PFGE Cluster Survey
Presented by: Nupur A. Sashti, TN
FoodNet Outbreak Working Group

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Session V: Stories from the States
Wednesday, August 29th 2012
Study Overview

- **Purpose:** To determine what epidemiological factors encourage successful investigations of PFGE clusters
  - “When do we start really investigating clusters, to what depth & why”

- **8 FoodNet States Involved:** CO, CT, GA, MD, MN, NM, OR, TN

- **Length of time:** Data were collected for 3 years (2009-2011)

- **Methods:**
  - A cluster was defined as 2 or more isolates that matched by PFGE and had isolation dates within 30 days
  - Data was collected for Salmonella and E.coli only
  - For each cluster, a 2 page survey was filled out.
Identifiers

Pathogen
OB Name
Outbreak ID
XbaI pattern
BlnI pattern

What factors encouraged investigation?

- Uncommon serotype
- Uncommon pattern
- Geo/temporal clustering
- Demographic clustering
- Serotype/pattern spike
- OOS matches with a possible source
- Query from another state
- Query from CDC
- Case hx of high risk food exposure
- Case hx suggested an outbreak
- Routine f/u of all matches
- Match to possible food source
- Hunch that it was worthwhile
- Other (specify in notes)
- Don’t recall
- Not applicable

What discouraged investigation?

- Common serotype
- Common pattern
- Cases too spread out in time
- Cases too spread out in space
- No spike of serotype/pattern
- Too few cases locally
- Don’t normally investigate
- Not enough time or staff
- Subtype heterogeneity
- Long subtyping delays
- Unable to contact cases/bad hx
- Noticed too late
- Forgot about it
- Other states/CDC uninterested
- Cases stopped coming in
- We tried without success
- Other (specify in notes)
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Reference Dates

Specimen collection
PHL receipt
PFGE notice to Epi

Cluster Case Counts

in state
OOS
Start of investigation
Source identified
End of investigation

did not include OOS case
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Earliest notification or discussion with state lab</td>
</tr>
<tr>
<td></td>
<td>First limited/routine questionnaire</td>
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<tr>
<td></td>
<td>Gathered/reviewed interview questionnaires</td>
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<tr>
<td></td>
<td>First notification or discussion with other states</td>
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<tr>
<td></td>
<td>First notification or discussion with CDC</td>
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<tr>
<td></td>
<td>First active query to PulseNet</td>
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<tr>
<td></td>
<td>First posting to FBO listserv or EpiX</td>
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<td></td>
<td>Special active surveillance activities in state</td>
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<td></td>
<td>First in-depth hypothesis-generating interviews</td>
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<td></td>
<td>Initiated first analytic study</td>
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<tr>
<td></td>
<td>First environmental investigation(s)</td>
</tr>
</tbody>
</table>

*Indicate if not applicable, an approximation only, or if the date has been lost

**Was this a common-source outbreak?**
- Definitely yes
- Likely
- Don’t know
- Unlikely
- Definitely not

**What was the overall outcome?**
- Specific vehicle identified
- Specific venue/source
- Travel to same specific region
- General idea but no specifics
- No common source identified
- Evidence suggests no outbreak

**Primary mode(s) of transmission**
- Foodborne (confirmed)
- Foodborne (presumptively)
- Replicate contact
- Other animal contact
- Person-to-person
- Other

**NORS Reporting**

Reported: Yes, No, or Question mark?

NORS ID#
Overview of Data

Total clusters: 1008 (98 had missing NORS status)

Total clusters used in analysis: 910

<table>
<thead>
<tr>
<th>Pathogen</th>
<th># of Clusters</th>
<th># of Clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>822 (90%)</td>
<td>Yes</td>
</tr>
<tr>
<td>E. coli</td>
<td>88 (10%)</td>
<td>No</td>
</tr>
</tbody>
</table>
The FREQ Procedure

Table of SUBTYPE by STATE

<table>
<thead>
<tr>
<th>SUBTYPE(Serotype or Serogroup)</th>
<th>STATE(State postal code)</th>
<th>Frequency</th>
<th>Percent</th>
<th>Row Pct</th>
<th>Col Pct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO</td>
<td>1</td>
<td>0.10</td>
<td>100.00</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>CT</td>
<td>0</td>
<td>0.00</td>
<td>00.00</td>
<td>0.00</td>
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<tr>
<td></td>
<td>GA</td>
<td>0</td>
<td>0.00</td>
<td>00.00</td>
<td>0.00</td>
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<tr>
<td></td>
<td>MD</td>
<td>0</td>
<td>0.00</td>
<td>00.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>68</td>
<td>6.77</td>
<td>12.24</td>
<td>8.36</td>
</tr>
</tbody>
</table>

(Continued)
Characteristics associated with investigations reported to NORS

<table>
<thead>
<tr>
<th>What factors encouraged investigation?</th>
<th></th>
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<tbody>
<tr>
<td>□ Uncommon serotype</td>
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</tr>
<tr>
<td>□ Not applicable</td>
<td></td>
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</tbody>
</table>

<table>
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<tr>
<th>Characteristics</th>
<th>Odds Ratio (95% CI)</th>
</tr>
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<tr>
<td>Case hx suggested an outbreak</td>
<td>19.22 (9.4–39.33)</td>
</tr>
<tr>
<td>Hunch that it was worthwhile</td>
<td>11.71 (5.31–25.76)</td>
</tr>
<tr>
<td>Case hx of high risk food exposure</td>
<td>7.59 (2.59–22.20)</td>
</tr>
<tr>
<td>Serotype/pattern spike</td>
<td>5.33 (3.3–8.63)</td>
</tr>
<tr>
<td>OOS matches with possible confirmed source</td>
<td>5.01 (2.99–8.39)</td>
</tr>
<tr>
<td>Match to possible food source</td>
<td>4.60 (1.88–11.28)</td>
</tr>
<tr>
<td>Query from another state</td>
<td>3.23 (1.73–6.02)</td>
</tr>
<tr>
<td>Geographic and/or temporal clustering</td>
<td>2.80 (1.93–4.01)</td>
</tr>
</tbody>
</table>
Characteristics associated with investigations that were not reported to NORS

**What discouraged investigation?**

- Common serotype
- Common pattern
- Cases too spread out in time
- Cases too spread out in space
- No spike of serotype/pattern
- Too few cases locally
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- We tried without success

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case too spread out in space</td>
<td>0.04 (0.005–0.27)</td>
</tr>
<tr>
<td>Too few cases locally</td>
<td>0.17 (0.09–0.32)</td>
</tr>
<tr>
<td>Cases too spread out in time</td>
<td>0.23 (0.09–0.57)</td>
</tr>
<tr>
<td>Noticed to late</td>
<td>0.36 (0.18–0.74)</td>
</tr>
<tr>
<td>Common Serotype</td>
<td>0.43 (0.24–0.76)</td>
</tr>
</tbody>
</table>
Investigation Timeline:
Days from cluster recognition to investigation activity

-3
0 1 2 3 4 11

1st recognized cluster

EpiX posting

Routine Questionnaire

Gathered Questionnaires & PulseNet Query

Discussed w/ SPHL

Discussed cluster with other states

Analytical study
Looking at the number of in-state cases reported only
*Cluster size: at end of investigation
Conclusions:

• Beyond lab data, there are key epidemiological factors that are associated with investigations reported to NORS, such as:
  • Geographic clustering
  • Number of cases per cluster
  • Correspondence with other states and public health agencies
  • Inclination that cluster is worthwhile
Limitations:

• It would have been helpful to know if each cluster investigation was state led or CDC led?

• Many answers were subjective in nature
Questions??