Salmonella senftenberg Outbreak Associated with a Fundraiser, Limestone County, Alabama – October 2013 (AL1310JMP-42a)

Introduction

On October 7, 2013, the Public Health Area (PHA) 2 Field Surveillance Staff (FSS) from Limestone County was notified of several individuals reporting symptoms of gastrointestinal illness (GI) after eating food from an October 4 fundraiser. A reported count of 250-300 individuals received food from the fundraiser. The Athens Limestone Hospital Infection Preventionist reported to PHA 2 FSS that 47 individuals that cited having eaten food from the fundraiser, presented at the emergency room on October 5 & 6.

Methods

A retrospective cohort study was conducted including ill and non-ill individuals who ate food from the October 4 fundraiser following the use of a hypothesis generating questionnaire (HGQ) to determine common exposures among ill individuals (N=6). A fundraiser flyer (Appendix 1) that listed food items for the fundraiser was obtained from a social media website. Using information obtained from the HGQ and food items listed on the fundraiser flyer, an outbreak specific questionnaire (OSQ) was developed to collect information on demographics, food consumption history, illness onset, and clinical symptoms. A case was defined as an individual who ate food from the October 4 fundraiser and became ill with GI symptoms within 72 hours of eating. Cases were further classified as probable or confirmed. A probable case met the basic case definition and a confirmed case met the basic case definition but also had salmonellosis confirmed by bacterial culture of a clinical specimen.

PHA 2 environmental staff conducted on-site environmental inspections of food preparation facilities used during the fundraiser and interviewed food preparers for the fundraiser. Environmental samples were obtained from two facilities (a church and local jail) where food for the fundraiser was prepared and from a variety of areas where food could have been contaminated. Representative samples were obtained of primary food items served at the fundraiser. Samples of desserts and beverages offered at the fundraiser were unavailable for testing.

An epidemic curve was plotted and distributions of demographic characteristics were compared between ill and non-ill individuals using Fisher's exact test and t-test (continuous observations). Attack rates and risk ratios were calculated and used as the measure for statistical significance. Because there were a variety of desserts from different homes and no one dessert type was referenced we did not include desserts in the data analysis. To identify predictors of illness, univariate and multivariate logistic regression models were analyzed. All statistical analysis was performed using SAS.

Food, clinical (stool), and environmental samples were sent for enteric bacteriological testing at the Alabama Department of Public Health Bureau of Clinical Laboratories (BCL). Serotyping and pulsed-field gel electrophoresis (PFGE) identification was performed on food, stool, and environmental samples.

Results

Environmental Assessment

Food items served at the fundraiser included white beans with ham (beans), onions, vinegar-based coleslaw, cornbread, poured soft drinks, and a variety of homemade desserts. The serving time for food was between 10:30 a.m. and 1:00 p.m. on October 4. Ninety-four percent of individuals interviewed reported eating between 11 a.m. and 1 p.m., October 4. The Environmental Assessment Report and interviews revealed that a foundation, church, and local jail were used for food preparation; the fundraiser was held at the church. Interviews with food preparers identified several opportunities for cross-contamination and improper holding temperatures including 1) Soaking the beans in plastic lined horse trough covered with plywood, with a water hose running water through the trough; 2) Handling food items without gloves; 3)Turning off heat source for the beans and disconnecting gas lines for burners without monitoring temperature of food; 4) Transferring the beans in outside cooking pots to a smaller iron pot on wheels to take large quantities of the beans inside the church; 5) Using one sterno can per 6" deep chaffing pan to maintain the holding temperature of the beans; and 6) Re-using chafing pans and adding new beans to existing beans throughout the serving time.
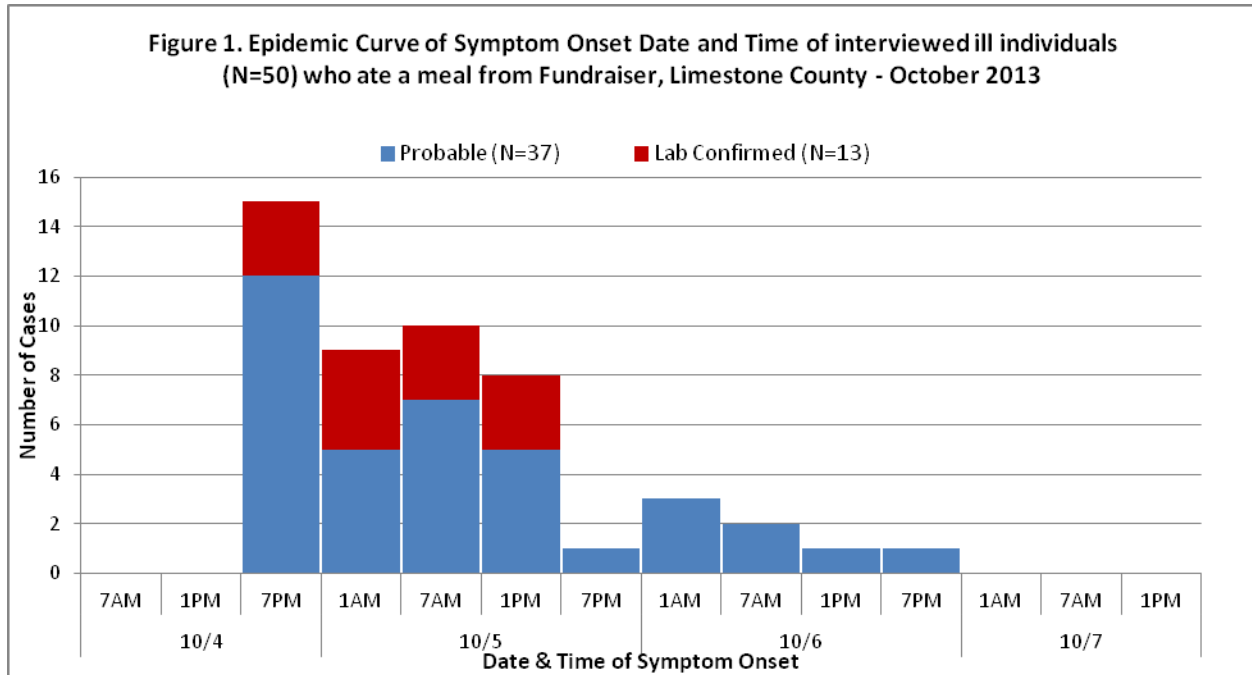
Epidemiological Analysis

PHA 2 FSS staff identified 134 exposed individuals, 73 (54%) individuals were interviewed with the outbreak specific questionnaire (OSQ). Of those interviewed, 50 (68%) reported illness and met the basic case definition. Demographic characteristics were similar between ill and non-ill (Table 1). The most commonly reported signs and symptoms were diarrhea, extreme tiredness/weakness, and abdominal pain. Additional symptoms reported were muscle aches, nausea, headache, fever, vomiting, and bloody stools.

Onset of illness ranged from October 4 at 8:30 p.m. to October 6 at 7:00 p.m. (Figure 1). The incubation ranged from 6.5 to 55 hours (median,

Table 1. Summary of Demographic and Clinical Presentation of ill and non-ill individuals associated with Fundraiser, Limestone County - October 2013.			
	Ill (N=50)	Not Ill (N=23)	p-value
Age (years)			
Median (Range)	52 (21-85)	54 (26-84)	0.55[†]
Gender			
Female	36 (72%)	13 (57%)	0.28[‡]
Incubation period (range), hours	20 (6.5-55)		
Symptoms (%)			
Diarrhea	49 (98%)		
Extreme tiredness/weakness	48 (96%)		
Abdominal Pain	42 (84%)		
Muscle Aches	40 (80%)		
Nausea	39 (78%)		
Headache	37 (74%)		
Fever	32 (64%)		
Vomiting	17 (34%)		
Bloody Stools	3 (6%)		
Illness Duration among recovered (range)	3 days (2 hours -5days)		

†Age p-value based on equal variance t-test. ‡Based on 2-tailed Fisher exact test.

20 hours). Twenty-eight (56%) cases had recovered by the time they were interviewed; among those cases who had recovered, the duration of illness ranged from 2 hours to 5 days (median, 3 days).

Figure 1. Epidemic Curve of Symptom Onset Date and Time of interviewed ill individuals (N=50) who ate a meal from Fundraiser, Limestone County - October 2013

There was no statistically significant association detected between food items served at the fundraiser and illness (Table 2). Logistic regression analysis also did not yield any statistically significant predictors between being ill in relation to food items eaten, whether the meal was eaten at the fundraiser, picked up, or delivered, age, or sex. Among those ill, we modeled predictors of seeking medical care

Table 2. Relative Risk for Food Exposure Among individuals who ate food from the Fundraiser, Limestone County – October 2013.

Food Item	Exposed			Not Exposed			Risk Ratio†	p-value‡
	Ill	Not Ill	AR (%)	Ill	Not Ill	AR (%)		
White Beans (w/ ham)	50	22	69	0	1	0	2.08§	0.35
Onions	26	8	76	24	15	62	1.24	0.21
Cornbread	47	23	67	3	0	100	0.67	0.55
Coleslaw	43	20	68	7	3	70	0.98	1

†Relative Risk; ‡Based on 2-tailed Fisher exact test (significance = p<0.05). §0.5 correction factor.

(saw physician, went to ER, or was hospitalized) vs. not seeking medical care.   However, the analysis did not yield any statistically significant predictors for seeking medical care.

Laboratory Report

Fourteen food samples, 30 environmental samples, and 13 stool specimens were obtained for enteric bacteriological testing. *Salmonella senftenberg* was isolated in two environmental samples obtained from the church, nine food samples, and all stool specimens. The two positive environmental samples were from environment swabs of a dirty strainer and the double sink floor drain at the church

(Appendix 2). Seven positive food samples were of beans served during the fundraiser; two of the food samples were from two separate boxed food plates and five were from beans contained in 5 gallon buckets used during the fundraiser. *Salmonella senftenberg* was also found in cornbread from a hospital dinner plate and onions from another dinner plate. The PFGE patterns for the positive environmental, food, and stool specimens matched each other and were a 93.8% match with previous Senftenberg patterns in our local database, and a 100% match with isolates that had the outbreak pattern (JMPX01.0366) in the national PulseNet database. The Senftenburg pattern found in the outbreak isolates were assigned the PulseNet outbreak code of 1310ALJMP-1 (JMPX01.0366). Ten additional confirmed cases associated with this outbreak, but not available for interview, were identified through laboratory reporting. All ten cases matched the PulseNet identification for 1310ALJMP-1 (JMPX01.0366).

Discussion/Conclusions

Analysis of the clinical and epidemiological data of ill cases associated with an October 4 Fundraiser in Limestone, AL, was consistent with salmonellosis.   Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps within 12-72 hours after infection, with an average incubation of 24 hours and illness lasting 4 to 7 days. The epidemic curve of symptom onset among interviewed cases supports a point-source exposure. Although the statistical analysis could not implicate a primary food source, *Salmonella senftenberg*, with indistinguishable strains, was isolated in food samples of the beans, environmental samples taken from the church, and stool specimens. How or at what point during the food preparation the beans became contaminated with *S. senftenburg* cannot be definitively determined, but the environmental inspection and interviews suggests opportunities for person to food, food to food, and equipment to food cross contamination or improper holding temperatures.

In summary, a *Salmonella senftenberg* outbreak occurred in association with a Fundraiser in Limestone County. The collective descriptive epidemiological data, environmental investigation, and laboratory results support the hypothesis that the beans served during the fundraiser was the contaminated food source. It is unclear how the beans became contaminated with the bacteria; but salmonellosis is often food related and typically occurs when food products are contaminated with the bacteria through cross contamination or when improper holding temperatures occur.

Recommendations

Several recommendations were issued by the FSS and the environmentalist during visits to the foundation, church, and local jail and case interviews. Recommendations and a flyer (Appendix 4) were given on how to improve food safety and prevent salmonellosis infection.

References

1. Centers for Disease Control and Prevention, National Enteric Disease Surveillance: *Salmonella* Annual Report, 2011 (downloaded October 13, 2013 at http://www.cdc.gov/ncezid/dfwed/PDFs/salmonella-annual-report-2011-508c.pdf).

Key Public Health Personnel Involved in the Investigation

Crystal Page, R.N., Field Surveillance Staff Nurse
Kent Holsclaw, Environmentalist
John Guarisco, PhD, Environmental Toxicologist
Carolyn Warner, MT, ASCP, Microbiologist
Tina Pippin, R.N., Surveillance Branch Manager
Catishia Mosley, M.S.P.H., Epidemiologist

Athens — ███████████████████████████

Annual Bean Day

Friday, October 4th, 2013
10:30 a.m. – 1:30 p.m.

████████ ██████, ████████████

Ticket Cost: $6.00

Ticket includes: white beans, slaw, cornbread, onions, drinks and
homemade desserts. (delivery plates do not include drinks)

Delivery available for 10+ plates
Call ████████████
or
Email: ████████████████
For more information contact ████████████ at ████████████
or
Email: ████████████████████

Appendix 2
Environmental Samples Positive for *Salmonella senftenberg*

Church Dirty Strainer

Church Annex sink floor drain

Appendix 3

Outbreak strain *Salmonella senftenberg* PFGE pattern - 1310ALJMP-1 (JMPX01.0366)

JMPX01.0366

Avoid Food Cross-Contamination

What is cross-contamination of food and how does cross contamination spread disease?
- Cross contamination occurs anytime harmful germs, like bacteria (i.e., *Salmonella*, *Escherichia coli*, or *Shigella*), viruses (i.e., Norovirus), toxin-producing organisms (i.e., *Staphylococcus aureus* or *Bacillus cereus*), or parasites (i.e., *Cyclospora*) are transferred from one food to another food in homes, restaurants, and other places where people prepare and eat food such as work or church gatherings.
- Cross contamination can occur through indirect spread of bacteria, virus, toxins, and parasites from raw food to ready-to-eat food by equipment, food handlers, cook utensils, or surfaces (e.g., refrigerator handles, knives, or preparation areas).
- Germs can be spread by hands, cutting boards, utensils, counter tops, and food.

What are the symptoms of foodborne illness?
- People with a foodborne illness may have symptoms such as fever, vomiting, diarrhea (sometimes bloody), nausea, chills, and abdominal cramps.
- People at a higher risk for developing foodborne illness, include pregnant women, young children, older adults, and people with medical conditions.

How do I stop food cross contamination?
- **Clean**
  - Wash hands (running water and soap for 20 seconds) before and after going to the bathroom, changing diapers, and handling and feeding pets.
  - Wash all surfaces with hot soapy water before and after preparing each food item.
  - Use paper towels to clean up kitchen surfaces. If cloth towels are used, select the hot cycle on washing machine to clean.
  - Rinse all fresh fruit and vegetables, including those with skins and rinds, under running water.
  - Do not wash raw poultry before cooking, because bacteria in raw poultry juices can be spread to other foods, utensils, and surfaces.
  - Rub firm-skin fruits and vegetables under running water or scrub with a clean brush.
  - Clean the lids of canned foods before opening.
- **Separate**
  - Avoid direct contact between raw food and ready-to-eat food during transport, storage, and preparation.
  - Separate raw meat, poultry, seafood, and eggs from other food in the grocery cart, grocery bag, and refrigerator.

DETECT   TEST   REPORT

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