Acquisition of *Clostridium difficile* Associated with Potentially Contaminated Inpatient Rooms

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**Background**

- Hospital rooms of inpatients with *Clostridium difficile* infection (CDI) can become contaminated with this bacteria's spores.
- Unless adequately disinfected, rooms can serve as a reservoir where subsequent patients hospitalized in the same room can also become infected with *C. difficile* (CD).
- It was incidentally noted that a patient acquired severe CDI while in a room in our hospital that had recently been occupied by another patient with CDI. We sought to evaluate the frequency of this type of event.

**Methods**

- Pilot study was conducted for a new surveillance measure to estimate the frequency that patients acquire CDI after exposure to a room recently occupied by a patient with CDI.
- CD test results and room location data were obtained from our 500-bed tertiary care center's MedMined database.
- Hospital-acquired CDI was defined as positive CD PCR test ≥3 days after admission.
- A room was defined as "potentially contaminated" when occupied by a patient who had a positive CD test within the prior 14 days.
- A patient was defined as exposed if he/she occupied a "potentially contaminated" room within 14 days prior to testing positive for CD.
- The Emergency Department and operating rooms were excluded from the study.

**Results**

- During the period July-September 2013, 93 patients had a positive CD PCR.
- Of the 47 hospital-acquired cases, 5 (11%) had developed CDI after exposure to a "potentially contaminated" room (occupied 0-2 days prior by a person with CDI).

<table>
<thead>
<tr>
<th>Geographically associated cases</th>
<th>Room</th>
<th>Dates same room was occupied</th>
<th>Date 1st C. difficile positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index—patient 1</td>
<td>A</td>
<td>Jul 23—Jul 28</td>
<td>Jul 22</td>
</tr>
<tr>
<td>HAI—patient 2</td>
<td>A</td>
<td>Jul 28—Aug 18</td>
<td>Jul 28</td>
</tr>
<tr>
<td>Index—patient 3</td>
<td>B</td>
<td>Aug 1—Aug 7</td>
<td>Aug 1</td>
</tr>
<tr>
<td>HAI—patient 4</td>
<td>B</td>
<td>Aug 7—Sep 5</td>
<td>Aug 15</td>
</tr>
<tr>
<td>Index—patient 5</td>
<td>C</td>
<td>Aug 3—Aug 6</td>
<td>Aug 4</td>
</tr>
<tr>
<td>HAI—patient 6</td>
<td>C</td>
<td>Aug 6—Aug 7</td>
<td>Aug 15</td>
</tr>
<tr>
<td>Index—patient 7</td>
<td>D</td>
<td>Jul 22—Aug 23</td>
<td>Aug 20</td>
</tr>
<tr>
<td>HAI—patient 8</td>
<td>D</td>
<td>Aug 25—Sep 10</td>
<td>Sep 8</td>
</tr>
<tr>
<td>Index—patient 9</td>
<td>E</td>
<td>Sep 9—Sep 12</td>
<td>Sep 11</td>
</tr>
<tr>
<td>HAI—patient 10</td>
<td>E</td>
<td>Sep 12—Sep 17</td>
<td>Sep 16</td>
</tr>
</tbody>
</table>

**Illustrative pair of cases:**

- On Sep 9 patient 9 was admitted from a nursing home with confusion, leukocytosis, and UTI to room E. On Sep 11 he developed diarrhea and was found to be positive for *C. difficile* that same day. He passed away on Sep 12.
- On Sep 12 patient 10, who was recovering after hysterectomy, was transferred into room E. On Sep 16 she developed diarrhea and was found to be positive for *C difficile* which progressed to septic shock.

**Discussion**

- This investigation identified a subset of hospital-acquired *C. difficile* infections (CDI) associated with a room recently occupied by a previous patient with *C difficile*.
- These cases of hospital-acquired CDI may have been due to incomplete cleaning of rooms and equipment. However, there are multiple other factors that contribute to CDI and its nosocomial spread including antibiotic exposure and healthcare providers not adhering to hand hygiene and contact precaution guidelines.

**Limitations:**

1. Small cohort of 47 potentially hospital-acquired cases.
2. No control groups.
3. Associations could have been under-recognized because emergency department and operating rooms could not be included in the analysis.

**Conclusion**

- In a 3-month period, this specialized surveillance measure uncovered a small but important percentage of inpatients who had acquired CDI potentially from a contaminated room.
- Our hospital subsequently instituted sporidial (bleach-based) disinfectants for terminal cleaning of all inpatient rooms.
- It is relevant to develop computerized algorithms in surveillance systems that can recognize these geographical associations for hospital-acquired infections; this data can then be used to guide environmental health interventions.

**References**


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