PLEASE PASS THE BACTERIA: AN OUTBREAK OF *CLOSTRIDIUM PERFRINGENS* ASSOCIATED WITH CATERED THANKSGIVING MEALS

BACKGROUND

On November 23, 2005, ACDC received a report of possible foodborne illness following a Thanksgiving-themed luncheon held at a large worksite in the San Fernando Valley. The initial report stated that there were 250 people ill with vomiting and diarrhea out of 300 employee guests of the event. Upon investigation, it was revealed that, *including* the San Fernando Valley luncheon, the implicated cater, a fast-food restaurant of a popular chain of restaurants, prepared a total of 5 holiday meals/events with more than 400 guests the day prior, November 22. Due to the very large number of ill individuals reported and the alleged involvement of commercial food, ACDC initiated an investigation on November 23.

METHODS

General Investigation: ACDC contacted guests of the initial foodborne illness report (the San Fernando Valley luncheon) to obtain further information regarding who attended the event, the extent and symptoms of illness, and the foods consumed. When it was revealed that the implicated caterer conducted several additional similar orders on the same day, the complete list of orders was requested. ACDC then contacted all parties and inquired about presence of gastrointestinal illness. A menu of common food items was compiled from the catering lists and additional items possibly associated with illness were gleaned from participant interviews.

Case Finding: Two standardized questionnaires were created to survey either guests of the catered parties or restaurant employees in order to identify the cause and extent of illness as well as the possible source of illness. The questionnaires also included questions assessing basic demographic information. The guests were sent questionnaires via email, FedEx and fax, and the restaurant employees were interviewed by private telephone calls conducted by ACDC staff.

Case-Control Study: An outbreak-associated case was defined as any individual who ate one of the catered meals prepared on November 22 or worked at the implicated restaurant on November 22 and had the following symptoms occurring between November 22 and November 24: 1) two or more bouts of diarrhea in 24 hours, and 2) at least one additional compatible symptom (e.g., abdominal cramps, nausea or vomiting). Controls were guests of the events that did not meet the case definition of illness and were available for interview by ACDC staff.

Laboratory: Stool specimens were collected from three patrons of the San Fernando Valley luncheon and sent to the Los Angeles County (LAC) Public Health Laboratory for testing. Illness due to a bacterial toxin was the most likely suspected pathogen due to the quick onset of illness, brief duration of illness, and the implicated foods (e.g., turkey).

Environmental Health Inspection: The LAC Department of Environmental Health, Food and Milk Program (F&M) inspected the restaurant kitchen on November 23 and a hearing with the restaurant management was conducted on November 29. F&M performed a follow-up inspection on November 30.

RESULTS

Employees: During the first visit the inspector made to the restaurant, the management reported that no employees had been recently ill with diarrhea or vomiting. This claim was supported by information gathered from preliminary interviews with restaurant staff—nine out of twelve employees were interviewed via telephone, three could not be reached. Due to lack of cooperation, ACDC was unable to fully survey

the employees, and since there were no reports of illness among the employees, they were excluded from further analysis.

Guests: For a case-control study, ACDC attempted to contact guests of all five parties that had placed catering orders for November 22—four groups responded, all reported some illness among members. A total of 237 questionnaires (187 cases and 50 non-cases) inquiring symptoms and foods consumed were obtained for analysis.

Table 1. Frequency of Symptoms (N=187)

Symptoms	Number of Cases	Percent of Cases
Diarrhea	175	93.6
Abdominal Cramps	158	84.5
Nausea	58	31.0
Headache	38	20.3
Vomiting	25	13.4
Body Aches	19	10.2
Fatigue	25	13.4
Chills	18	9.6
Dizziness	18	9.6
Skin Rash	3	1.6

The majority of respondents (65%, n=154) were male; however the proportion of male versus female patrons was similar among cases and control (69.5% of cases were male, 66% of controls were male). The mean age of the cases was 39 years and controls 42 years. Among the cases, diarrhea and abdominal cramps were the most commonly reported symptoms (Table 1). The median incubation time was 8.5 hours (range 3.5 to 40 hours, Figure 1) and the median duration of symptoms was 18 hours (range 1 to 96 hours, Figure 2). All of the parties reported that none of their guests were ill prior to or during the catered meals.

Among the food items analyzed, both turkey and gravy were significantly associated with subsequent illness (Table 2); however, when analyses controlled one for the other, only turkey remained significant implicating turkey as the most likely cause of illness.

Table 2. Food-Specific Analysis for Selected Items

Food Consumed	Number of Cases (n=187)	Number of Controls (n=50)	Attack Rate (%)	Odds Ratio	95% Confidence Interval
Turkey	179	37	82.9	7.86	[3.04 – 20.31]
Ham	153	38	80.1	1.42	[0.67 – 3.00]
Gravy	164	28	85.4	5.60	[2.76 – -11.38]
Stuffing	126	32	79.7	1.16	[0.60 – 2.23]

Table 3. Analysis of Turkey and Gravy Controlling for Confounders

Food	Odds Ratio	95% Confidence Interval
Turkey (Controlled for Gravy)	7.27	[1.35 – 39.05]
Gravy (Controlled for Turkey)	6.75	[0.93 – 49.23]*

* Not statistically significant.

Laboratory Findings: One of three stool specimens submitted for testing was positive for *Clostridium perfringens*. None of the samples tested positive for *Bacillus cereus*.

Environmental Health: On November 23, F&M conducted an inspection of the restaurant that catered the meals—this revealed several health violations: foods were maintained at improper temperatures, containers were not properly covered inside the refrigerator; chemicals were stored next to cooking pans, etc. During the hearing held on November 29, the restaurant managers were educated about proper food handling procedures, errors were reviewed and further recommendations for improving restaurant safety were discussed. The following day, F&M returned to the restaurant for a follow-up inspection and noted that all previous known violations were corrected.

Figure 1. Incubation time, Time of onset of illness (N=167)

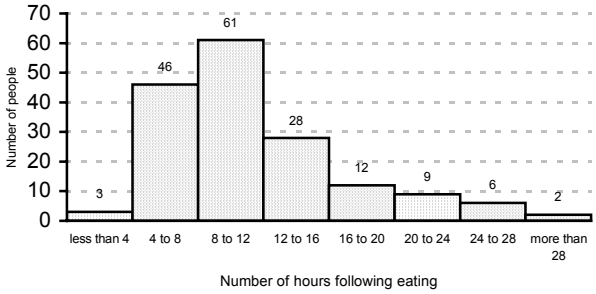
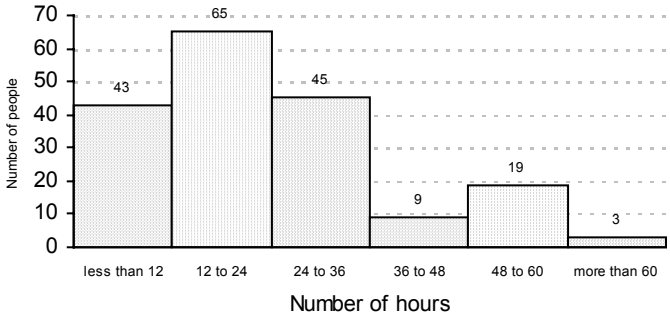


Figure 2. Duration of symptoms (N=184)



DISCUSSION

ACDC's investigation determined that the cause of illness was most likely *C. perfringens* due to improperly cooked turkey. While the environmental inspections indicated that the restaurant was clean and functional, it was likely operating beyond capacity on November 22—as such space and equipment limitations most likely prevented the restaurant staff from storing and roasting the turkeys at proper temperatures.

During the investigation, the restaurant's corporate manager and food safety consultant worked closely with ACDC to improve the standards of quality for their chain of restaurants. This experience provided a valuable opportunity to foster cooperation between Public Health and their corporation.

Limitations: This investigation was limited by a few factors. First, responses to the questionnaires were likely hindered by recall bias due to the retrospective nature of the data collection. Similarly, guests of the San Fernando Valley luncheon who had filed the original complaint had predetermined that the gravy was the cause of their illness—thus their responses likely over-emphasized that food as the cause when its association was questionable. In addition, despite the large number of people affected by the outbreak, only a few of the patrons were willing to submit specimens for testing, and the Public Health Laboratory was unable to collect samples of the turkey for testing—thus while *C. perfringens* infection from the turkey was the most likely cause of illness, additional tests could have further validated that finding. Finally, since only a portion of those who did not meet the case definition was available to interview as controls for this study, investigation ay have been limited by self-selection bias.

Recommendations: This outbreak illustrates many of the recommendations that the Los Angeles County Department of Health Services provides to restaurants to avoid food-associated illness. Foremost, restaurants should not exceed workspace capacity when preparing foods since this can contribute to compromising food safety (i.e., limiting proper cooking time, mixing uncooked food and their cooking utensils with cooked food). Moreover, all restaurants need to adhere to the following food handling practices: 1) hot food should be held at 140°F or warmer, 2) cold food should be held at 41 °F or colder, 3) when serving food at a buffet, keep food hot (i.e., with chafing dishes, slow cookers, or warming trays)

and keep food cold by nesting dishes in bowls of ice or use small serving trays and replace them often, and 4) food that is likely to spoil should not be left out more than 2 hours at room temperature.