Evaluation of *Salmonella* Cluster Detection and Investigations in NYC

HAENA WAECHTER, MPH
NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE
8TH ANNUAL OUTBREAKNET CONFERENCE
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Population is 8 million
- 43% of NY State’s population
- 321 square miles

Significant burden of illness due to foodborne pathogens each year
- Approximately 1200 salmonellosis, 80 STEC, and 40 listeriosis cases

26,000 food establishments
13,000 food retail establishments
- Supermarkets, delis “bodegas”, big box wholesale stores
Salmonella Surveillance in NYC Prior to FoodCORE Funding

- **Epidemiologic activities**
  - Interviewed salmonellosis cases only if:
    - Case-patient was identified as part of a cluster
    - Case-patient was identified as a daycare attendee/worker, healthcare worker, foodhandler

- **Public Health Laboratory activities**
  - Performed serotyping on 100% of isolates
  - Performed pulsed-field gel electrophoresis (PFGE) typing on ~ 40% of isolates
Enhanced *Salmonella* Surveillance in NYC Following FoodCORE Funding

- **Epidemiologic activities**
  - Hired a team of 6 student interns
  - September 1, 2009 began performing hypothesis generating interviews of all salmonellosis cases

- **Public Health Laboratory activities**
  - Hired 2 technologists
  - April 2011 began PFGE-typing all *Salmonella* isolates (except S. Enteritidis)
  - January 2012 began PFGE-typing all *Salmonella* isolates
  - March 2012 began preparing a weekly cluster report
Cluster Detection in NYC

- **Weekly *Salmonella* serotype analysis**
  - Looks at serotype specific increases citywide by comparing:
    - 4 week (previous, comparable, & subsequent) period from the past 5 years
    - Serotype signals if increase is > 2 SD above the mean

- **PulseNet Laboratory – PFGE matched clusters**
  - Searches for local or multi-state clusters of salmonellosis when:
    - Local clusters identified by PFGE clustering in time
    - NYC isolate matches a multi-state cluster

- **CDC or department of health outside NYC**
Objectives and Methods

- To evaluate improvements in cluster detection and investigations following FoodCORE funding

- Compared *Salmonella* clusters identified during a 12 month period prior to FoodCORE funding (pre-enhanced surveillance) to clusters identified during a 12 month period following FoodCORE funding (enhanced surveillance)
Methods

- Pre-enhanced surveillance:
  - September 1, 2008 – August 31, 2009

- Enhanced surveillance:
  - April 1, 2011 – March 31, 2012

- Salmonellosis clusters:
  - 2 or more cases with indistinguishable PFGE occurring within 60 days
  - Cases with indistinguishable PFGE to a multi-state cluster and a CDC outbreak code was designated
  - Cases associated with a marked increase of a specific serotype through weekly serotype analysis
Methods

• Confirmed vehicle source:
  ○ Clusters of infection where *Salmonella* has either been cultured from the vehicle or the vehicle has been statistically implicated in an analytic study.*

• Suspect vehicle source:
  ○ Clusters of infection where investigational and/or laboratory data indicate a likely source/vehicle of infection without confirmation: vehicle is a known risk factor, established errors in food preparation, or reported consumption by a high proportion of cluster-associated cases. *

*Definitions based on FoodCORE metrics: [http://www.cdc.gov/foodcore/ssl-metrics.html#definitions](http://www.cdc.gov/foodcore/ssl-metrics.html#definitions)
### Identified *Salmonella* Clusters and Investigations

<table>
<thead>
<tr>
<th></th>
<th>Pre-enhanced Surveillance</th>
<th>Enhanced Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clusters identified N</td>
<td>38</td>
<td>54</td>
</tr>
<tr>
<td>Cluster investigations N (%)</td>
<td>9 (24%)</td>
<td>54 (100%)</td>
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</tbody>
</table>
First to Report *Salmonella* Cluster to the NYC DOHMH

**Weekly Serotype Analysis**
- Pre-enhanced Surveillance: 0
- Enhanced Surveillance: 18

**NYC PulseNet Lab**
- Pre-enhanced Surveillance: 2
- Enhanced Surveillance: 16

**CDC/Other Health Department**
- Pre-enhanced Surveillance: 2
- Enhanced Surveillance: 20

**Clusters (N)**
- Pre-enhanced Surveillance: 2
- Enhanced Surveillance: 36

Legend:
- Pre-enhanced Surveillance
- Enhanced Surveillance
### Salmonella Cluster-Associated Cases and Case Investigations

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<td>Identified clusters N</td>
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<tr>
<td>Cases associated with clusters N</td>
<td>38</td>
<td>54</td>
</tr>
<tr>
<td>Interviews of cluster associated cases N (%)</td>
<td>249 (24%)</td>
<td>307 (83%)</td>
</tr>
<tr>
<td>Interviews with complete food history N (%)</td>
<td>9/61 (15%)</td>
<td>159/255 (62%)</td>
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<tr>
<td>Median days from case report to interview date</td>
<td>18.5 Days</td>
<td>2 Days</td>
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## Salmonella Clusters with a Confirmed/Suspect Source Identified

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<td>N</td>
<td>38</td>
<td>54</td>
</tr>
<tr>
<td>Clusters with a confirmed/suspect source identified</td>
<td>0</td>
<td>10 (19%)</td>
</tr>
<tr>
<td>N (%)</td>
<td></td>
<td></td>
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<tr>
<td>Clusters where a recall was initiated</td>
<td>0</td>
<td>6 (11%)</td>
</tr>
<tr>
<td>N (%)</td>
<td></td>
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Conclusion

- **Enhanced surveillance**
  - Number of clusters identified increased and a greater number were identified through PFGE subtyping
  - Cluster-associated cases
    - More interviews
    - Interviews were more timely and complete
  - A greater proportion of clusters had a confirmed/suspect source identified and had a recall initiated
Limitations

- Cluster data prior to 2010 were retrospectively entered into a database
- Multiple people managing clusters in the database which can affect data quality
Future

- Detect clusters faster
  - Reduce *Salmonella* serotyping turn-around times
  - Reduce PFGE turn-around times

- Refine cluster definitions
  - Create methods for identifying PFGE patterns that are above baseline in a particular time period
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