



Understanding the Root Cause of an Outbreak

Norovirus Workbook

Identifying contributing
factors and environmental antecedents



Integrated Food Safety
Centers of Excellence



Outbreak Info

Outbreak Identification:

On June 23rd, the health department hotline received a complaint of illness in a group of three who had eaten at a restaurant on June 19th. The three cases lived in two separate households and shared no other meals or events in common in the week prior to illness. All three cases experienced diarrhea, and two experience vomiting. Upon receiving this complaint, environmental health was contacted, and an investigation was initiated.

Epi Findings:

Cases were identified through interviews with restaurant patrons identified through credit card receipts. A case-control study was conducted. Cases were defined as a patron who developed vomiting and/or diarrhea (>3 loose stools in a 24-hour period) after eating food from the restaurant.

Interviews were conducted with 48 patrons. Five cases (including the three from the initial complaint group) were identified. All five cases reported diarrhea and abdominal cramps, three (60%) reported vomiting, and one (20%) reported fever. The median incubation period was 27 hours (range, 21 to 83 hours). The median duration of illness was 15 hours (range, 4 to 84 hours). One of the cases submitted a stool specimen which was positive for norovirus GII.

Consumption of pretzels, wontons, and sweet potato tots were associated with illness.



Resources

CIFOR OUE Agent List:

Agent Name	Median Incubation Period (Range) ¹	Primary Signs and Symptoms	Primary Specimen(s)	KEI ² -Special group(s)	KEI-Geographic Considerations	KEI-Notable Exposures
Hepatitis E	26-42 days (15- 64 days)	Jaundice, dark urine, D, fever, abdominal pain, arthralgia, rash, hepatomegaly, altered consciousness	Stool in Cary-Blair, raw stool, Serum		Foreign travel, especially Asia, Middle East, Africa and Central America; exposure to pigs	Contaminated drinking water; oysters, mussels and other shellfish; pork, pig liver; and raw/rare deer and boar
Norovirus	12-48 hours (10- 50 hours)	N, V, D, abdominal cramps, fever (low grade), HA, myalgia, malaise	Stool in Cary-Blair, raw stool	Institutionalized populations		
Parvovirus (Human Bocavirus, HBoV 2-4)	Unknown- emerging pathogen	D, V, fever, abdominal pain, coryza, cough	Stool in Cary-Blair, raw stool, serum, CSF	Children		

IAFP Key E. Situations that likely contributed to outbreaks of food-borne diseases when breads, pastries, or donuts were implicated as vehicles:

Key E (continued)

Fruits, Nuts, Spices, Grains, or Mushrooms	Farm/Field										Processing										Retail Store/Food Service/Home																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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		Animals Access Human Sewage	Animal Feces/Manure	Feed	Sewage	Soil/Grass/Mud			Storage Water	Worker	Inadequate/Improper Cooling	Storage Conditions	Cross contamination	During Cooling	Environment	Improper Cleaning of Equipment	Manipulation/Spread	Use of Contaminated Water	Worker	Improper Hot Holding	Inadequate Refrigeration	Prolonged storage	Room/Outdoor Temperature Holding	Heat Process Failure	Improper Cooling	Improper pH Adjustment	Improper Water Activity (a _w)	Inadequate Reheating	Organism/Toxin Survives Process (Processing)	Improper/Defective Packaging	Cross Contamination	During Reconstitution	Improper Cleaning of Equipment	Worker/Person	Improper Hot Holding	Inadequate Refrigeration	Prolonged storage	Room/Outdoor Temperature Holding	Heat Process Failure	Improper Cooling	Inadequate Reheating	Organism/toxin survives																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
✖ = Principal Factor to Consider ✓ = Factor to Consider ▲ = Potential Factor to Consider ● = Source of contamination, but likely to be destroyed during later processing T = Toxin Survives Heat Processes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</



Exercise 1

Use the outbreak information and resources to answer below questions for site visit.

What practices would investigators want to observe?

What records would investigators want to review?

What might be some questions investigators would ask the manager and/or food worker?





Outbreak Info

Environmental Findings:

- Inspectors visited the restaurant on June 23rd to conduct an environmental assessment (interview employees regarding recent illness history, review preparation practices, and collect credit card receipts for patrons who dined at the restaurant on June 19th). **(THINK: Why did food items such as pretzels, wontons, and tater tots make patrons sick?)**
- During the environmental assessment interviews were conducted with 37 restaurant employees. One employee, who worked as a server, host, and food runner, reported recent gastrointestinal illness. The employee reported an illness onset date of June 17th and a recovery date of June 19th and reported working June 18th and 19th. Her job duties included cutting fruit, scooping ice for drinks, and garnishing drinks with fruit. **(THINK: Why did employees work while ill?)**
- The facility's illness log did not indicate any illness. **(THINK: Why were the restaurant's illness policies not being followed?)**
- Inspectors observed bare-hand contact when servers cut fruit, garnished drinks, and put toppings on desserts. **(THINK: Why were staff handling ready-to-eat foods with their bare hands?)**

Next step: Use these findings to work through possible contributing factors and environmental antecedents. (Go to next page)



Exercise 2A

Determine follow-up questions and think about contributing factor and environmental antecedent categories.

Based on the *think* questions from the environmental findings, what are some follow-up questions you would ask manager and/or food worker?

Which category(ies) would the contributing factor(s) fall into? (Contamination? Proliferation? Survival?)

Which category(ies) would the environmental antecedents fall into? (People? Process? Equipment? Food? Economics?)





Exercise 2B

Determine contributing factors and environmental antecedents.

What contributing factor(s) do you suspect?

What environmental antecedent(s) do you suspect? Choose the top 3.





Resource

Short-term	
Embargo/discard/destroy product	
Require physical facility or equipment change	
Change ingredient (remove or replace)	
Change process (correct or replace)	
On-the-job training	
Fines/penalties	
Closure	
Limit menu/restrict food	

Long-term	
Formal training/certification	
Policy change (written or documented)	
Risk control plans	
Increase inspections	
Change supplier	
Require consultant or 3 rd party audit	
Change product (remove or replace)	



Exercise 3

What control measures would you implement?

Based on contributing factors and environmental antecedents you identified, what might be some short-term and long-term corrective actions you would put in place to ensure this wouldn't happen again?

How could findings from this investigation be used to influence food safety at a community or national level?



Contributing Factor Video



Environmental
Antecedent Resources