Rhode Island RRT: The Mysterious E. coli Affair

PulseNet/OutbreakNet East Coast Regional Meeting
1/16/19

Genevieve Caron
Public Health Epidemiologist
Center for Food Protection
Rhode Island Department of Health
Overview

- Background
- Detection, Investigation Activities, and Findings
- Theories
- Lessons Learned/Conclusions
About Rhode Island

- RI population 1.056 million
- Centralized Structure
  - No LHDs
  - 3 field offices
  - State Health Lab and Health Department located in Providence
- EHS-Net state
Rhode Island Rapid Response Team core members:

- Center for Food Protection (CFP)
- Center for Acute Infectious Disease Epidemiology (CAIDE)
- State Health Laboratory (SHL)
About EAEC/ETEC

**Enteroaggregative Escherichia coli (EAEC)**
- Not a reportable pathogen in RI
- Responsible for 10-20% of travelers’ diarrhea cases¹
- Associated with both acute and persistent diarrhea among children and adults in developing and developed countries¹

**Enterotoxigenic Escherichia coli (ETEC)**
- Not a reportable pathogen in RI
- A frequent cause of travelers’ diarrhea¹
- A high dose (10 million to 10 billion ETEC cells) may be needed to cause an infection in adults²

¹ Control of Communicable Diseases Manual, 20th edition
² FDA Bad Bug Book
Tuesday 9/4- CFP received a complaint that 3 people became ill with diarrhea and abdominal cramps 2 days after eating wraps at Restaurant A, a casual Mediterranean restaurant.
Fun Fact

Restaurant A was experiencing a **boil water advisory** for E. coli contamination of the municipal water (which began on 8/31)
Tuesday 9/4 - CFP sent state food inspectors to the establishment. **Findings:**

- Establishment reported following the appropriate procedures during the boil water advisory
- Violation: Ambient temperature of the walk-in refrigerator was 50 degrees F
- No ill food workers were reported
Detection of Outbreak

**Wednesday 9/5-** CAIDE received a call from University A’s health services:

- Roughly 20 sorority members ill with diarrhea and abdominal cramps
- Several individuals reported eating at Restaurant A
Investigation Activities

- Surveys distributed online
- Tomato and lettuce are suspect vehicles based on preliminary exposure information
- **Onsite investigation:**
  - Collected food and environmental samples
  - Control measures implemented
  - Obtained customer information from online orders for case finding
Source of Cases

Initial Cluster + University Cases + Online Orders/Case Finding
Case Control Study

- **Participants:** 64 cases and 78 well individuals
- **Symptoms:**
  - 98.4% diarrhea
  - 15.5% vomiting
- **Incubation period:** median 2 days (range 1-4 days)
- **Duration:** median 2 days (range 1-4 days)
- **Two foods were statistically significant:**
  - Lettuce (OR: 24.8, 95% CI 4.2-544.5)
  - Tomato (OR: 9.59, 95% CI 3.1-35.8)
Epidemic Curve

Displayed are the 55 cases with a known illness onset date. As of this analysis, 64 cases have been identified.
Laboratory Findings

- 9 clinical specimens were submitted
  - ETEC and EAEC were detected via the BioFire GI panel at Rhode Island Hospital
  - SHL testing was negative for norovirus or any enteric pathogens
- SHL sent the clinical specimens to CDC for additional testing and serotyping
Serotyping/WGS Results

Note: All isolates within each serotype were closely related via WGS
Laboratory Findings

• Environmental swabs:
  • All negative for *E. coli*

• Food samples:
  • Chopped lettuce positive for *E. coli* at SHL, but did not show virulence factors for EAEC/ETEC at CDC
  • All other samples negative for *E. coli*
Lettuce Food Flow

1. Lettuce boxes received from delivery
2. Boxes are kept in walk-in cooler
3. Boxes are placed on the prep table
4. Lettuce cut with a knife on cutting board
5. Cut lettuce is immersed in water in 3-bay sink
6. Lettuce is placed in strainer
7. Lettuce is placed in containers with lid
8. Containers are moved into the walk-in cooler
9. Cut lettuce is moved into prep unit
10. Wraps are assembled and served
Theories

1 2 3
Theory 1: Ill Food Worker

- No ill food workers reported
- No stool testing performed
- Possibility of asymptomatic food worker
- Two employee health/hygiene violations
- May not explain the strong signal on the lettuce
Theory 2: Source of Lettuce

- No other outbreaks detected
- However ETEC/EAEC are not reportable pathogens
- Would explain the strong signal for lettuce
Theory 3: Contaminated Water

+ Very coincidental that boil water advisory was occurring for the same pathogen

- Why did we not see illnesses associated with other restaurants?

- Syndromic surveillance did not show an increase in GI illnesses in the area
Theory 4: Unknown
Lessons Learned

- PCR testing of stools for *E. coli* recommended
  - Our State Health Lab is looking into validation of Biofire for use during outbreak investigations
- Culture confirmation and sequencing of the positive water sample would have been helpful
Conclusions

- Confirmed *E. coli* outbreak
- Associated with consuming food from Restaurant A around Labor Day weekend of 2018
- The lettuce was identified as the suspect food item based on statistical significance
  - One lettuce sample was positive for *E. coli* but neither EAEC or EHEC was isolated
- Laboratory evidence from clinical samples supports belief that individuals became ill from a common source.
Thank you! Questions?

Genevieve.Caron@health.ri.gov