ABSTRACT

Background: Clostridium difficile Infection (CDI) is an URGENT level of threat in United States as published by US Government in a stark report entitled “Antibiotic Resistant Threats in the United States, 2013” Yet there is limited information on geographic distribution of CDI in the community. The present study compared the rates of hospital admissions due to CDI, number of ED visits and number of readmissions within 30 days of hospital discharge for all counties of Michigan, USA.

Methods: Using Michigan CMS claims data from 2014, we examined geographic trends in C. difficile discharges and readmissions for all counties in Michigan. We then identified counties with the highest number of discharges and readmissions. In additional analysis, we focused on specific clinic providers to understand the burden of CDI among different clinic locations across Michigan.

Results: Counties 4, 5 and 7 accounted for a large number of patients with CDI. Patients in these counties also experienced relatively high numbers of 30 day hospital readmissions and emergency department (ED) visits associated with CDI. Analysis of the same data by providers depicted a very similar trend. These high CDI burden NPI providers were located in a tri-county area of counties 4, 5 and 7 in Michigan.

Conclusion: The high CDI burden in concentrated pockets in the community suggests that these county health care providers may be amenable to interventions specifically focused on CDI knowledge, prevention and treatment.

BACKGROUND

- Clostridium difficile is common cause of antibiotic associated diarrhea and is an alarming challenge being a common health care associated infection. Clostridium difficile is an anaerobic, gram positive, spore forming bacteria responsible for rising morbidity and mortality in hospitals and chronic care facilities.

- The annual rate of CDI increased from 463.1 to 1096.5 CDI discharges per 100,000 discharges from 2002 to 2008 in Michigan.

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METHODS

Using Michigan CMC claims data for 2014, we examined geographic trends in Clostridium difficile discharges and readmissions for all counties of Michigan. We identified Michigan counties with highest overall number of C. difficile discharges and readmissions.

We identified counties with highest number of 30 day C. difficile hospital readmission rates and 30 day emergency department visit rates. We also focused on specific clinic providers to understand Clostridium difficile Infection burden among different clinic locations across Michigan.

RESULTS

CONCLUSION

- Increasing Clostridium difficile discharges and readmission rates in various Michigan counties demand need for strict antibiotic stewardship programs throughout the hospitals.

- Counties with high CDI burden should be the focus of increased interventions at hospital and ambulatory clinic levels. The high CDI burden in concentrated pockets of the community suggests that these county health care providers may be amenable to interventions specifically focused on CDI knowledge, prevention and treatment.

- Our study identifies current scenario of Clostridium difficile Infection burden in various counties of Michigan. This data can be used as a tool to direct health care reforms and interventions in hospitals and clinics of Michigan counties with high prevalence of C. difficile infection.

Listing of the top ten providers in Michigan who cared for patients discharged with C. difficile infection, 2014.

<table>
<thead>
<tr>
<th>Truncated NPI</th>
<th>C. difficile patients</th>
<th>Total patients</th>
<th>C. difficile Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>12453</td>
<td>311</td>
<td>2099</td>
<td>14.82</td>
</tr>
<tr>
<td>11645</td>
<td>175</td>
<td>2573</td>
<td>6.80</td>
</tr>
<tr>
<td>10230</td>
<td>167</td>
<td>16267</td>
<td>1.03</td>
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<tr>
<td>19220</td>
<td>141</td>
<td>510</td>
<td>27.65</td>
</tr>
<tr>
<td>12553</td>
<td>124</td>
<td>2682</td>
<td>4.62</td>
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<tr>
<td>10736</td>
<td>121</td>
<td>2392</td>
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</tr>
<tr>
<td>14675</td>
<td>99</td>
<td>2257</td>
<td>4.39</td>
</tr>
</tbody>
</table>

Data source: Centers for Medicare and Medicaid (CMS) Fee-for Service (FFS) inpatient claims

1. Counties 4, 5 and 7 had increased overall Clostridium difficile Infection discharges and readmissions.

2. Counties 4, 5 and 7 also had increased 30 day Clostridium difficile infection Emergency Department visits and hospital readmissions.

3. Ambulatory clinics in the same counties 4, 5 and 7 received maximum population of C. difficile infection cases.