Serratia marcescens
Outbreak Investigation

Preliminary information as of May 3, 2011. Subject to change.
Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. This report summarizes the field component of the investigation conducted in collaboration with the Alabama Department of Public Health. Because of the preliminary nature of this report, future correspondence or other published reports might present results, interpretations, and recommendations that are different from those contained in this document.
Objectives

- Determine the extent of the outbreak of *Serratia marcescens* bacteremia

- Evaluate risk factors for *Serratia* bacteremia and identify possible etiologies

- Review TPN compounding practices to identify potential sources of contamination

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TPN Customers of Compounding Pharmacy A

Hospital W (Bessemer)
Hospital S (Alabaster)
Hospital Q (Prattville)
Hospital G (Birmingham)
Hospital L (Birmingham)
Hospital P (Birmingham)

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Serratia bloodstream infections among patients in hospitals receiving TPN from one compounding pharmacy – Alabama

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Case Definition

*Serratia marcescens* bacteremia occurring in patients receiving TPN from Compounding Pharmacy A between January 1, 2011 through March 15, 2011

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## Case Characteristics

<table>
<thead>
<tr>
<th>Case Characteristic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>19</td>
</tr>
<tr>
<td>Number of healthcare facilities</td>
<td>6</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>56</td>
</tr>
<tr>
<td>(Range)</td>
<td>(38-94)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
</tr>
<tr>
<td>Higher level of care required</td>
<td>11</td>
</tr>
<tr>
<td>Deaths</td>
<td>9</td>
</tr>
</tbody>
</table>

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## Attack Rates Among Patients Receiving TPN: March 1 – March 15, 2011

<table>
<thead>
<tr>
<th></th>
<th>Number of S. marcescens bloodstream infections</th>
<th>Number of Patients Receiving TPN</th>
<th>Attack Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonates</td>
<td>0</td>
<td>7</td>
<td>0%</td>
</tr>
<tr>
<td>Adults</td>
<td>17</td>
<td>41</td>
<td>41%</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>48</td>
<td>35%</td>
</tr>
</tbody>
</table>

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TPN Production

Baxa EM2400

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Amino Acid Sterilization by Filtration

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Potential Sources of Contamination

- Cleaning of mixing equipment with tap water may have been a source of introduction of *Serratia marcescens* in the TPN compounding process.
- Suboptimal practices in filter-sterilization of the amino acid solution may have led to contamination of the TPN compounding process.
  - According to USP 797 Guidelines, the filter should not be changed during the filtration process.
  - Amino acids should be tested and stored at appropriate conditions as per USP 797 Guidelines.
- Regular compliance with sterility testing as per USP 797 guidelines may have been lacking.
- Regular compliance with manufacturer instructions for tubing used with the TPN compounding machine may have been lacking.
  - Tubing should be discarded and changed every 24-hours.

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Serratia marcescens PFGE

Note: Lane 2 is TPN. All others are patient specimens.

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Human and Environmental Samples

*Serratia marcescens*, PFGE Match

- Tap water spigot
- Amino Acid powder from Meds IV
- Impellor
- Carboy mixing container
- Amino Acid mixture from Meds IV
- 2 TPN bags from Meds IV
- 2 TPN bags from patients
- 1 TPN isolate from patient
- 14 patient isolates

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