Outbreak of Gastrointestinal Illness at Gresham Olive Garden, April 2005.

I. Summary

An outbreak of gastrointestinal illness was found to be associated with eating food from an Olive Garden restaurant in Gresham Oregon on April 19th and 20th. Based on laboratory findings in persons from multiple households, enterotoxigenic *E. coli* was the agent involved. No one specific food or food handler was implicated as the cause of the outbreak.

II. Initial Investigation

On April 21, 2005, a citizen called Multnomah County Health Department (MCHD) Environmental Health with a complaint of gastrointestinal (GI) illness after eating dinner on April 19th at the Olive Garden restaurant in Gresham, Oregon. Because multiple household were described by the caller as being involved, Environmental Health referred the call to the MCHD Communicable Disease Program (CD) on the 22nd. A nurse from CD interviewed the family on the evening of the 22nd. Eight people in two households had illness characterized by profuse diarrhea and cramping. The only food shared between the two households in the preceding five days came from the Olive Garden, and among the ill were four persons who ate leftovers only (i.e., did not go to the restaurant). Median incubation after eating was 36 hrs (range 36-64). Two of eight ill had vomiting, and one had fever. One of the ill persons was seen at a hospital emergency department. This person was dehydrated and told she had blood in stool & urine. Stool culture for standard bacterial enterics came back negative. Follow-up interviews indicated that six of the eight cases had marked improvement over 2-3 days (symptoms worst on first day of onset); and two were ill for more than three days.

As the GI illness described was of longer duration and accompanied by worse abdominal cramping than is characteristic of Norovirus infection, CD requested that MCHD environmental health specialists inspect the restaurant over the weekend. No high risk environmental violations were identified during the inspection on Saturday, April 23rd.

A second call from a different set of households was received on Monday April 25th. This group reported similar symptoms, especially noting the severity of abdominal cramping. Four of five persons from three households were ill, bringing our count of unsolicited suspect cases to 12 persons from five households.

The second call indicated a more widespread problem, and led the county to initiate a full outbreak investigation. The subsequent investigation included the following:

- Additional environmental health investigation, including interviews with food handlers (including servers) and restaurant managers, and
- Interviews from a cohort of Olive Garden (Gresham) patrons who ate dinner on April 19th and surrounding meals,
- Further lab testing of specimens from ill persons

The Oregon Department of Human Services Acute & Communicable Disease Program participated in this investigation, and environmental health specialists from the Olive Garden assisted with data gathering and essential information.

III. Outbreak Investigation & Laboratory Findings

Environmental Health Review Summary

Two MCHD Environmental Health Specialists (EHS) visited the Olive Garden on the afternoon of 4/27/2005. They met with Olive Garden managers and a corporate sanitarian. During this visit food preparation practices were reviewed with managers and employees, and Spanish-speaking kitchen employees were interviewed by a Spanish-speaking EHS. The review of kitchen and serving practices included food handling processes, starting from delivery of products to storage, prep, cooking, cooling, storage, reheating, and service. No critical food handling violations were identified. In particular, hand-sinks were in working order, food temperatures at cook line steam tables and coolers were generally in appropriate ranges, and walk-in coolers appeared fine, as did cooling methods. No illness was reported among kitchen staff in days before the 19th.

Food issues of interest that came up during the visit included sample meals, appetizer handling, and sauce holding temperatures. Sample meals are made and offered to employees so they can provide a first-hand description of the meal to interested customers. These meals are served individually to employees in a given timeframe. The ill employees identified during the investigation – who had onsets consistent with eating on the 19th -- did not report eating the sample meal on the 19th. Regarding appetizer handling, the most common appetizer, bread sticks, were handled differently from other appetizers. One of the production chefs prepares par-baked breadsticks. After oven-heating of the pre-made product, breadsticks are brushed with margarine, sprinkled with garlic salt, and placed in wait station warmer. If not used within 15 minutes, they are discarded. Unlike other appetizers that are provided to servers on serving plates, breadsticks are taken by servers from the warmer with tongs and placed in a linen-lined wicker basket. The only sauce holding temperature issue that came up on the day of inspection was that one cold sauce being held above the grill appeared overly warm (60°F). The sauce was removed from use for that day. As all other foods were at an acceptable temperature, the issue did not suggest a systemic problem.

On 5/03/2005, the restaurant was re-visited by a DHS and MCHD EHS-Net outbreak investigation team. They talked with the same management team as on previous visit. An EHS-Net interview form was completed and additional site observations made. The final state report to the facility is pending, but no critical violations were reported to MCHD-CD on that visit.

Cohort Study

The purpose of the cohort study was to identify if a given food or food-handler was statistically associated with the point source outbreak under investigation. As most persons in this particular cluster had recovered or were recovering from their illness, the

primary concern was to assess if there might be involvement of a food that might have public health implications beyond this outbreak.

Methods

Information relevant for the cohort study and provided by Olive Garden management included receipts for all persons eating at the Olive Garden Restaurant in Gresham Oregon on April 18th, 19th, or 20th; a listing of all foods and beverages served on the 19th with number of units served (received during the April 23rd inspection); and a list of food-handling staff by shift.

The cohort was developed from receipt information. MCHD requested the receipts on Monday, April 25th, and received the hard-copy listing on Wednesday, April 27th. Information on the receipt printout included card-holder name, foods eaten by party, server name, and time of meal. To obtain phone numbers for interviewing, names from each receipt were looked up in publicly-available, on-line reverse phone directories. For names with multiple listings, MCHD started with persons whose addresses were closest to Gresham and listed up to five phone numbers to attempt an interview. (NOTE: Receipts sent to state were looked up at the state.) The phone numbers were provided to interviewers along with the receipt information, in case food questions arose during the interview. Calls were made on Thursday and Friday, April 28th and 29th, respectively.

Interviewers from county and state used a standard interview instrument. This instrument was based on interviews with the initial callers, the Olive Garden menu, and the list of foods served on April 19th. As it was highly unlikely that a food not eaten by the initial households could have been a cause of illness, those foods were specified in the interview. Additional commonly-served foods were included based on food list provided by Olive Garden management. "Other foods/beverages" questions were asked to capture additional information not otherwise specifically requested. The format was the standard format used by state and county officials in suspect food-borne, point-source outbreaks (preliminary questions, foods, symptoms and medical treatment, demographic data, and any final questions).

Analyses were carried out in SAS. The case definition used was diarrhea (more then two loose stools in one day) from 6-96 hours after eating at the Olive Garden. This definition was established after identifying enterohemorrhagic *E. coli* as the outbreak-associated agent (see lab findings below). Incubation period was based on time stamp from the meal receipt and self reported onset time. For grouping by meals, lunch was defined as before 5pm; and dinner, at or after 5pm. Foods were assessed by dish, type (e.g. entrée v. appetizer), ingredients, and staff responsible for preparation. Interview data was also merged with data on server (obtained from receipt) and a "table-level" analysis performed for if anyone was ill from a given table or not, by server. To optimize sample size, information from the initially interviewed patrons (part of initial response) was included in the data for analysis.

Results

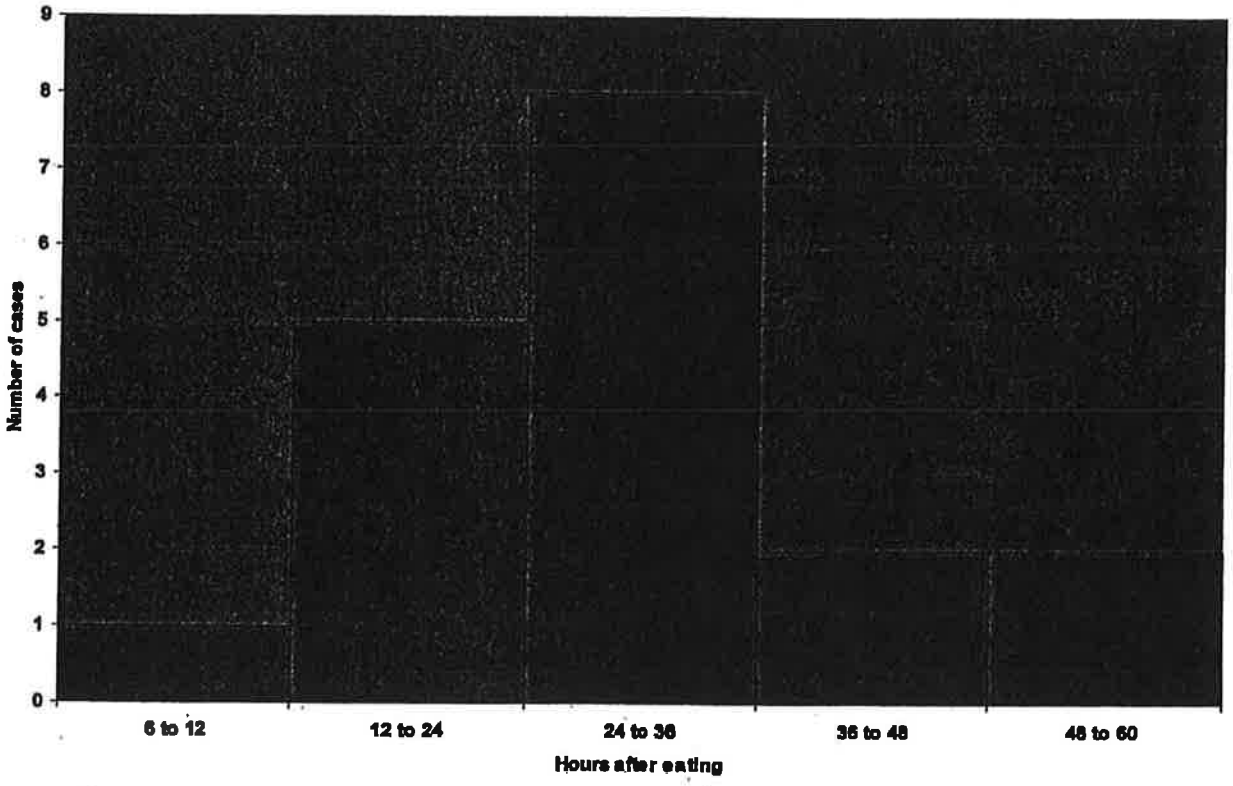
We received 136 useable receipts for April 19th, and 61 for April 20th lunch. Based on 155 receipts for which numbers were looked up at MCHD, at least one phone number was found for approximately 45% of receipts (69/155 receipts). For the 69 MCHD receipts with any number, 111 phone numbers were identified and 106 calls made. Of the 106

calls made, 42 (40%) calls resulted in contact with a person. Ultimately, 19 parties from 197 receipts were contacted by staff at the county and state (14/155 MCHD; 5/42 state; 9 and 12%, respectively). These 19 parties (including the original two parties; see Initial Investigation) resulted in 57 interviews.

Eighteen of 57 persons (32%) interviewed met the case definition. Median incubation period was 33 hours (range 8-59 hours; Figure 1). In addition to diarrhea, most people (13/16; 81%) had stomach cramps; half (9/18; 56%) reported nausea. Less common symptoms included chills (5/16 persons; 28%), headache (7/16 persons; 39%), and muscle ache (8/16 persons; 44%). Vomiting (3/16 persons; 17%) or fever (self-reported 2/18 persons; 11%) were unusual.

Figure 1: Incubation period*

*Consider hours after eating given range of eating times – i.e., eating in restaurant or eating leftovers.



The only food exposure statistically associated with illness was eating any appetizer except breadsticks (see Appendix for full listing of foods and associations with illness). Other appetizers were considered apart from breadsticks because all but two people reported eating breadsticks and because of food servers are involved in "plating" the breadsticks but not other appetizers (note that breadsticks are handled with tongs). The attack rate among those who ate any appetizer other then breadsticks was 50%; however, only 10 of 18 ill persons reported eating any appetizer other than breadsticks. The second most commonly eaten appetizers (after breadsticks) were the dipping sauces (alfredo and marinara), and the dipping sauce prep is done by a different cook than the one who does the other appetizers (excluding breadsticks). Eating a dipping sauce was

not associated with illness. Breadsticks alone or in combination with a dipping sauce were not associated with illness. Because the same prep cook makes the other appetizers and salad as main course, these items were combined for analysis: there was no association between this combined variable and illness (*p-value* for Chi-square test, 0.526). No single other appetizer was independently associated with illness.

Few other items were commonly enough consumed to explain the 18 cases of illness observed. Other then breadsticks, the most commonly eaten items were salads (38/57 persons), drinks with ice (27/57 persons), and water (25/57 persons). Among foods grouped according to common ingredients, 26 of 57 persons ate a food made with a white sauce base (includes alfredo dipping sauce). In all of these commonly eaten foods, the attack rates ranged only from 26-41% and none were statistically associated with illness. Eating anything with alfredo sauce (a subset of the white sauce group) was of border line significance, but only 8 of 18 ill people reported eating this type of food. Attack rates of 100% were seen among persons eating butter or spaghetti with meatballs, but in both cases only two persons reported eating either item.

In addition to using food prep information to help group items, shifts were examined to see if there were any unusual patterns of workers and specific types of food (e.g., sauce prep cook). No significant groupings were evident. However, the nature of the work of some food handlers in the kitchen – e.g., those on the expediter line or working as a back-up prep chef -- involved contact with multiple types of foods served.

Exposure to servers was analyzed at the table level, in order to avoid unjustly weighting the information by the size of the parties served. Eleven servers provided meals for the 19 parties interviewed. Six of these 11 servers waited on at least one party with a subsequently ill person.

Laboratory Findings

Specimens from five people were submitted to public health laboratories (MCHD, Oregon State Public Health Lab, and CDC) to help identify the cause of the outbreak. These five people included one staff member whose date of onset was similar to the ill patrons. The other four people were patrons from four different seatings served by at least three different staff.

All five specimens were negative for Norovirus, Cryptosporidium, and standard enteric pathogens (Salmonella, Shigella, Campylobacter, and E. coli 0157). They were sent to CDC to be tested for enterotoxigenic *E. coli* (ETEC; a.k.a., "traveler's diarrhea"). Four of five specimens came back positive for ETEC serogroup 0169:H41. Note that CDC had indicated that false negatives are not uncommon in ETEC testing, so that ETEC as a cause of illness should not be ruled out in the person who tested negative.

III Conclusions

ETEC was the cause of the point source outbreak examined here. No one food was strongly implicated in this outbreak that affected at least 18 people. As in most situations where no one food item is implicated, the most common suspicion is contamination of food by a food handler that had contact with an array of menu items. As a number of different servers had ill persons among the parties they served, the most

likely sort of food handler in this case would have been a member of the kitchen staff. If one of the kitchen staff were the source of ETEC, they most likely would have handled either appetizers and some sauces or the breadsticks. No kitchen staff reported illness in the days before the 19th. The possibility of asymptomatic carriage should not be ruled out. However, it should be remembered that based on the foods they were likely to handle no individual kitchen worker was identified as a likely source, and food handling practices appeared excellent.

Alternative possibilities to contamination by a food handler include an unidentified food. Such a food item would the most likely be an uncooked garnish, like a sprig of parsley, served with most types of meals but eaten only by certain persons. It should be noted that neither sprigs of parsley nor similar garnishes were identified in our review of recipes and food presentation. Another alternative could be a transient lapse in food handling practices that led to contamination of a food item at just one point in time. This second option appears unlikely, as ill persons were identified at multiple points in time, including across two separate meals.

Appendix

Associations between food and illness.

Foods listed by dish and by grouping. Italicized food groupings were made *post hoc* during analysis based on food recipes and preparation. Relative risk provided only if *p-value*$\leq$0.05

	Ate			Did Not Eat				Relative	
Food	Ill	Well	% Ill	Ill	Well	% Ill	P-value[a]	Risk	[95% CI]
Appetizers									
Breadsticks	16	39	*29*	2	0	*100*	0.096		
Bruschetta	0	0	-	18	39	*32*	n.a.		
Other bread	0	0	-	18	39	*32*	n.a.		
Butter	2	0	*100*	16	39	*29*	0.096		
Alfredo dipping sauce	3	3	*50*	15	36	*29*	0.368		
Marinara dipping sauce	3	8	*27*	15	31	*33*	1.000		
Fried mozzarella	2	2	*50*	16	37	*30*	0.584		
Fried zucchini	2	2	*50*	16	37	*30*	0.584		
Stuffed mushrooms	2	3	*40*	16	36	*31*	0.646		
Any Appetizer excluding breadsticks	10	10	*50*	8	29	*22*	0.028[b]	2.3	[1.08, 4.91]
Any dipping sauce	6	8	*42*	12	31	*28*	0.334		
Breadsticks with dipping sauce	5	8	*38*	13	31	*30*	0.795		
Soup or Salad									
Zuppa Toscana	4	3	*57*	14	36	*28*	0.191		
Garden salad	8	27	*23*	10	12	*45*	0.074[b]		
Other green salad	2	3	*40*	16	36	*31*	0.646		
Salad with entrée	6	16	*27*	12	23	*34*	0.579[b]		
Salad only	4	12	*25*	14	27	*34*	0.504[b]		
Any green salad	10	28	*26*	8	11	*42*	0.227[b]		
Entrees									
Chicken Alfredo[c]	4	3	*57*	14	36	*28*	0.191		
Fettuccine Alfredo	0	0	-	18	39	*32*	n.a.		
Seafood Alfredo	3	2	*60*	15	37	*29*	0.313		
Spaghetti w/meat sauce	0	0	-	18	39	*32*	n.a.		
Spaghetti w/meatballs	2	0	*100*	16	39	*29*	0.096		

Food (Continued)	Ate			Did Not Eat				Relative	
	Ill	Well	% Ill	Ill	Well	% Ill	P-value[a]	Risk	[95% CI]
Spaghetti w/sausage	0	0	-	18	39	32	n.a.		
Tuscan garlic chicken[c]	1	6	14	17	33	34	0.413		
Macaroni & cheese	1	3	25	17	36	32	1.000		
Other pasta w/chicken[c]	0	2	0	18	37	33	1.000		
Other pasta w/Alfredo sauce	0	1	0	18	38	32	1.000		
Other pasta w/meat sauce	0	3	0	18	36	33	0.544		
Other pasta w/sausage	0	0	-	18	39	32	n.a.		
Any dish with garlic sauce	1	8	11	17	31	35	0.247		
Any dish with alfredo sauce	8	9	47	10	30	25	0.101		
Any dish with a white sauce	9	17	35	9	22	29	0.652[b]		
Any dish with a red sauce	2	4	33	16	35	31	1.000		
Any entrée	10	23	30	8	16	33	0.808		
Other foods									
Any dessert	1	1	50	17	38	31	0.536		
Any drink w/ice	11	16	41	7	23	23	0.158		
Iced tea	2	6	25	16	33	33	0.666		
Lemonade	0	2	0	18	37	33	1.000		
A soft drink	1	4	20	17	35	33	1.000		
Water	9	16	36	9	23	28	0.526[b]		
Any food cooked with butter	13	22	37	5	17	22	0.254[b]		

[a] Two-sided Fisher's Exact Test unless otherwise specified

[b] Chi-square test

[c] Any dish with chicken was subsequently evaluated and found not to be associated with illness