Foodborne Outbreaks in the News

Matthew Wise, MPH, PhD

Outbreak Response and Prevention Branch
Division of Foodborne, Waterborne, and Environmental Diseases

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Why Did 2018 Seem So Bad?

- Large number of outbreaks were solved in time to warn the public
  - Continued investment in state/local investigation capacity
  - Implementation of novel laboratory methods like whole genome sequencing
  - Year-to-year variation in finding and solving outbreaks (2017 was slow)

- Several of the outbreaks were large/severe and some resulted in broad consumer and industry advisories

- New communications tools developed for new types of investigations
Outbreak Investigation Process
Foodborne Diseases in the United States: A Changing Landscape

Disseminated Foodborne Outbreak Linked to a Commercially Distributed Product
Detecting Disseminated Outbreaks with PulseNet

- Subtyping enteric bacteria is essential to identifying highly disseminated outbreaks
- PulseNet laboratory network established in 1996
  - Over 80 participating laboratories in the US
  - 60,000+ isolates subtyped annually
- Bacteria collected from ill people undergo DNA “fingerprinting” using pulse-field gel electrophoresis (PFGE) and whole genome sequencing (WGS)

Bacteria with the same “DNA fingerprint” are more likely to come from a common source than bacteria with different fingerprints

The more specific the fingerprint, the higher the likelihood the bacteria come from a common source
Detecting Outbreaks with PulseNet

- PFGE/WGS data transmitted to CDC and monitored for temporal clusters
- PulseNet notifies epidemiologists to investigate clusters
- 2-4 weeks from when someone eats a contaminated food to being confirmed as part of a multistate outbreak
Generating Hypotheses About the Source

- Demographics of ill people in the outbreak (age, sex, race/ethnicity)
- Geographic distribution
- Shape of the epidemic curve
  - Rapid ascent and descent?
  - Slow ascent and prolonged?
- Pathogen type and history
- Food exposure frequencies from initial interviews
Testing Hypotheses: Epidemiologic Evidence

Patterns in where and when people got sick, and past outbreaks caused by the same germ

Interviews with sick people to look for foods or other exposures occurring more often than expected

Discovery of clusters of unrelated sick people who ate at the same restaurant, shopped at the same grocery store, or attended the same event
Testing Hypotheses: Traceback Evidence

A common point of contamination in the distribution chain from farm to fork, identified by reviewing records collected from restaurants or stores where sick people ate or shopped.

Inspections in food production facilities, on farms, and in restaurants that identify food safety risks.
The germ that caused illness is found in a food item collected from a sick person’s home, a retail location, or in the food production environment.

The same DNA fingerprint linking germs found in foods or production environments to germs found in sick people.
Testing Hypotheses: Interpretation

- Making the link between a company or food item and an outbreak not taken lightly

- **All lines** of evidence must be evaluated
  - Want to be fast *and* right
  - All three lines are not needed, and in rare circumstances, may rely on a single, strong line of evidence
Taking Actions to Prevent More Illnesses

- Regulatory agencies have several tools to stop outbreaks
  - Product recalls
  - Facility closures

- Industry actions to stop the outbreak can include:
  - Issuing consumer warnings and product recalls
  - Defining the scope of the contamination event
  - Halting production and/or correcting processes

- CDC’s role is to publicly communicate about the outbreak source
  - Providing specific, actionable advice
  - Disseminating recall information, especially for consumers
Why CDC Communicates about Foodborne Outbreaks

#1 REASON:
Specific source identified & public can take action

Other reasons CDC may communicate include:
- State health department(s) communicate
- High risk group involved
- Deaths, high hospitalization rate
- Misinformation circulating
New Communications Tools

**Food Safety Alert**
- Higher level of public health concern
- Higher specificity food item identified (e.g., brand, lot, etc.)
- Specific, actionable advice for consumers and retailers

**Investigation Notice**
- Lower level of public health concern
- Lower specificity food item identified (e.g., general food item)
- General advice for consumers and retailers
Message Accuracy & Consistency

- Decision to post a notice is made jointly with partners
  - State and local health departments
  - Regulatory agency

- Discussion of communication plan with implicated firm

- Content for web posting shared in advance before posting
Outbreak of *Salmonella* Infections Linked to Frozen Raw Tuna

Posted April 16, 2019 at 4:45 PM ET

CDC, public health and regulatory officials in several states, and the U.S. Food and Drug Administration are investigating a multistate outbreak of *Salmonella* Newport infections linked to frozen, raw ground tuna supplied by Jensen Tuna.

Advice to Consumers, Restaurants, and Retailers

Restaurants and retailers should not sell or serve recalled frozen ground tuna from Jensen Tuna.

- On April 15, 2019, Jensen Tuna in Houma, Louisiana voluntarily recalled frozen ground tuna.
  - The recalled tuna was individually packaged in one-pound bags and sold in 20-pound boxes under lot numbers 2266, 2271, and 2272.
  - Jensen Tuna distributed product to distributors in Connecticut, Illinois, Iowa, Minnesota, New York, North Dakota, and Washington. Recalled product might have been redistributed to additional states.
  - If restaurants and retailers do not know if the frozen ground tuna they have is recalled, contact the distributor. When in doubt, don’t sell or serve it.

- Consumers who order sushi made with raw tuna, including "spicy tuna," should ask the restaurant or grocery store if the tuna is from Jensen Tuna. If you are not sure if the tuna has been recalled, do not eat it.

- Contact your health care provider if you think you may have become ill from eating raw tuna sushi.

- In general, people who are at higher risk for serious foodborne illness should not eat any raw fish or raw shellfish. People at higher risk include children younger than 5 years, pregnant women, adults older than 65 years, and people with weakened immune systems.
Confirming the Outbreak is Over

- CDC will close an investigation after reports of illness either stop or return to “expected levels”

- Other information is considered
  - Whether contaminated product is still available or in homes
  - Whether the source of contamination was known/mitigated
  - Reporting delays for the pathogen
Outbreak Example

*E. Coli* O157 Infections Linked to Romaine Lettuce, Spring 2018
April 2, 2018: Outbreak Detection

- NJ Department of Health notified CDC of a cluster of *E. coli* O157 infections in NJ and PA
- Several ill people reported eating salads at restaurants
- CDC Outbreak Response Team began coordinating a multistate investigation
April 5, 2018: Identifying an Illness Cluster

- Several ill people in NJ and PA reported eating salads from different locations of the same restaurant chain
  - Only common ingredient in the salads reported by ill people was romaine lettuce

- NJ collected records for romaine lettuce supplied to the restaurant locations

- NJ released a media statement that they were investigating an O157 outbreak
April 10, 2018: CDC Investigation Notice

17 people infected with the outbreak strain of *E. coli* O157:H7 from 7 states
- Included infections recently reported by the NJ HD

“This investigation is ongoing and a specific food item, grocery store, or restaurant chain has not been identified as the source.”
April 2018: Generating Hypotheses About the Source

- 26 cases in 10 states
- 12/12 reported eating romaine lettuce in the week before illness started
- 8/13 reported eating salads that contain romaine lettuce at the same restaurant chain in MO, OH, NJ, and PA
- Other restaurant and grocery store sub-clusters identified in additional states
Supply Chain and Communication Considerations

- Restaurants reported using bagged chopped romaine to make salads
  - At this time, ill people were not reporting whole heads or hearts

- According to records collected from points of service, all romaine lettuce was grown in the Yuma, AZ growing region
April 13, 2018: CDC Advises Consumers and Retailers

- 35 ill people reported from 11 states
  - 93% reported eating romaine lettuce in the week before their illness started
  - Most reported eating a salad at a restaurant; romaine lettuce was the only common ingredient

- “CDC recommends that consumers not eat, restaurants not serve, and retailers not sell chopped romaine lettuce from the Yuma, AZ growing region.”
April 19, 2018: New Data from Alaska and FDA

- One illness cluster at a prison was linked to whole head romaine, not pre-chopped.

- FDA’s traceback was identifying multiple processors and even more farms/ranches/lots that supplied romaine to restaurants where people got sick.

- This information begins to point to a larger reservoir of contamination that affected romaine grown in many different fields.
April 20, 2018: CDC Advice Expands

- 53 ill people reported from 18 states
- 95% reported eating romaine lettuce in the week before their illness started
- “CDC recommends that consumers not eat, restaurants not serve, and retailers not sell any romaine lettuce from the Yuma, AZ growing region.”
Supply Chain and Communication Considerations

- FDA begins to identify the full range of firms that are in the Yuma growing region, including firms outside of Arizona

- Advice needed to clarify what was meant by the Yuma, Arizona growing region
May 9, 2018: CDC Web Update

- 149 people infected in 29 states
  - 50% hospitalized; 17 people developed HUS
  - 1 death

- Romaine lettuce is no longer being grown or shipped from the Yuma area
  - 21-day shelf life for romaine so there might still be lettuce in the supply chain

"CDC recommends that consumers not eat, restaurants not serve, and retailers not sell romaine lettuce from the Yuma growing region."
Supply Chain and Communication Considerations

- According to the FDA, the last romaine shipments from the Yuma growing region were harvested on April 16, 2018 and the harvest season is over.

- The most recent illnesses reported to CDC started when romaine lettuce from the this region was likely still available in stores, restaurants, and in peoples’ homes.
May 16, 2018: CDC Lifts Advisory

- “Romaine lettuce from the Yuma growing region is past its shelf life and is likely no longer being sold in stores or in restaurants.”
June 2018: Environmental Assessment Launched

- Environmental assessment to determine possible routes of romaine contamination
  - Observation and record collection
  - Soil, water, and other sampling

- Outbreak strain identified in irrigation canal water adjacent to many fields identified in traceback
  - How did the outbreak strain get in the water?
  - How did the water contaminate the romaine?
June 28, 2018: Outbreak Declared Over

- Outbreak investigation closed in June 2018
  - Two weeks of shelf life following April 16
  - 2-4 week PulseNet delay

- Environmental Assessment completed in August 2018

- “This outbreak appears to be over. Epidemiologic, laboratory, and traceback evidence indicated that romaine lettuce from the Yuma growing region was the likely source of this outbreak.”
Outbreak of *E. coli* O157:H7 Infections

- 210 ill people from 36 states
- 48% hospitalized; 27 people developed HUS; 5 deaths

People infected with the outbreak strain of *E. coli* O157:H7, by state of residence

People infected with the outbreak strain of *E. coli* O157:H7, by illness onset date
Summary and Conclusions

- Challenges collecting epidemiologic evidence
  - People commonly consume leafy greens and often have multiple exposures
  - Recall of specific types of leafy greens is difficult and many restaurant exposures

- Because labels on lettuce do not typically list growing region, it was difficult for consumers and retailers to tell whether it was part of the outbreak
  - CDC warned consumers not to buy romaine unless they can verify the region of production
  - When do you lift this recommendation?
Evolving Communications

- Public messaging rapidly evolved as more information was collected

- Do not eat, serve, or sell:
  - Chopped romaine lettuce from Yuma, AZ growing region
  - Romaine lettuce from Yuma, AZ growing region
  - Romaine lettuce from Yuma growing region

- Romaine lettuce from the Yuma growing region is past its shelf life

- This outbreak appears to be over. Contaminated lettuce that made people sick in this outbreak should no longer be available.
E. coli O157 Infections Linked to Romaine Lettuce: Lessons Learned (So Far)

- Long history of O157 outbreaks with a suspected link to leafy greens, especially romaine, but these outbreaks are rarely publicly announced
  - Outbreak is often over by the time it is detected
  - Traceback is often inconclusive, either because of traceback limitations or (possibly) because the contamination is complex (not a single lot from a single processor)

- Need to find better ways to work between government, academia, and industry on addressing potential problems before they result in large outbreaks
Conclusions
Industry Involvement in Investigation Process

- Industry plays a critical role in multistate foodborne outbreaks
  - Hypothesis generation: early consultation with industry experts can help narrow down suspects based on the timing and geographic distribution of illnesses
  - Hypothesis testing: providing traceback data or sharing isolates from food/environmental testing can help confirm or refute a hypothesis
  - Pinpointing the cause: working with regulatory agencies to scope contamination events and identify/correct the cause of contamination
  - Stopping the outbreak: recall contaminated products and reach out to customers and consumers
  - Sharing lessons: disseminating information learned during an outbreak and/or recall to others in industry