



## OUTBREAK OF *SALMONELLA* AT A RESTAURANT IN LOS ANGELES COUNTY: PART OF A MULTI-JURISDICTION OUTBREAK

### OVERVIEW

On Thursday, 9/17/15, the Los Angeles County Department of Public Health (LAC DPH) received a foodborne illness report (FBIR) via the web.<sup>3</sup> The initial complainant reported 15 out of 18 ill after eating on Friday, 9/11/15. Initial food items reported were salad, zucchini carpaccio, crostini, bread and olive oil, mushroom truffle croquette, risotto, and an apple tart. Symptoms included diarrhea, abdominal cramps, fevers, body aches, and headaches. ACDC initiated an outbreak investigation to determine the extent of the outbreak, risk factors for the disease, and steps needed to prevent further spread.

### METHODS

- An outbreak-associated case was defined as a person eating at the FBIR-implicated restaurant between 9/6/15 and 9/13/15 who had:
  - 1) a stool, urine, or blood sample taken which grew *Salmonella*, or
  - 2) diarrhea and fever, or
  - 3) diarrhea and two of the following symptoms: nausea, fatigue, chills, fever, headache, body aches, or abdominal cramps.

An outbreak-associated control was defined as a person who ate at the restaurant during the same period of time but did not become ill with any gastrointestinal symptoms.

- LAC DPH Environmental Health Services (EHS) contacted the parties on the FBIR complaints to obtain contact information and preliminary information for all members.
- EHS conducted two inspections of the restaurant on 9/17/15 and 9/18/15.
- EHS requested contact information for all reservations made between 9/1/15 and 9/18/15.
- ACDC contacted the individuals who made reservations for case and control finding.
- ACDC created a food history and illness questionnaire for all the complainants from the FBIRs and interviewed them via telephone.
- ACDC collected data in MS Access and calculated frequency and distribution of symptoms among cases. Analyses of food items and combination of food items were also performed. All analyses were conducted using SAS 9.3 analysis software and MS Excel.
- ACDC sent out a health advisory to hospitals requesting to be notified of salmonellosis patients who could potentially be cases of the outbreak.
- ACDC created a separate questionnaire to interview employees on job duties, food history, and possible illnesses prior to the outbreak.
- ACDC, in conjunction with the District Public Health Nurses (PHNs), conducted a site visit on 9/18/15 to interview employees and initiate the process of stool collection.
- ACDC and EHS discussed food preparation with restaurant management and executive chef and obtained recipes with ingredient lists and invoices.

<sup>3</sup> [www.visualcmr.net/webvcmr/pages/public/pub\\_FBI\\_Report.aspx](http://www.visualcmr.net/webvcmr/pages/public/pub_FBI_Report.aspx)



- PHNs questioned all routinely reported *Salmonella* cases to determine if they had any connection to the LAC restaurant. Any new cases identified by the PHNs were additionally interviewed over the phone by ACDC with the outbreak food and illness history questionnaire.
- Employee stool samples were collected through the restaurant and received by PHNs at their District Health Centers.
- The LAC DPH Public Health Laboratory (PHL) tested all the employee stool specimens and provided results.
- PHL serotyped and determined the pulsed-field gel electrophoresis (PFGE) patterns for all the employee and case isolates.
- ACDC collaborated with Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA) via conference call and email to investigate the multistate outbreak and product trace back.

## RESULTS

### Setting

On Friday, 9/11/15, a group of employees went to an LAC restaurant for a company luncheon. This restaurant is a dine-in restaurant offering cuisine found in the Riviera and Coastal regions of France, Italy, and Spain. Some food items include ravioli, crostini, salad, lamb chops, risotto, zucchini carpaccio, branzino, truffle mushroom croquettes, and crème brulee. Wine and other alcoholic beverages are additionally available upon order. Patrons typically consume their food at the establishment; however, the restaurant also offers catering services. The restaurant is open seven days a week for lunch and dinner. On Saturday and Sunday, they serve brunch. It is frequented by families and friends who gather to share a meal or to celebrate special events. It is a popular location to hold special events such as weddings, baby showers, birthdays, and work luncheons. Employees are responsible for all the preparation and service of a majority of the food, but some food items come semi-prepared from a commissary in Long Island City, New York.

Among this LAC group, 15 out of 18 people eating at the restaurant reported becoming ill. EHS obtained line lists of the diners and ACDC interviewed luncheon attendees via telephone. Interviews were conducted with 13 of those individuals (87%). During this time, a public health nurse notified ACDC of an employee of the restaurant who tested culture positive for *Salmonella*. Subsequently, all CHS PHNs were notified of a potential outbreak. PHNs soon identified eight additional cases connected to the restaurant. ACDC made contact with all eight cases. In the following week, ACDC received eight more FBIRs identifying individuals who ate at the LAC restaurant and experienced illness between 9/6/15 and 9/13/15. Collectively, food and illness history questionnaires were completed on 81 individuals. Contact information for these individuals were obtained through FBIRs, reservation lists provided by the restaurant, and routinely reported cases PHNs identified as having recently eaten at the restaurant.

Out of the 81 individuals interviewed, 42 cases and 29 controls were identified. The remaining 10 individuals were ill, but did not meet case definition. Out of the 11 laboratory confirmed cases, 10 stool



samples were collected by the private medical facilities the cases visited, and one sample was collected by public health. All isolates of confirmed cases were forwarded to the PHL for serotyping and PFGE testing.

### **Cases: Restaurant Patrons**

The median age of cases was 33 years, ranging from 19-85 years (Table 1). Cases were both male (21%) and female (79%). The controls included males (24%) and females (76%) with a median age of 35 years (range: 23-93 years) (Table 1). Main symptoms of cases included diarrhea (100%), abdominal cramps (98%), nausea (81%), fever (38%), and chills (71%) (Table 2). Illness onsets occurred between 9/6/15 and 9/19/15 (Figure 1). The median incubation period was 30 hours (range: 2 to 139 hours). The median duration was slightly longer than 4 days (range: 1 day to at least 14 days). A total of 11 restaurant patrons had confirmed positive *Salmonella* Enteritidis laboratory cultures with the PFGE pattern JEGX01.0008.

### **Food Analysis**

The results of the statistical analysis of food items eaten by attendees are shown in Table 3. The truffle mushroom croquette (p-value <0.001) was eaten by 86% of cases and the tajine (p-value 0.016) was eaten by 36% of cases. Both food items were found to be significantly associated with illness.

### **Restaurant**

#### Inspection

All patrons interviewed consumed the food at the restaurant. The inspection by EHS on 9/17/15 revealed violations such as an employee eating while preparing food and the absence of gloves while having contact with food. The restaurant voluntarily closed that day for cleaning. The restaurant disposed of all food items and brought in new food stock. A third party food safety consultant was hired to train staff and provide guidance on food safety matters. Also, a cleaning service company was hired to conduct a deep cleaning of equipment in the kitchen.

EHS also conducted a second site visit the next day, 9/18/15, which included a walk-through of the areas that were cleaned the day before. The restaurant was allowed to hold a special pre-booked event on the evening of 9/18/15. Food and employees for this special event were from a sister location not associated with the outbreak.

#### Employees

There were 121 employees reported to ACDC. Contact was made with all 121 employees through in-person interviews or self-administration of interview sheets distributed by upper management at the restaurant. Out of 121, 23 employees admitted to gastrointestinal symptoms. Stool samples were collected from any employee that handled food or reported being symptomatic within the last month. The PHL performed the test for results. A total of 14 employees had positive stool cultures for *S. Enteritidis*, with PFGE pattern JEGX01.0008.



ACDC and CHS worked with the restaurant managers to ensure that these 14 employees were either removed from the restaurant until they were cleared by standard procedures or were placed in duties that did not involve food handling.

## DISCUSSION

This is a laboratory confirmed *S. Enteritidis* outbreak. The PHL, in conjunction with private labs, yielded a total of 25 positive *Salmonella* tests. Patrons and employees had identical serotypes and PFGE patterns. Patrons who tested positive were from separate dining groups and had eaten at the restaurant at different times or dates. Several cases were identified from routine *Salmonella* surveillance rather than foodborne illness reporting. Presumptive cases also reported severe symptoms such as ongoing diarrhea, fever, headaches, and body aches. Truffle mushroom croquettes and tajine were items found to be significantly associated with illness. Although the tajine resulted as significantly associated, 11 of the 12 individuals who ate tajine also ate the truffle mushroom croquette. In other words, the association of the tajine with illness is confounded by the consumption of the truffle mushroom croquette.

According to the CDC, *Salmonella* results in symptoms of diarrhea, fever, and abdominal cramps. Individuals generally become symptomatic 12 to 72 hours after being infected and remain so for approximately 4-7 days [1]. Children, elderly, immunocompromised, and individuals with severe symptoms may require hospitalization. Certain food items and meats are known to cause Salmonellosis when not properly heated. In particular, *S. Enteritidis* infection is most commonly associated with eggs, but other sources include raw milk, pork, beef, sprouts, and raw almonds [2]. In this outbreak investigation, the items mentioned above were not suspected to be the cause of infection.

The spread of *Salmonella* in this restaurant could have been through a contaminated ingredient used at multiple locations. Produce, for example, can be contaminated at the source before it is shipped through dirty irrigation water, manure, or animal contact. If *Salmonella* is able to contaminate one piece of a larger batch of produce, cross contamination would occur throughout the rest of the batch [3]. This restaurant, and its other locations, use ingredients that are pre-prepared in a commissary and then individually shipped out to each location. Particular to this investigation, black trumpet mushrooms were found to be one of those ingredients that are shipped to the commissary, dried, and then sent to the restaurants. The restaurant then prepares a puree by blending the dried mushrooms with oil, and the puree is used to garnish a few dishes including the truffle mushroom croquettes. Due to the absence of a heat kill step, it is possible the mushrooms, and therefore the puree, were contaminated before they were distributed. The CDC and FDA are involved in an ongoing multistate investigation with this restaurant and its commissary.

The cooking of the truffle mushroom croquettes also introduces a possible pathway for the spread of *Salmonella*. This item is partially prepared in the commissary and then finished in the kitchen of the restaurant. The commissary prepares a frozen truffle mushroom croquette mix that is shipped to each location. At the restaurant, the frozen mix is cut into cubes, dipped in flour and eggs, and fried. If the internal temperature of the croquette does not reach a minimum of 165°F, *Salmonella* may still survive.



Another source of the *Salmonella* could have been an infected food handler at the commissary. Infected individuals can excrete the bacteria in their feces for a few days or several weeks, depending on how quickly their bodies are able to rid the gastrointestinal tract of the illness [3]. *Salmonella* can remain in a person's system even after symptoms have resolved. Food handlers are possible sources of *Salmonella* due to the nature of their work [3-6]. Food handlers at the restaurant were most likely infected themselves when eating the contaminated food and were not the source. Food handlers were likely exposed due to the family style meals eaten on site every day. Also, because there was an outbreak of *Salmonella* with the same PFGE pattern at another location of this restaurant chain, it is more likely a food handler at the commissary would be implicated.

### LIMITATIONS

Cases that are found through routine *Salmonella* surveillance occasionally have difficulties recalling when and what they ate. Persons may eat out frequently and the restaurant is one of many exposures. More time has also passed for these cases compared to the individuals who report foodborne illness. As a result, it is also harder to remember the date and time their symptoms first began. These are individuals who have already been diagnosed and may be ascertained several days after resolution of their symptoms.

### PREVENTION

EHS educated restaurant owners and managers about sanitization and ways to prevent future *Salmonella* infections. The PHNs and ACDC educated all the restaurant workers and individual salmonellosis cases on the spread of *Salmonella* and the importance of staying home when ill to prevent spreading sickness.

### CONCLUSION

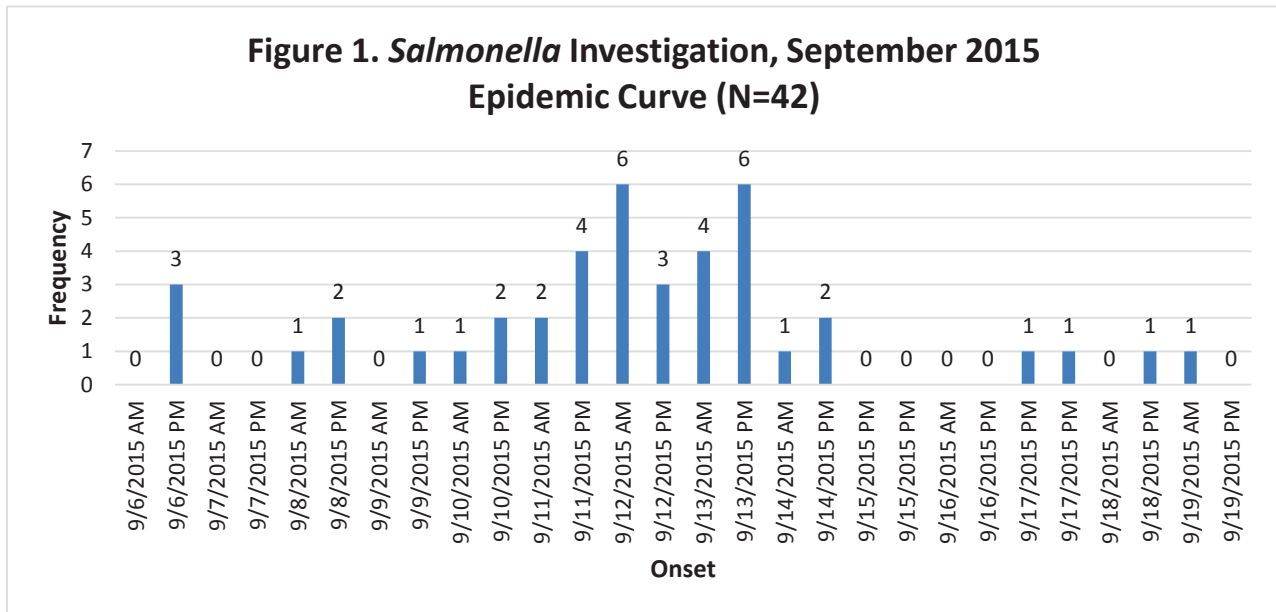
This is a single outbreak that occurred among patrons who dined at this restaurant between 9/6/15 and 9/13/15. This outbreak occurred in a specific restaurant location but is part of a larger cluster nationwide. The agent *S. Enteritidis* was confirmed by laboratory results. No additional complaints or illnesses have been reported for this restaurant location since the restaurant has taken appropriate measures to remove all potential causes of this outbreak. ACDC in conjunction with EHS will monitor for future reports of foodborne illness.

### REFERENCES

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	Cases (n=42)		Controls (n=29)	
	N	(%)	N	(%)
Male	9	(21%)	7	(24%)
Female	33	(79%)	22	(76%)
Age Group (years)				
<1	0	(0%)	0	(0%)
1-4	0	(0%)	0	(0%)
5-9	0	(0%)	0	(0%)
10-19	1	(2%)	0	(0%)
20-49	31	(74%)	22	(76%)
50-74	9	(21%)	3	(10%)
>74	1	(2%)	1	(3%)
Unknown	0	(0%)	3	(10%)
Median age	33 years		35 years	
Age range	19-85 years		23-93 years	

Symptom	N	%
Fatigue	32	76%
Nausea	34	81%
Diarrhea	42	100%
Bloody Diarrhea	5	12%
Body Aches	25	60%
Abdominal cramps	41	98%
Dizziness	18	43%
Chills	30	71%
Vomiting	12	29%
Headache	22	69%
Fever	16	38%
Fever > 102°F	0	0%
Tingling	2	5%
Median Duration=1.7 days (range 1-5 days)		
Median Incubation=34 hours (range 2-51 hours)		



Food Item	Cases (N=42)			Controls (N=29)			p-value
	Percent	n	N	Percent	n	N	
Salad	17%	7	42	38%	11	29	0.043
Fig & Gorgonzola Risotto	10%	4	42	7%	2	29	0.696
Crostini	67%	28	42	69%	20	29	0.839
<b>Truffle Mushroom Croquette</b>	<b>86%</b>	<b>36</b>	<b>42</b>	<b>17%</b>	<b>5</b>	<b>29</b>	<b>&lt;0.001</b>
Filet Mignon Salad	12%	5	42	14%	4	29	0.814
Caramelized Apple Tart	21%	9	42	10%	3	29	0.221
Zucchini Carpaccio	17%	7	42	10%	3	29	0.452
Lamb	21%	9	42	10%	3	29	0.221
Beef Carpaccio	2%	1	42	3%	1	29	0.789
<b>Tajine</b>	<b>36%</b>	<b>15</b>	<b>42</b>	<b>10%</b>	<b>3</b>	<b>29</b>	<b>0.016</b>
Bread	36%	15	42	38%	11	29	0.849
Olive Oil	38%	16	42	38%	11	29	0.989
<b>Water</b>	<b>60%</b>	<b>25</b>	<b>42</b>	<b>90%</b>	<b>26</b>	<b>29</b>	<b>0.008</b>
Ice	26%	11	42	38%	11	29	0.293
Truffle Risotto	2%	1	42	3%	1	29	0.789
Pot de Cream	10%	4	42	14%	4	29	0.576
Tartufo	7%	3	42	0%	0	29	0.141
Salmon	19%	8	42	10%	3	29	0.319
Paella	7%	3	42	7%	2	29	0.968
Buratta	5%	2	42	3%	1	29	0.787
Octopus	7%	3	42	3%	1	29	0.507
Sea bass	5%	2	42	3%	1	29	0.787