CDC’s National Environmental Assessment Reporting System (NEARS): Informing Foodborne Illness Outbreak Investigation and Prevention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of CDC or the Agency for Toxic Substances and Disease Registry.
Host-agent-environment model of disease transmission
Location of U.S. outbreaks

61% restaurants
EH outbreak investigation activities

- Interviewing kitchen managers and food workers
- Observing how restaurants prepare food (for example, food temperatures)
- Reviewing or collecting records (for example, records of food cooking temperatures, traceback records)
- Sampling for pathogens in the restaurant kitchen
Outbreak contributing factors

Contamination

Proliferation

Survival
50% of outbreaks have identified contributing factor.
Outbreak environmental antecedents

- People
- Processes
- Equipment
- Food
- Economics

Contributing factors
Outbreak example

Restaurant A

Dinner rolls

36 cases of *Salmonella* Enteritidis
Outbreak example

Same set of brushes

Raw chicken

Cooked rolls
Illness/outbreak prevention
National Environmental Assessment Reporting System (NEARS)
NEARS 2014-2016 data

- Outbreak characteristics
- Outbreak establishment characteristics
- Outbreak investigation characteristics
NEARS outbreaks

- 212 confirmed outbreaks
- 99 suspected outbreaks
- 93 unknown agent outbreaks
NEARS outbreaks

- Norovirus: 61%
- Salmonella: 16%
- Clostridium perfringens: 6%
Contributing factors to NEARS outbreaks

- Bare-hand contact by infectious food handler: 28%
- Other mode of contamination by infectious food handler: 23%
- Glove-hand contact by infectious food handler: 16%
- Cross-contamination of ingredients: 11%
- Insufficient time or temperature during cooking: 11%
NEARS outbreak establishments

- 73% independently owned
- 87% complex food preparation
- 55% serve <200 meals daily
Policy to restrict or exclude ill workers

<table>
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<tr>
<th>Policy Status</th>
<th>No policy</th>
<th>Non-written policy</th>
<th>Written policy</th>
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<tbody>
<tr>
<td>Percentage</td>
<td>14%</td>
<td>39%</td>
<td>47%</td>
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Policy for workers to tell managers when they are ill

<table>
<thead>
<tr>
<th>Policy Status</th>
<th>No policy</th>
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<th>Written policy</th>
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</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>8%</td>
<td>36%</td>
<td>56%</td>
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</table>
Policy requiring disposable glove use

- 62% Non-written policy
- 28% Written policy
- 10% No policy
NEARS outbreak investigations

- 25% 2 visits
- 50% 1 visit
- 25% >2 visits

- 23% 1-2 days
- 8% >3 days
- 69% Same day
Recap

NEARS collects data from the environmental health component of outbreak investigations to:

✓ Emphasize environmental causes of outbreaks
✓ Target prevention efforts

These data can be analyzed to identify and understand:

• Establishment types vulnerable to outbreaks
• Contributing factors to outbreaks
• Gaps in establishment policies and practices
• Gaps in investigation practices
Future research

- What restaurant characteristics are associated with outbreak occurrence?
  - Compare outbreak to non-outbreak restaurants

- What restaurant characteristics are associated with outbreak size?
  - Compare small to large outbreaks

- What restaurant characteristics are associated with outbreak type (bacterial vs. viral)?
  - Compare bacterial to viral outbreaks
NEARS
- General info: www.cdc.gov/nceh/nears/index.htm
- Recent pub: www.cdc.gov/nceh/ehs/nears/publications.htm

CDC’s Environmental Assessment Training
Thank you