New Tools for Local and State Food Safety Programs

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What information do you need about Foodborne Illness Outbreaks?

- Would more information about the characteristics of food establishments involved in foodborne outbreaks be helpful?
- Could you use science-based information to help inform your inspection prioritization?
- Would a characterization of your program involvement in investigating foodborne outbreaks be helpful?
- Would more details than we now have about outbreak food vehicles be helpful?
- Do you think knowing why outbreaks appear to occur would be helpful?
Overview of Presentation

- The Problem
- Background to Address Problem
- Environmental Assessment
- Training
- Surveillance
The Problem

- Each year roughly 1 in 6 Americans (or 48 million people) get sick, 128,000 are hospitalized, and 3,000 die from foodborne diseases.*

- Acute foodborne illnesses cost the U.S. an estimated $152 billion each year in healthcare, workplace, and other economic losses.

- Half of all foodborne illness outbreaks are associated with restaurants/delis.

*http://www.cdc.gov/foodborneburden/estimates-overview.html
The Problem

- Inspectors (environmental health specialists) need training on conducting environmental assessments during foodborne outbreak investigations.*

- Limited contributing factor information and no information on environmental antecedents are currently reported to CDC's existing National Outbreak Reporting System (NORS).

Check out more information on our website:
http://www.cdc.gov/nceh/ehs/EHSNet/index.htm
Food Safety Work

Environmental Health Specialists Network (EHS-Net)

Practice Based Research
Restaurant Food Safety*

Surveillance
National Voluntary Environmental Assessment Information System (NVEAIS)

Improve understanding of environmental causes of foodborne illness outbreaks

Improve environmental public health practice
- Effective prevention and interventions

Reduction in foodborne illness

*http://www.cdc.gov/nceh/ehs/EHSNet/foodsafety.htm
EHS-Net Participants, 2000–2010

- CA
- CO
- CT
- GA
- IA
- MN
- NY
- OR
- RI
- TN
Check out more information on our website:
http://www.cdc.gov/nceh/ehs/EHSNet/index.htm
Environmental Assessments

- **Past** – Foodborne Outbreak

- **Present** – Routine Inspections
  - Information representing current conditions
  - What can be observed or measured at the time of the inspection
  - What violations of regulatory requirements are cited

- **Future** – Plan Review or Hazard Analysis and Critical Control Points (HACCP) Plan Development
  - Based on expectations in the future
  - Identifies potential food safety problems
  - Identifies potential critical control points and limits for future use
Foodborne Illness Outbreak Environmental Assessments

- Describes how the environment contributes to the introduction and or transmission of agents that cause illness

- Objectives of the assessment
  - Identify contributing factors
  - Identify environmental antecedents
  - Generate recommendations for informed interventions
### Environmental Causes of Foodborne Illness Outbreaks

<table>
<thead>
<tr>
<th>Contributing factors</th>
<th>Environmental antecedents</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Factors that caused the outbreak</td>
<td>• Factors that led to the contributing factors</td>
</tr>
<tr>
<td>• <em>How</em> the outbreak occurred</td>
<td>• <em>Why</em> the outbreak occurred</td>
</tr>
</tbody>
</table>
Environmental Causes of Foodborne Illness Outbreaks

Outbreak
- *E. coli*
- Outbreak caused by salads eaten at Restaurant A

Contributing factor
- Cross contamination
- Worker used same utensils on raw ground beef and salads

Environmental antecedents
- Worker in a hurry
- Worker had not been trained on avoiding cross contamination
Check out more information on our website:
http://www.cdc.gov/nceh/ehs/EHSNet/index.htm
e-Learning on Environmental Assessments of Foodborne Illness Outbreaks

e-Learning

- Uses cutting-edge e-learning technologies to develop competency with environmental assessments of foodborne illness outbreaks and deliver free training over the Internet to enhance global food safety.

Since release, >900 users have registered & begun the training.
User Profile: All Users

- 86% live in the United States.
  - 48 states and the District of Columbia.
- 14% live in 42 other countries
User Profile: Government

- 58% (721 of 1233 registered users) employed by government agencies
  - United States: 641 users.
  - International: 80 users.
User Profile: Difference in Pretest and Mastery Test Scores for All Users

Pretest (average of 701 users) vs. Mastery Test (average of 193 users)
Check out more information on our website: http://www.cdc.gov/nceh/ehs/EHSNet/index.htm

SURVEILLANCE
National Voluntary Environmental Assessment Information System (NVEAIS)
Using Environmental Assessments to Investigate Disease Outbreaks

Medium (food, water, wastewater, air, etc.) → System → Prevention unsuccessful → Exposure → Outbreak

Health Outcomes:
- Increasing severity of illness
- No illness

prevention successful → No illness
Using Environmental Assessments to Investigate Disease Outbreaks

Medium
(food, water, wastewater, air, etc.)

Process, Food Properties, Equipment, People, Economics

Environmental Assessment

Contributing Factors and Environmental Antecedents

NVEAIS

System

Safety measures successful

No illness

Safety measures unsuccessful

Exposure

Outbreak Investigation

Epidemiological, Laboratory

Host and Agent

NORS

Health Outcomes

Severity of illness and public health’s ability to detect will vary

Outbreak
Data reported to NVEAIS by local and state food safety programs will be used to:

- Characterize food vehicles and monitor trends.
- Identify and monitor contributing factors and environmental antecedents.
- Generate hypotheses.
- Guide planning, implementation, and evaluation of food safety programs.
Data Collection Instrument

- Part 1 – General characterization of outbreak
- Part 2 – Establishment description
- Part 3 – Manager interview
- Part 4 – Establishment observation
- Part 5 – Suspected/confirmed food
- Part 6 – Sampling
- Part 7 – Contributing factors
Preliminary Results, 2009-2013 EHS-Net Pilot*

- 320 outbreaks were reported
- Averaged 64 outbreaks reported each year
- 84% of outbreaks involved restaurants
  - Other locations included a caterer, bakery and monastery
- Contributing factors reported in 70% of outbreaks

*All data in this and the remainder of presentation represents examples of the type of information NVEAIS can provide
Identified Food Vehicle of Outbreak

- Beef: 11
- Beverages/Ice: 6
- Crustaceans: 3
- Dairy: 1
- Eggs: 3
- Fish: 13
- Fruits/Nuts: 7
- Game: 1
- Grains/Beans: 7
- Leafy greens: 7
- Mollusks: 6
- Pork: 4
- Poultry: 14
- Root vegetables: 5
- Vegetables from a vine or stalk: 6
- Undetermined: 6
- Multi-ingredient: 12

Frequency
Number of Meals Served Daily

- Less than 100: 15%
- 100 to 199: 20%
- 200 to 299: 22%
- 300 to 399: 12%
- 400 to 499: 8%
- 500 to 599: 5%
- 600 to 699: 6%
- 700 to 799: 4%
- 800 to 899: 3%
- 900 to 999: 1%
- 1,000 to 1,999: 6%
- 2,000+: 4%
Ratio of Food Workers to Manager

<table>
<thead>
<tr>
<th>Ratio of Food Workers to Manager</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1:1</td>
<td>2%</td>
</tr>
<tr>
<td>1:1 - 2:1</td>
<td>12%</td>
</tr>
<tr>
<td>2:1 - 3:1</td>
<td>17%</td>
</tr>
<tr>
<td>3:1 - 4:1</td>
<td>16%</td>
</tr>
<tr>
<td>4:1 - 5:1</td>
<td>10%</td>
</tr>
<tr>
<td>5:1 - 6:1</td>
<td>10%</td>
</tr>
<tr>
<td>6:1 - 7:1</td>
<td>8%</td>
</tr>
<tr>
<td>7:1 and greater</td>
<td>25%</td>
</tr>
</tbody>
</table>
Number of Days Between the Date the Establishment Was Identified for an Environmental Assessment and the Day of First Contact with Establishment Management

- 0 Days: 73%
- 1 Day: 14%
- 2 Days: 5%
- 3 Days: 3%
- 4 Days: 1%
- 5+ Days: 4%
Number of Visits to the Establishment to Complete the Environmental Assessment

- 1 Visit (45%)
- 2 Visits (34%)
- 3 Visits (12%)
- 4 Visits (4%)
- 5+ Visits (5%)
Quality of Communication

- Good: 46%
- Very Good: 45%
- Fair: 4%
- Poor: 1%
- Very Poor: 1%
- No communication: 3%
Currently Registered

- California Department of Health
- Connecticut Department of Health
- Davis County Health Department (Utah)
- Minnesota Department of Health
- New York City Department of Health and Mental Hygiene
- New York State Health Department
- North Carolina Department of Health and Human Services
- Tennessee Department of Health
- Wisconsin Department of Health
NVEAIS Registration

- Please consider participating in NVEAIS.

- NVEAIS was specifically designed to answer a variety of environmental questions important to food safety programs and the prevention of foodborne illness and outbreaks.

Register at

http://www.cdc.gov/nceh/ehs/NVEAIS/participation.htm
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Thank you

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov

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.