

***E. coli* O157:H7 Outbreak Associated with A Wedding Reception in Wake County**

Final Report: November 29, 2007

Background:

On October 22, General Communicable Disease Control Branch (GCDC) was contacted by a guest and family member of the bride to report an outbreak of gastroenteritis caused by *Escherichia coli* O157:H7, associated with a catered wedding reception held in Raleigh on October 13, 2007. GCDC reported the call to Communicable Disease nurse staff at the Wake County Human Services Department (WCHS) and offered to assist with their investigation. The wedding reception was held at the Exploris Museum in Raleigh and was catered by Triangle Catering. 110 wedding guests were invited to attend, and staff who worked the event were allowed to consume leftover food items. Both staff and guests were interviewed as part of this investigation.

Triangle Catering provided their menu contract to WCHS on October 23. GCDC built a questionnaire based on the contract and using elements of the new Communicable Disease Report Form and the revised STEC Surveillance Form recently designed. The family provided a guest list to WCHS nurses on October 25, 2007. Attempts were made to interview all reception guests and catering staff from October 24-29, 2007. Interviews were obtained from 65 people (56 wedding guests and 9 staff).

Interviews were collected by nurses and environmental health specialists with WCHS and Wake County Environmental Services (WCES), members of the Public Health Regional Surveillance Team (PHRST) 4 located in Raleigh, students at UNC coordinated by the North Carolina Center for Public Health Preparedness, and staff from the New York State Department of Health and the Arkansas Department of Public Health. A data entry and analysis program was written in Epi Info 2000 by the GCDC foodborne disease epidemiologist, and data entry was done October 27-29. Data analysis for this final report was done on November 29, 2007.

Descriptive epidemiology:

110 guests attended the wedding, coming from Arkansas, New York, North Carolina, Tennessee and Virginia. It was thought initially based on telephone numbers that some guests also came from Ohio; upon interview it was determined that these were former Ohioans who had moved to North Carolina. For the 65 completed interviews, 45 (80%) are from North Carolina. The age range of people in the dataset is 5-75 years old, with a mean of 39 years old. There are 37 Females (57%) and 28 Males (43%) in the dataset.

27 people report a diarrheal illness with onset between October 13-24, 2007. One person (a guest) was excluded as a case in this analysis because her gastroenteritis began on October 13 and reportedly continued for nearly one month, and her illness is not confirmed to be caused by *E. coli* O157:H7. Another person was not counted as a case in this analysis because his onset date is October 24, 2007, and he is known to be epi-linked by marriage to a case in the dataset whose onset date was October 18, 2007. It is assumed that his gastroenteritis is more likely associated with her illness than to his food exposures at the reception.

The case definition used for this analysis is a person who attended the Wedding and Reception on October 13 who developed diarrhea with onset October 14-23. These timeframes were used due to the known incubation period for *E. coli* O157:H7, which is ordinarily 2-10 days, with a usual

incubation of 3-5 days. The individual reporting a prolonged diarrheal illness with onset on October 13 is thought to represent the background rate of gastroenteritis; it would be unusual to find any group of 119 people where no one was experiencing some type of gastroenteritis at a given point in time. One person reported abdominal cramps and nausea but no diarrhea. In the analysis she is included as a person reporting symptoms of illness, but who does not meet the case definition.

A table of symptoms is provided below:

<u>Symptom</u>	<u>Number of People Reporting</u>	<u>% of ill</u>
Diarrhea	27	96
Abdominal Cramps	18	64
Watery Diarrhea	10	38
Non-bloody diarrhea	10	38
Bloody diarrhea	8	29
Nausea	7	25
Vomiting	3	11

Four people are known to be culture confirmed at this point with *E. coli* O157:H7. One is a relative from New York. One is a person who attended the reception who lives here in Raleigh. One is a resident of Arkansas. The fourth is a child who attended the reception but who also lives in a household where people were sick. His onset date is October 19, and he could be either related to the reception exposure or a secondary case due to household contact. In either event, his food history data was not included as either a case or a control in the analysis, due to no one being sure what he ate at the reception.

Two people were hospitalized. One patient in New York reportedly has acute renal failure, and is considered an HUS case by the State of New York. No deaths have been reported.

Key findings:

Two events represented the best opportunity for exposure: a rehearsal dinner on October 12 attended by 46 people, and the reception on October 13 attended by 110 guests and 9 catering staff. Statistically, the rehearsal dinner on October 12 is not associated with illness. The Odds Ratio for the Rehearsal Dinner is 1.60, with Confidence Intervals .49-5.18 and a p value= .29. People had an equal chance of becoming ill whether they attended the Oct. 12 event or not.

For the Wedding Reception, 65 identified food items were named on the contract and included in the questionnaire. A table listing those exposures, the Relative Risk, Confidence Intervals and p values is included below. In calculating p values, Fisher's Exact p values were selected due to the small number of occurrences in some cells and a desire to be consistent. This makes the analysis more conservative than it might need to be.

Exposure	Odds Ratio	Confidence Intervals	p value
Artichoke Stuffed Chicken Breast	1.17	.36, 4.04	0.51
Baked Brie	1.99	.67, 5.99	0.15
Beef w/mustard caper sauce	1.73	.59, 5.09	0.21
Any beverage	2.20	.72, 7.25	0.12
Biscuits	0.71	.16, 2.77	0.44
Bloody Mary	0	Und	Und
Bread Cubes	1.37	.49, 3.85	0.35
Buffet	1.53	0.11, 47.09	0.60
Canapes	3.69	.87, 19.31	0.06
Cantaloupe	0.49	.15, 1.44	0.14
Cheddar/beer fondue	1.30	.44, 3.80	0.40
Cheesecake lollipops	0.61	.22, 1.67	0.23
Chocolate fondue	0.51	.14, 1.70	0.21
Club soda	0	Und	Und
Coke	2.10	.57, 8.16	0.19
Crackers	0.74	.27, 2.00	0.36
Cranberry Juice	1.32	.03, 53.36	0.67
Coffee Creamer	2.72	.19, 83.77	0.39
Decaf coffee	0	Und	Und
Any dessert	1.05	.35, 3.23	0.57
Diet Coke	0.77	.13, 3.65	0.52
Dinner Rolls	0.62	.21, 1.75	0.25
Focaccia Bread	0.98	.28, 3.34	0.61
Any Fruit and Cheese	1.05	.35, 3.23	0.57
Garlic Bread Sticks	1.42	.41, 4.84	0.38
Ginger Ale	Und	Und	0.43
Grenadine	Und	Und	0.07
Havarti Cheese	0.99	.17, 5.20	0.65
Honey Dew Melon	0.07	0.00, 0.51	0.00
Hot tea	0	Und	Und
Italian Torte	0.63	.07, 3.88	0.47
Kahlua and cream	1.32	.03, 53.36	0.67
Kiwis	0.65	.02, 8.95	0.60
Lemon and Lime Juice	1.32	0.03, 53.36	0.67
Lemons in a beverage	1.44	.45, 4.63	0.36
London Broil	8.45	1.26, 198.33	0.02
Mangoes	0	Und	Und
Margarita	0	Und	Und
Marinated Mozzarella Cheese	1.06	.23, 4.64	0.60
Any Mixed Drink	1.55	.55, 4.38	0.27
Mixed Vegetable Medley	0.74	.26, 2.11	0.37
Mozzarella w/sun dried tomatoes	1.87	.35, 10.84	0.22
Orange juice	0	Und	Und
Pasta primavera	1.42	.41, 4.84	0.38
Pineapple	0.38	.12, 1.08	0.05
Pineapple juice	1.32	.03, 53.36	0.67

Pork tenderloin w/ apples	0.52	.12, 1.90	0.24
Provolone Cheese	1.24	.39, 3.86	0.45
Regular coffee	1.87	.35, 10.84	0.34
Sage derby cheese	1.06	.23, 4.64	0.60
Salad	0.58	.19, 1.74	0.23
Shrimp w/ Dill and cucumber	3.08	1.04, 9.49	0.03
Sprite	1.33	.13, 13.58	0.58
Strawberries	0.64	.19, 2.04	0.32
Sweet and Sour Mix	0	Und	Und
Sweet Tea	.60	.14, 2.27	0.33
Swiss Cheese	0.45	.11, 1.61	0.17
Tonic Water	1.73	.45, 6.88	0.30
Twice baked potatoes	1.69	.50, 6.19	0.28
Unsweet tea	1.33	.13, 13.58	0.58
Homemade wafers	0.63	.07, 3.88	0.47
Wisconsin cheddar	0.85	.30, 2.33	0.47
Zucchini w/ rosemary & sundried tomatoes	0.64	.19, 2.04	0.32

Interpreting these data, there are only a few exposures that merit any consideration. The association that explains the largest number of cases is the London Broil. The Odds Ratio is 8.45 for that exposure, and it would explain 96% of cases observed. London Broil is made from beef and is generally served rare or undercooked. It is biologically plausible. The p value for the association is 0.02, meaning there is only a 2% chance this observation would occur randomly. The confidence intervals for the association do not cross 1.00, meaning there is little possibility that it is not truly associated with illness.

There are two exposures that have good statistical evidence also, the Canapes and another appetizer, the shrimp with dill and cucumbers. None of these exposures explain as many cases as the London Broil, but they cannot be ruled out as relevant exposures. One potential explanation for these exposures might be that contaminated London Broil flank steaks were in the kitchen, and that cross-contamination of hors d'oeuvres occurred. In this scenario, all cases could be easily explained. It will be impossible to say for sure, since no leftovers exist that could be tested at this time.

It does seem more likely than not that the outbreak occurred because of exposures to food items served at the wedding reception that were contaminated with *E. coli* O157:H7.

Limitations of the dataset include the fact that several interviews were never completed by the New York and Arkansas departments of health, and more data may improve our ability to measure associations. It is also theoretically possible that some other exposure exists for this cohort that we have not been told about. We did identify in interviews that desserts (wedding cake) and beverages (beer, wine, rum, vodka, gin and whiskey) were served at the reception in addition to the items provided by Triangle Catering. We have no systematic information about those items.

The association between London Broil flank steaks and the outbreak was reported to the North Carolina Department of Agriculture, and a compliance officer from that agency examined the invoices and other records the caterer had regarding those steaks. The invoice information

indicated who the distributor for the product was, but there were no records available to identify the original producer for the meat. Therefore it is impossible to complete traceback for the item, or to identify unopened product that could be tested. The State Laboratory for Public Health did identify a bacterial pattern ID for this strain of *E. coli* and upload that pattern into the national database maintained by the CDC in Atlanta, GA, but no other matching patterns have been at this time.