

Barbacoa Meat associated with Salmonella outbreak at Ethnic Supermarket

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ABSTRACT

Introduction: An outbreak of *Salmonella Uganda* associated with an ethnic supermarket in Houston, Texas was identified in February 2012. Barbacoa meat, a mixture of cow cheek and tongue, was recognized as the source of salmonella, purchased by two independent families on Sunday, January 29, 2012.
Methods: Epidemiologic investigation included active surveillance, multiple restaurant investigations, and collection of food and clinical samples. Receipts provided by supermarket manager showed approximately 1,100 pounds of barbacoa meat purchased the weekend of interest. The apparent lack of temperature control observed during the initial investigation, combined with the establishment's history of hand lavatory and potential cross contamination violations, led to additional inspections to monitor the intensive two-day process of preparing, cooking, distributing, and storing over 1,000 pounds of the barbacoa meat. Relationships between foods eaten and cases were analyzed by Fisher's exact test.
Results: Routine surveillance identified 11 confirmed and probable cases out of 16 persons (median age 26 years), one of whom was hospitalized. Preliminary epidemiological investigation of the first ten cases followed by a confirmed case suggested that barbacoa meat was the common source which was purchased at the same ethnic supermarket. Onset of symptoms occurred January 29 to February 4, 2012. The highest attack rate was 92% for barbacoa. Two stool cultures from patients tested positive for *Salmonella Uganda* (PFGE HU.TDWX01.0004). Stool cultures from employees tested negative. Illness was associated with the barbacoa meat (P=0.0027, two-tailed Fisher's Exact test).
Conclusion: Although, results did not indicate point of contamination microbiologically, poor hygiene practices likely led to the cross-contamination of food and work areas. This outbreak supports the essential implementation of inspections to identify such establishments as "high risk" and be subject to frequent routine inspections to reduce future outbreaks.

BACKGROUND

Foodborne infections of *Salmonella* continue to be a significant public health concern in the United States, with about 42,000 cases reported. Because many cases are not diagnosed or reported, the actual number of infections may be twenty-nine or more times greater¹. While *Salmonella* serotype Enteritidis (SE) is one of the most common serotypes reported worldwide, outbreaks associated with the rare serotype, *Uganda*, occurred in New York City and Chicago in the summer of 2001. Both outbreaks were associated with ready-to-eat pork products².

Initial inquiries in this investigation identified one cluster of salmonella, *Uganda*, associated with one ethnic supermarket. The first case was associated with a family gathering of 16, of whom 11 fell ill following a brunch. All ill persons had consumed barbacoa and 3 consumed carnitas which were purchased the morning of January 29, 2012. None of the 5 who did not become ill had barbacoa or carnitas. The second case in the cluster was a 70 year old man who required hospitalization after having eaten barbacoa from the same supermarket on January 29, 2012. Sales of barbacoa at this particular supermarket are limited to weekends only; with preparation and cooking done on Friday and Saturdays.

Investigation Objectives:

- To establish source of a community outbreak of *Salmonella Uganda*.
- To identify contributing factors associated with restaurant-related foodborne illnesses and the compliance of food-safety practices through multiple on-site inspections.
- To describe characteristics and practices of employees of the ethnic restaurant.

METHODS

- Investigation and supermarket inspection of this outbreak was performed by the following entities: HCPH Epidemiology Program, Environmental Public Health (EPH), and the Houston Department of Health and Human Services Bureau of Laboratory Services.
- Active surveillance was initiated on March 9, 2012 to determine scope of outbreak at one neighboring clinic (0.3 miles) and one hospital (7.7 miles).
 - Case definition included cases who developed symptoms of gastroenteritis between the week of January 30 and February 6, 2012.
- Three on-site inspections were conducted between March 5, 2012 and March 11, 2012. Observations in the supermarket environment during preparation, cooking, distribution, and storage process were recorded. Figure 2 shows timeline of events.
- Food samples of barbacoa were collected from different locations within the vat and steam table, at different times and transported to Houston Department of Health and Human Services Bureau of Laboratory Services.
- Clinical samples from four employees were collected and transported to Houston Department of Health and Human Services Bureau of Laboratory Services for testing.
- All statistical analyses were performed using STATA 10.

Table 1. Demographics of participants

	Participants (N=16)	Ill (N=11)
Age		
Median Age	22	26
Range	3,35	3,70
Gender, count (%)		
Women	6 (37.5)	2 (18.2)
Male	10 (62.5)	9 (81.8)
Ethnicity, count (%)		
Hispanic	15 (93.8)	11 (100)
Non-Hispanic	0 (0)	0 (0)
Unknown	1 (6.25)	0 (0)

Figure 1. Epidemic Curve

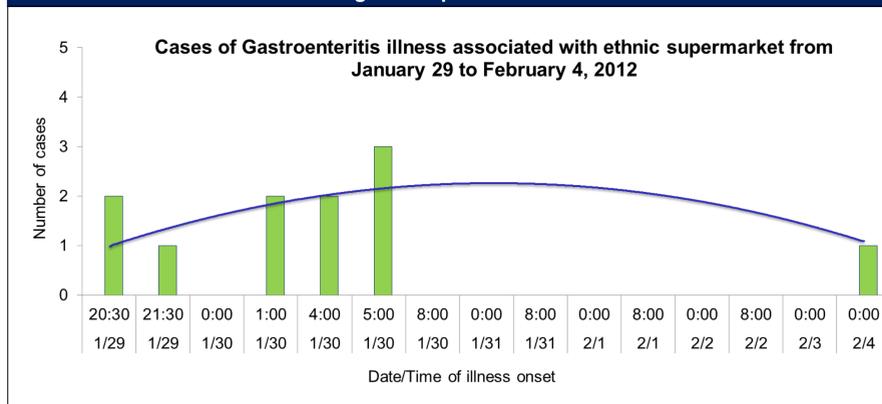


Figure 2. Timeline of events

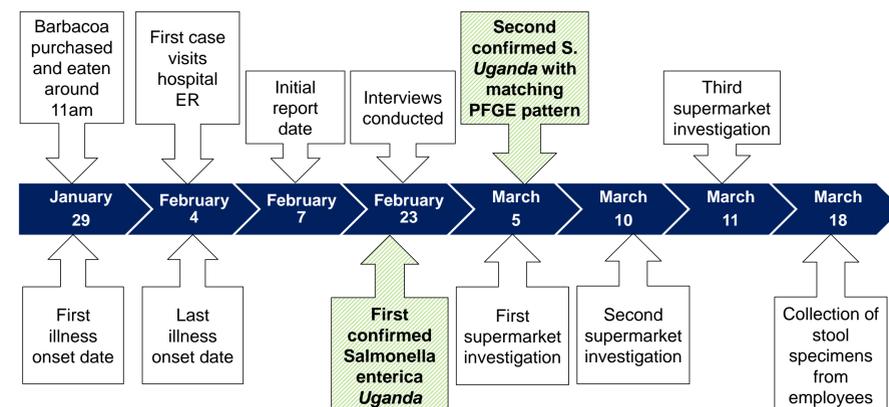


Figure 3. Flowchart of barbacoa production

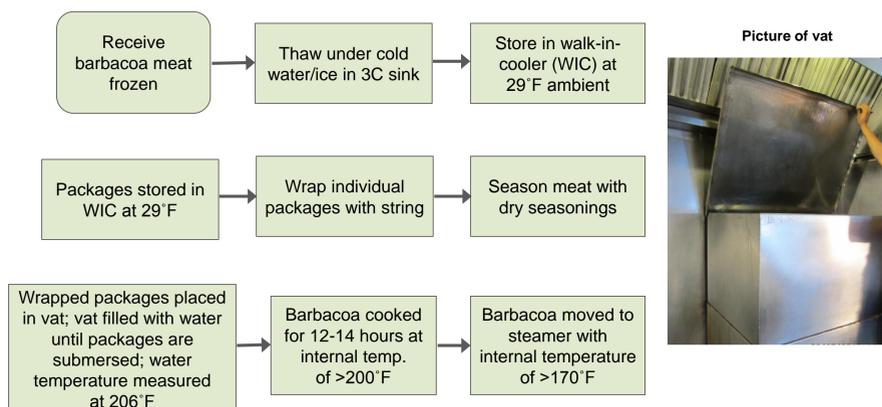


Table 2. Symptoms profile of confirmed and probable cases

Symptoms	Count (%)
Diarrhea	11 (100)
Abdominal pain	11 (100)
Nausea	10 (91)
Vomiting	10 (91)
Fever	10 (91)
Headache	9 (82)

Table 3. Food specific Attack Rates, Risk Difference, Relative Risk and P-values

Food item	Ate item			Did not eat item			Risk Difference	Relative Risk	P-value*
	Ill	Not ill	Attack Rate	Ill	Not ill	Attack Rate			
Barbacoa	11	1	92%	0	4	0%	92	Undefined[†]	0.0027
Carnita	3	0	100%	8	5	62%	38	1.6	0.5089

*Fisher's exact tests were used to adjust P values if cell counts were less than 5.
[†]The relative risk for barbacoa is undefined. This is because no one became ill among persons who did not eat barbacoa.

OBSERVATIONS

- The stainless steel vat used to cook barbacoa meat is described as a customized kitchen appliance used for cooking large amounts of meat at a time. This appliance has no temperature indicator and uses a gas valve located on the bottom right side to adjust temperature and turn the vat on and off (refer to picture).
- March 5, 2012**
- Receipts of inventory for January 28-29 showed 1,100 lbs. of barbacoa purchased.
 - There was no temperature indicators on any of the kitchen equipment.
- March 10, 2012**-Approximately 400 lbs. of barbacoa were prepared
- No working thermometer was seen in the establishment.
 - Thawing of frozen meat took place in 3-compartment sink which was located next to a narrow entranceway to and from the kitchen. During the thawing process, the sink's faucet was turned on and continuously splashed water on the meat causing droplets to disperse to surrounding areas. Meanwhile, employees were coming in and out with food items. Steps involved in the production of barbacoa is documented in a Figure 3.
 - Forty packets were individually wrapped and placed in the vat to cook. Upon removal, of the last packet, an employee stepped inside the vat to remove the meat and clean the vat. The employee had not removed his shoes for both of these tasks.
 - A staff was seen to wash hands without taking gloves off.
- March 11, 2012**-Approximately 700 lbs. of barbacoa were prepared
- A staff handled raw meat after having touched deli meat without changing gloves.

FINDINGS

All ill individuals were of Hispanic ethnicity with 82% males and average age of 26 (Table 1). The majority of the illnesses (91%) occurred before 6 AM January 30, 2012. The incubation period ranged from 9.5 hours to 18 hours with a median time of 15 hours (Figure 1). All cases (100%) had diarrhea and abdominal pain and 91% had fever, vomiting and nausea (Table 2). The duration of illnesses ranged between 5 and 10 days. Attack rate of barbacoa was highest at 92% (p-value=0.0027) which made it the most suspected food source for developing gastroenteritis (Table 3). The high risk difference (92) in comparison to the carnita food item supports barbacoa as the high risk food source in this outbreak. Temperatures of the barbacoa immediately removed from the vat as well as held on the steam table ranged from 160°F to 210°F. Laboratory results from the thirteen samples of barbacoa taken on March 10, 2012 and clinical samples from employees were all negative for *Salmonella*. There were several potential opportunities for cross contamination of cooked product. Although this investigation demonstrates that EPH routine inspections can successfully identify high risk restaurants at increased risk of foodborne outbreaks, it also calls for more emphasis on regulation and education to prevent future outbreaks in ethnic supermarkets using similar appliances as a cooking vat.

RECOMMENDATIONS

- Preparation tasks of the barbacoa prior to cooking and the removal of the cooked barbacoa from foil packages into serving pans be assigned to two different individuals to avoid possibility of cross contamination.
- Monthly routine inspections will be required as the establishment's extremely high risk rating with the minimum of one inspection conducted within every four-month period.
- EPH will conduct a food handlers' class for all employees at the supermarket that is to be tailored to the needs and operations of the establishment.
- The cleaning and sanitization of the cooking vat should be done using a deck brush.

LIMITATIONS

The epidemiological investigation was hindered due to time delays inherent with PFGE testing and reporting date, particularly in *Salmonella* outbreaks. In this event, the initial report date and PFGE results were 27 days apart. A limitation of the analyses was the relatively small sample size.

REFERENCES

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