CA EPI 13-06: Multistate Outbreak of *Escherichia coli* O157:H7 Infections Associated with Two Varieties of Ready-to-Eat Salads, October–November 2013

June 17, 2014

SUMMARY

In October and November of 2013, a multistate outbreak of shiga-toxin producing *Escherichia coli* O157:H7 (*E. coli* O157) infections occurred, affecting 28 California residents and 5 residents of Washington (3), Arizona (1), and Texas (1). Investigation by the California Department of Public Health (CDPH) in cooperation with local, state, and federal partners identified two varieties of pre-packaged, ready-to-eat (RTE) salads from one company as the likely source of the outbreak.

BACKGROUND

During the final week of October 2013, the CDPH Microbial Diseases Laboratory (MDL) and Santa Clara County Public Health Laboratory identified a cluster of six *E. coli* O157 infections in the San Francisco Bay Area with isolates sharing a novel pulsed-field gel electrophoresis (PFGE) pattern combination (EXHX01.0589/EXHA26.3182). On October 29, the U.S. Centers for Disease Control and Prevention (CDC) notified CDPH of a matching isolate from an Arizona patient and designated the cluster as 1310CAEXH-1. CDPH initiated an investigation to identify additional cases, identify a source, and prevent further illness.

METHODS

Epidemiologic Investigation

For the purposes of the CDPH investigation, a case-patient was defined as a California resident from whom an *E. coli* O157 isolate matching the outbreak strain had been collected on or after October 1, 2013. The outbreak strain was defined by matching the unique PFGE pattern combination EXHX01.0589/EXHA26.3182 or the multiple-locus variable-number tandem repeat analysis (MLVA) pattern. To enhance case finding, CDPH notified affected local health jurisdictions (LHJs) of a potential ongoing *E. coli* O157 outbreak and requested enhanced surveillance and expedited processing of isolates.

Case report forms of case-patients were reviewed for information about patient demographics, clinical presentation and exposures before illness onset. Preliminary information from these case reports indicated a high frequency of produce consumption. Case-patients were interviewed using a standardized hypothesis-generating questionnaire (HGQ) which was modified as additional information was obtained about common specific food items. The frequency of patient exposure to specific food items was compared to reported consumption of the same food items in the general

population based on data from the 2006–2007 Foodborne Diseases Active Surveillance Network (FoodNet) Population Survey Atlas of Exposures [1].

Shopper purchase history was collected whenever possible. When prepackaged salads from Grocery Chain A (GCA) became a leading suspect vehicle, GCA was asked to provide background shopper data for comparison. Binomial and chi-square tests were used to compare exposures reported by patients to FoodNet and GCA shopper data. Data were managed and analyzed in Microsoft Excel 2010 and SAS v 9.3.

PFGE and MLVA analysis for California case-patients were performed by MDL and some county public health laboratories. Matching PFGE isolates from other states were identified through the CDC PulseNet system. MLVA testing for matching isolates from other states was performed by CDC. Food and environmental samples collected during the investigation were processed and tested by the CDPH Food and Drug Laboratory Branch, USDA, and FDA.

Traceback Investigation

Results of the epidemiologic and laboratory investigations informed traceback investigations of implicated products by the CDPH Food and Drug Branch (FDB), the U.S. Department of Agriculture Food Safety Inspection Service (USDA-FSIS), and the U.S. Food and Drug Administration (FDA). Details on the methods and findings of the traceback investigation will be available from these agencies.

RESULTS

Epidemiologic Investigation

As of December 17, 2013, a total of 33 persons infected with the outbreak strain of *E. coli* O157 were reported from four states, including Arizona (1), California (28), Texas (1), and Washington (3), with reported illness onset dates from October 5 through November 1, 2013. The median age of affected individuals was 29 years (range: 2–78); 64 percent were female. Of 32 patients with known clinical status, 9 (28 percent) were hospitalized with no deaths reported.

CDPH identified 28 case-patients in California from ten local health jurisdictions: Alameda (2), Berkeley (2), Contra Costa (4), Los Angeles (3), Riverside (1), San Francisco (5), San Mateo (4), Santa Clara (4), Santa Cruz (1), and Sonoma (2). The median age of California case-patients was 28 years (range: 2–78); 64 percent were female. Of 27 patients with known clinical status, 6 (21 percent) were hospitalized with no deaths reported.

All 33 case-patients had isolates with the unique matching PFGE pattern combination. MLVA analysis was performed on 29 isolates with perfect concordance to PFGE results. MLVA was not performed on isolates from two patients in Los Angeles County. Ten case-patients were initially identified by MLVA and were interviewed an average of 2.6 days earlier after symptom onset than those initially identified by PFGE.

Of the 32 patients who were interviewed with the HGQ, 27 (84 percent) reported shopping at or consuming food purchased from GCA. Of these, 24 (89 percent) reported consumption or likely consumption of a prepackaged, RTE salad from GCA during the week before illness onset, compared with an expected 18 percent of GCA customers purchasing RTE salads on the basis of consumer purchase history (p <.0001). Among 24 patients who reported prepackaged salad consumption, 22 (92 percent) reported one of two specific salad varieties compared to 10 percent of GCA shoppers purchasing a RTE salad (p <.0001). Each salad was a prepackaged, RTE variety with over a dozen ingredients, seven of which were in common (Table 1). Two patients reported consuming RTE salads purchased at stores other than GCA prior to illness onset.

No other food exposures were found to be statistically significantly associated with illness when compared to national FoodNet population data, other than produce associated with the two salads. CDPH epidemiologists communicated their findings to colleagues at FDB, FDA, USDA-FSIS, CDC, state partners, and GCA headquarters on November 6, 2013 when preliminary analysis of food exposure data implicated the two varieties of prepackaged RTE salads.

Traceback Investigation

GCA reported to CDPH on November 6, 2013 that both of the implicated salad varieties supplied to the affected areas were produced by a single facility (Company A) located in Richmond, CA. GCA halted stocking the two implicated salads produced by Company A on the same day. RTE salads from other producers were offered as usual. FDB conducted a site visit to Company A on November 8 and took product samples; all tested negative for contamination with *E. coli* O157. Company A was found to have supplied RTE salads and fresh sandwich wraps to multiple retailers including grocery stores and cafes in the San Francisco Bay Area and one of the two implicated salad varieties to GCA stores in Washington, Texas, Nevada, Arizona, and Southern California. On November 10, 2013, Company A issued a recall of all products sharing fresh ingredients with the two implicated RTE salads.

FDB initiated a traceback investigation of the common salad components and identified a single farm supplier of romaine lettuce to the two implicated salads during the exposure period. Ten environmental samples were collected during a site visit to the farm on November 21, 2013. Five soil samples were positive for *E. coli* O157 but these isolates did not match the outbreak strain. On subsequent visits to the supplying farm and Company A on December 10 and December 11, respectively, additional samples were collected but all tested negative for *E. coli* O157. Further details of the FDB, USDA-FSIS, and FDA investigations will be available from those agencies.

DISCUSSION

An outbreak of *E. coli* O157:H7 infections occurred in October and November of 2013, affecting 33 individuals in four western states. The outbreak disproportionately affected California residents, accounting for 85 percent of all case-patients. Two varieties of prepackaged RTE salads produced by Company A and sold by GCA were implicated as

the source of infection. This is supported by the statistically significant association of case-patients with consumption of one of two implicated GCA salad varieties and by the regional distribution of reported cases matching the regional distribution of these two salads. No other food items or exposures were associated with illness. While these salads were strongly associated with the outbreak, the exact source of the contamination remains undetermined.

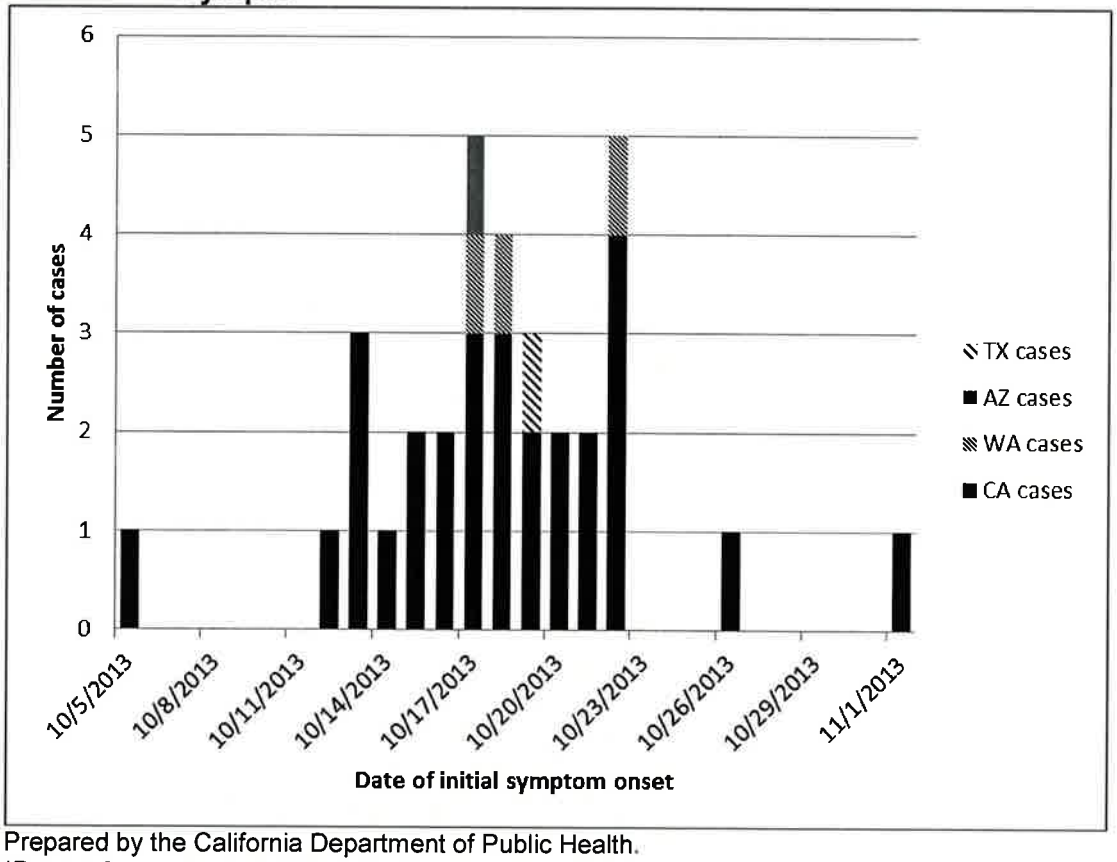
ADDITIONAL INFORMATION

CDC: http://www.cdc.gov/ecoli/2013/O157H7-11-13/index.html

USDA: http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall-case-archive/archive/2013/recall-065-2013-release

FDA:
http://www.fda.gov/Food/RecallsOutbreaksEmergencies/Outbreaks/ucm374327.htm

Epidemiologic curve for *Escherichia coli* O157:H7 cluster 1310CAEXH-1 by state and date of symptom onset*.



Prepared by the California Department of Public Health.
*Dates of onset were unknown for three individuals and are estimated as occurring three days prior to collection of their laboratory sample.

Table 1: List of ingredients in two implicated varieties of prepackaged ready-to-eat salads. Bolded ingredients were common to both salad varieties.

Salad A	*Salad B*
Romaine lettuce	**Romaine lettuce**
Red cabbage	**Red cabbage**
Corn	**Corn**
Red bell pepper	**Red bell pepper**
Grilled chicken	**Grilled chicken**
Asiago cheese	**Asiago cheese**
Green onions	Pumpkin seeds
Israeli couscous	Sundried tomatoes
Pecans	Spring mix
Currants	Green cabbage
Sweet basil dressing	Green bell pepper
	Cilantro
	Jalapeno Caesar dressing

REFERENCES

1. Centers for Disease Control and Prevention (CDC). Foodborne Active Surveillance Network (FoodNet) Population Survey Atlas of Exposures. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2006 – 2007.