tr>
</tbody>
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Secondary Outcomes

Future Directions

Implementation strategy that is achievable and potentially could be expanded to other broad-spectrum antibiotics

Assists in the facilitation of achievement of Joint Commission action requirements for our institution

Conclusions

Limitations

- Unmatched patient groups at baseline (i.e., sex, age, carbapenem therapy)
- Difference in number of patients per cohort
- Implementation of antimicrobial stewardship services may have reduced number of opportunities for interventions due to carbapenem therapies being used for specific disease states as indicated

Conclusion

- Duration of therapy almost 3-fold greater in 2019 compared to 2018 due to indicated disease states requiring carbapenem therapy
- Risk for Clostridioides difficile infection ranges from 15.4-26.3%
- Risk for re-escalation in antibiotic therapy seen in 2.8% of patients in post-intervention compared to pre-intervention
- Use of this implementation process may require ~10 minutes of pharmacist time per patient encounter

References

7. HealthPartners Clinic and Regions Hospital: Microbiology and Clinical Pharmacy Handbook for Antimicrobial Susceptibility. Published internally by HealthPartners and Regions Hospital Clinical Laboratory, publication 2018.

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