Modernizing Outbreak Detection Through Teamwork

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The findings and conclusions in this presentation are those of the presenters and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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Most outbreaks identified via citizen report

Source of Report

- Citizen Report
- Medical Professional
- PFGE
- Surveillance
- CDC/Other State Inquiry
Where do Outbreaks Occur?

- Of 4,924 foodborne outbreaks in 2006-2010:
  - 84 or ~2% were multistate ones
  - 186 or ~4% were multicounty within a state
  - The rest or 94% were single county

- Conclusion: All public health is local
Most clusters identified via PulseNet
Significance of Multistate Outbreaks

- While only ~2% of 4,924 reported foodborne outbreaks in 2006–2010 were multistate, they contributed:
  - ~7% of outbreak illnesses
  - ~31% of outbreak hospitalizations
  - ~34% of outbreak deaths
Human Specimen Isolates Uploaded to PulseNet USA and Identified Clusters, 1996-2011†

† Data are preliminary and subject to change
* data type information may not be complete for these years
15 New Food Vehicles Identified in US Multistate Outbreaks since 2006

- bagged spinach
- carrot juice
- peanut butter
- broccoli powder on a snack food
- dog food
- pot pies/frozen meals
- canned chili sauce
- hot peppers
- pepper
- raw cookie dough
- hazelnuts
- whole fresh papayas
- pine nuts
- kosher broiled chicken livers
- scraped tuna product

Data Sources: Foodborne Disease Outbreak Surveillance System, CDC Web postings
Impact of Multistate Outbreaks

- Often reveal important gaps in food safety systems
- Major implications for food safety policy in government and industry
- Many require national-level response
- Conclusion- Public health is local, national and international
Types of Evidence for Hypothesis Generation and Testing
Exposure Information

- **Case exposure data**
  - Interviews (structured and open ended)
  - Loyalty card, credit card and receipt data
  - Restaurant recipe data

- **Comparison data**
  - Historical survey (FoodNet Population Survey)
  - Historical case data (Case-Case Study)
  - Concurrent control data (Case-Control and Cohort Study)

- **Environmental Assessment**
  - Cross-contamination
  - Pathogen proliferation
  - Ill food handler
Types of Evidence for Hypothesis Generation and Testing

Product Distribution Information

- Common items among places of exposure
  - Brands and lots among associated food service facilities
  - Market share

- Trace back and trace forward
  - Source convergence for suspect item
  - Distribution to case locations

- Industry food distribution information
  - Distribution patterns matching time and location of cases
Types of Evidence for Hypothesis Generation and Testing
Microbiologic Information

- **Targeted food testing**
  - Case refrigerators
  - Specific lots, times of production
  - Retained samples

- **Targeted environmental testing**
  - Food contact surfaces
  - Built structures (floors, drains, etc)
  - Water

- **Pathogen characterization**
  - Virulence factors
  - Antimicrobial resistance
Team Work in Outbreak Detection and Investigation

- Need to find opportunities to pursue each type of evidence
- To be collected concurrently if possible, for the fastest results
- To bring at least two types of evidence to bear in the implication of a food vehicle
  Which
- Requires close team work and communication

All levels- Across Disciplines -Across Departments
Modernizing Methods

- Explore DNA sequence technology
- Determine data standards
- Identify new data sources
- Develop tools to better manage and share data
- Implement performance measurement
Thank you

Get to know your colleagues
Learn from them
Have fun!

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