International Outbreak of *Shigella sonnei* Among Airline Passengers—Honolulu, Hawaii, 2004

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CDC/Office of Workforce and Career Development
The Outbreak

• Sept 2, 2004 - Japan calls Hawaii
  – Seven psgrs from Honolulu with *Shigella sonnei*
  – Airline A, Honolulu to Japan, Aug 23 and 24

• More cases
  – Airline A, Honolulu to Minneapolis, Aug 22
  – Airline B, Honolulu to Sydney, Aug 23

• Airlines A and B served by same caterer
Shigella sonnei

- Fecal-oral transmission
- Causes diarrhea, fever, nausea, vomiting and cramps
- Incubation 12 to 96 hours
- Illness lasts 4 to 7 days
- Usually self-limited
- Low infectious dose

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Objectives

• Determine extent of outbreak
• Determine source of contamination
• Prevent future outbreaks
Case Definitions

- **Confirmed**
  - Departed Honolulu by air Aug 22-24
  - Reported diarrhea
  - Stool culture (+) for *S. sonnei*

- **Probable**
  - Departed Honolulu by air, flight with confirmed case
  - Reported diarrhea
Case-finding and Surveys

• Case finding – Epi X and PulseNet

• Five flights surveyed (same caterer)
  – Three with confirmed cases
  – Two with no known cases
Environmental Investigation

- Site visits to caterer
- Employee interviews
- Review of ill-employee log
- Traceback of implicated food item
Laboratory Investigation

- Case patients
  - Stool samples for culture
  - Pulsed-field gel electrophoresis (PFGE)

- Caterer employees - stool samples for culture
Extent of Outbreak

- 12 flights with 45 confirmed cases
- Departed HNL August 22-24
- 3 different airlines (Airlines A, B, and C)
- Served by same caterer
Preliminary results
# Attack Rate of Diarrhea

<table>
<thead>
<tr>
<th>Flight</th>
<th>Total No.</th>
<th>No. ill</th>
<th>Attack Rate (%)</th>
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<tbody>
<tr>
<td>Airline A</td>
<td>204</td>
<td>110</td>
<td>54%</td>
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<tr>
<td>Airline B</td>
<td>67</td>
<td>8</td>
<td>12%</td>
</tr>
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<td>Airline C</td>
<td>63</td>
<td>20</td>
<td>32%</td>
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*Preliminary results*
Onset of Symptoms by Date for Cases of *S. sonnei* Associated with Air Travel from HNL August 22-24, 2005

Preliminary results

- **Confirmed**  n= 45
- **Probable**  n=112
## Risk Ratios (RR) by Food Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Ate Food Item</th>
<th></th>
<th>Did Not</th>
<th></th>
<th>RR</th>
<th>(95% CI)</th>
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<tr>
<td></td>
<td>Ill/Total</td>
<td>Attack Rate</td>
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<tr>
<td>Chicken A</td>
<td>73 / 112</td>
<td>65%</td>
<td>35 / 83</td>
<td>42%</td>
<td>1.5</td>
<td>(1.2–2.1)</td>
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<tr>
<td>Tortellini</td>
<td>40 / 76</td>
<td>53%</td>
<td>67 / 116</td>
<td>58%</td>
<td>0.9</td>
<td>(0.7–1.2)</td>
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<tr>
<td>Cookie</td>
<td>74 / 124</td>
<td>60%</td>
<td>33 / 66</td>
<td>50%</td>
<td>1.2</td>
<td>(0.9–1.6)</td>
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<tr>
<td>Chicken B</td>
<td>2 / 25</td>
<td>8%</td>
<td>5 / 35</td>
<td>14%</td>
<td>0.6</td>
<td>(0.1–2.7)</td>
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<tr>
<td>Spaghetti</td>
<td>4 / 25</td>
<td>16%</td>
<td>3 / 33</td>
<td>9%</td>
<td>1.8</td>
<td>(0.4–7.2)</td>
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<td>Chicken C</td>
<td>9 / 24</td>
<td>38%</td>
<td>9 / 27</td>
<td>33%</td>
<td>1.1</td>
<td>(0.5–2.4)</td>
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<tr>
<td>Lemon bar</td>
<td>15 / 27</td>
<td>55%</td>
<td>5 / 28</td>
<td>18%</td>
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<td>III/Total</td>
<td>Attack Rate</td>
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<tr>
<td>Salad A</td>
<td>104 / 164</td>
<td>63%</td>
<td>5 / 33</td>
</tr>
<tr>
<td>Salad B</td>
<td>7 / 42</td>
<td>17%</td>
<td>1 / 21</td>
</tr>
<tr>
<td>Salad C</td>
<td>20 / 41</td>
<td>49%</td>
<td>0 / 14</td>
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*Preliminary results*
Raw Carrot?

• Salad associated with illness
• **Raw carrot** common to all flights
• Vehicle for *S. sonnei*?

• No reported cases on Airlines D and E
• No raw carrot served on Airlines D and E

*Preliminary results*
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<td>3</td>
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*Preliminary results*
Environmental Investigation

- Caterer site visit
- Ill-employee log
- Employee interviews
- Carrot traceback
Caterer Site Visits

- 2,700 meals for flights with confirmed cases of *S. sonnei*
- 11,555 airline meals dispensed during the outbreak contained raw carrot
- Food hygiene deficiencies identified

*Preliminary results*
Vegetable Storage Bins
Chlorine Vegetable Sanitizer
Environmental Investigation

- Caterer site visit
- Ill-employee log
- Employee interviews
- Carrot traceback
Environmental Investigation

- Caterer site visit
- Ill-employee log
- Employee interviews
- Carrot traceback – 900 bags

Preliminary results
Laboratory Investigation

• Case patients
  – 45 cases with (+) S. sonnei stool culture
  – 39 with closely-related PFGE pattern

• 56 employees of caterer all (-) for S. sonnei

Preliminary results
Discussion

• Recognized via international cooperation
• Extent likely greater than identified
  – Attack rate 12 - 54%
  – 2,700 meals on 12 flights, estimate 300 - 1,500 persons ill
  – 11,555 meals with raw carrot, estimate 1,400 - 6,200 possible cases

Preliminary results
Conclusions

• Vehicle of contamination = raw carrot

• Introduction of contamination
  – At facility or prior to arrival?
  – Accidental or intentional?

• Highlights rapid global spread of illness from point source contamination at major airline hub

Preliminary results
Limitations

- Case finding likely incomplete
- Recall bias
- Stool specimen limitations
- Carrot traceback incomplete

Preliminary results
Recommendations

• Correct food hygiene deficiencies at caterer
• Cultivate relations with domestic and international partners to promote rapid outbreak identification
• Promote airline food security
Acknowledgments

• Hawaii Department of Health
  – Paul V. Effler
  – Sarah Y. Park
  – Cathy C. Chow
  – Michele Nakata
  – Dana Tamashiro
  – Precilia Calimlim
  – Howard He
  – Myra Ching-Lee
  – Becky Kanenaka
  – Many others

• CDC
  – Eric Mintz
  – Pavani Kalluri
  – Romulo Colindres
  – Janet Blair
  – Desmond Jennings

• Japanese Ministry of Health
  – Paul Kitsutani

• Minnesota Department of Health
  – Stephanie Wedel
  – Kirk Smith
  – Dave Boxrud

• Australian Ministry of Health