Impact of Expanded Carbapenem Resistant Enterobacteriaceae (CRE) Screening on Rates of Hospital Acquired (HA) CRE Infection

Methods

Active surveillance for CRE was performed using a culture-based technique on rectal swabs. CRE was defined as any Enterobacteriaceae isolate intermediate to resistant to ertapenem, imipenem, or doripenem. Of note, at the time of this study, the 2010 CLSI breakpoints for carbapenems had not yet been implemented. Mechanism of carbapenem resistance was not determined.

Throughout all study periods, once a patient was identified as being colonized or infected with CRE, they were placed on contact precautions, isolated on select units with dedicated nursing staff and received daily chlorhexidine bathing for the duration of their hospital stay. January 2014 through July 2015, we utilized a limited CRE surveillance strategy by performing point prevalence surveillance testing on units per week on a rotating basis hospital wide. In August 2015 thru April 2016, expanded CRE surveillance was implemented to include on admission testing for high risk populations (hospital stay >48 hours in the past year, transfer in from another hospital, CHG bathing and less progression to infection.

Statistical Methods

Father’s exact test was used to calculate statistical significance of incidence rates. Multivariable analysis was performed to determine risk factors associated with hospital acquired CRE bacteremia with P<0.05 determining significance. A Poisson regression model reporting incident risk ratios was used. The two surveillance periods were included in the model as the exposure surveillance variable with the referent category the limited surveillance time period.

Results

Table 1: Comparison of Hospital (HA) and Community Acquired (CA) CRE Infection and Colonization Rates Between Limited and Expanded Active Surveillance Periods

<table>
<thead>
<tr>
<th></th>
<th>Limited Surveillance Period</th>
<th>Expanded Surveillance Period</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRE Infection</td>
<td>0.71 (0.37, 1.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
<tr>
<td>CRE Colonization</td>
<td>1.16 (0.57, 2.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Table 2: Modified Poisson Model to Assess the Risk of Hospital Acquired CRE Infection

<table>
<thead>
<tr>
<th></th>
<th>Limited Surveillance Period</th>
<th>Expanded Surveillance Period</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
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<tr>
<td>&lt;60 years</td>
<td>0.71 (0.37, 1.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
<tr>
<td>60+ years</td>
<td>0.71 (0.37, 1.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
<tr>
<td>Race (white)</td>
<td>0.71 (0.37, 1.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
<tr>
<td>Male sex</td>
<td>0.71 (0.37, 1.35)</td>
<td>0.30 (0.12, 0.74)</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Conclusion

The percent of patients screened who were found to have CRE was un-changed between the limited and expanded surveillance periods. Expanded active surveillance resulted in increased identification of patients with community acquired CRE colonization and infection, allowing for earlier isolation, cohorting of nursing staff and CHG bathing to be implemented.

While rates of hospital acquired CRE infection decreased in the expanded surveillance period, the impact was lessened when we accounted for other patient specific factors such as age, gender, race and endoscopy procedures prior to development of CRE. Further study is needed to elucidate the predictors of CRE infections and the impact of 100/1,000 screening on CRE infection rates. We significantly increased our ability to identify patients with community acquired CRE colonization and infection, allowing for earlier isolation, cohorting of nursing staff, and CHG bathing and less progression to infection.

References:


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