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SALMONELLA TYPHIMURIUM OUTBREAK ASSOCIATED WITH RESTAURANT 'A' ELKO, NV FINAL REPORT, SEPTEMBER 10, 2019

PURPOSE

- Describe the magnitude of this outbreak;
- Provide findings of environmental, epidemiological, and laboratory investigations;
- Identify risk factors that caused or contributed to this outbreak;
- Summarize the findings of the investigations conducted by the Division of Public and Behavioral Health (DPBH) of the Department of Health and Human Services (DHHS). The investigation was carried in partnership with the Environmental Health Section (EHS) and the Office of Public Health Investigations and Epidemiology (OPHIE);
- Document the DPBH's outbreak response actions and decisions and support them with data and literature.

INITIATION OF INVESTIGATION

Between Friday, March 8, 2019 and Monday, March 11, 2019 OPHIE received 12 *Salmonella* positive laboratory reports from Hospital A in Elko. Case interviews were conducted to obtain symptomology, onset dates, potential exposures, incubation period and other information. EHS was notified of the increasing frequency of *Salmonella* reports. By 3:00 PM on March 11, 2019 five (5) interviews had been completed revealing that all five (5) cases had dined at Restaurant A in Elko and reported consuming "sunny side up" eggs. EHS inspectors were notified of the findings and subsequently inspected Restaurant A on the same day.

ENVIRONMENTAL INVESTIGATION

Methods

The following activities were conducted during the environmental investigation:

1. On-site field investigation at Restaurant A and collection of information on sources of food supply for menus and recipes.

2. Interviews of employees and managers of Restaurant A. Symptomatic/ill employees were excluded from work and were required to submit a stool sample to the Nevada State Public Health Laboratory (NSPHL) for testing of *Salmonella*.
3. Food samples of suspect food items were collected from Restaurant A.
4. Environmental surface samples from Restaurant A were collected.

Results

The following deficiencies were identified and corrected on-site:

- Potentially hazardous, raw food of animal origin stored or displayed directly above ready-to-eat foods.
- Thermometers were not available/provided for the reach-in refrigeration units.
- Wiping cloths were not stored in a bucket of water with adequate sanitizer.
- Knives and other utensils were stored in crevices between equipment.
- Ice machine was not cleaned and/or sanitized; a thick layer of what appeared to be mold was observed.

In addition to above, EHS required Restaurant A to cease serving “sunny side up” eggs immediately.

On March 12, 2019 EHS staff conducted a second site visit to determine the source of the eggs and the manner they are received, stored, and prepared by the restaurant. Most of the eggs received by Restaurant A between March 1, 2019 and March 5, 2019 had been served and consumed. Eggs received on March 8, 2019 were put on a hold order.

On March 13, 2019, EHS collected 19 dozen egg samples from Restaurant A and submitted them to the NSPHL for testing.

EHS excluded two (2) symptomatic employees from working and required them to submit clinical samples. Both employees were tested, and confirmed positive for *Salmonella*. Both employees were later recovered and cleared to return to work after submitting follow up samples.

In addition, the Food and Drug Administration (FDA) was notified and assigned a team of investigators to conduct environmental sampling at Restaurant A on Wednesday, March 20, 2019. FDA worked with EHS staff who were familiar with the restaurant and could help guide the environmental sampling activities.

Food Samples

No *Salmonella* species were detected in the egg samples.

Surface Swabs Samples

A total of 107 samples were collected and analyzed by the FDA laboratory. No *Salmonella* species were detected.

EPIDEMIOLOGICAL INVESTIGATION

Methods

The epidemiological investigation included the following:

1. Development of a case definition in order to characterize cases;

2. Interviews of cases using routine investigation survey forms to identify meal companions at Restaurant A;
3. Interviews of cases and their meal companions to identify foods eaten at Restaurant A using the restaurant menu;
4. Hypothesis generation;
5. Case control study to test the hypothesis;

Outbreak cases were defined as follows:

Clinical criteria: A clinically compatible case for this outbreak is defined as a person who developed the following symptoms within 72 hours of meeting the epidemiological criteria (defined below):

- Diarrhea AND/OR
- Abdominal pain, nausea, or vomiting, with or without a fever

Epidemiological Criteria: An epidemiologically compatible case for this outbreak is defined as a person who either ate at or worked at Restaurant A in Elko between February 26, 2019 and March 10, 2019.

Case Classification:

Confirmed: A confirmed case is defined as a person who meets the epidemiological criteria with or without meeting the clinical criteria and has laboratory confirmation of *Salmonella*.

Probable: A probable case is defined as a person who meets the clinical and epidemiological criteria but had no laboratory confirmation.

The initial hypotheses were:

1. An unknown food item provided by Restaurant A caused the illness among some patrons and employees;
2. A food handler or more of Restaurant A contaminated foods and then caused some patrons and employees who ate there to become ill.

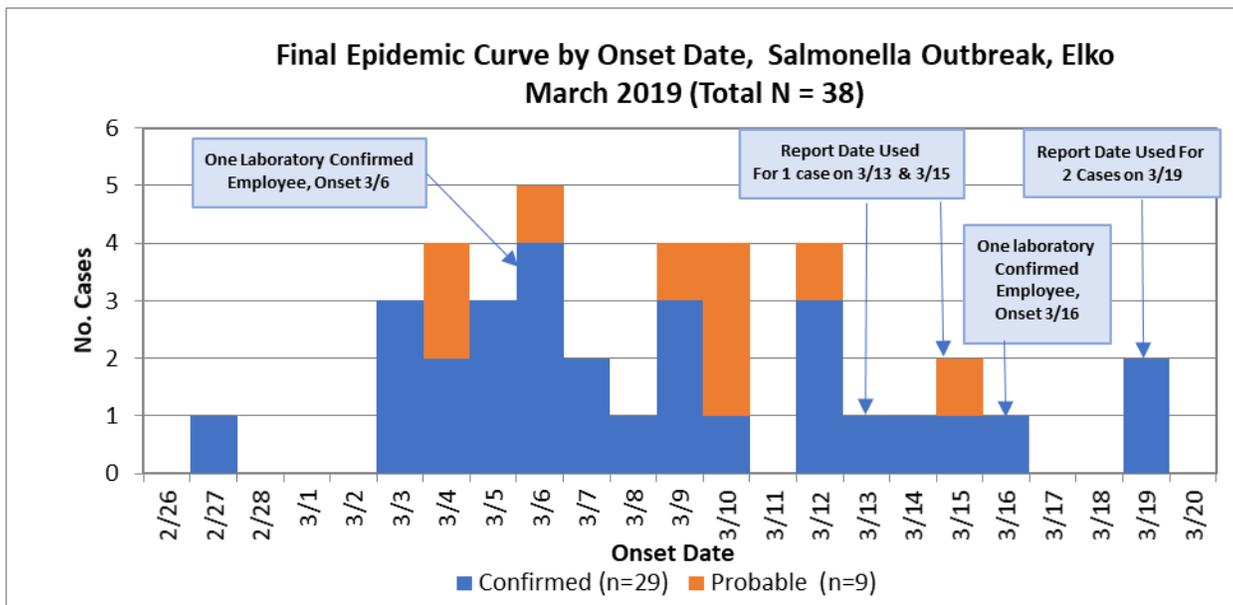
A case-control study was performed to assess the association between exposure and illness and to help identify a potential source of infection. Each case and control was interviewed using the standardized *Salmonella* questionnaire, along with the restaurant menu.

Results

As of the date of completing this outbreak investigation, April 10, 2019, a total of 38 cases met the outbreak case definition. Of those 29 were confirmed and nine (9) were probable. Two (2) of the 38 cases were employees associated with Restaurant A.

Of the 38 cases, 13 (34%) were females and 25 (66%) were male. Median age of cases was 49 years (range 1-82 years). All cases occurred between February 27 and March 16, 2019. Date of first identified exposure to Restaurant A was February 26. Last exposure to Restaurant A seemed to have occurred on March 10, 2019. As not every case was interviewed, Case-reporting Date was used as a segregate for the Onset Date.

Please see Final Epidemic Curve (below).



OPHIE staff notified local health authorities in Elko County and the Health Department of the neighboring State of Utah regarding this outbreak and the observed increase in the frequency of positive *Salmonella* case reports in Elko.

OPHIE staff notified the Elko County Health Officer, the urgent cares in Elko and the health clinic located at the Elko mine.

Case-Control Study

There were 86 menu items identified from Restaurant A. On March 19, 2019 initial bivariate analysis was performed to assess the association between the 86 menu items and outcome. This analysis included nine (9) cases and nine (9) controls. Findings showed statistical significance for the “American Breakfast.” However, odds ratio could not be determined due to a “0” value in one cell of the 2 by 2 table. The Fisher Exact P value is (0.009). This meal includes 3 eggs (any style) choice of meat, and choice of hash browns or fries, and choice of toast or buttermilk biscuit. Although eggs are not the only food item consumed with this meal, they are the only consistent item that does not come with multiple choices.

Binomial analysis was also performed using the state of Oregon’s model. The Centers for Disease Control and Prevention (CDC)’s FoodNet background rate chosen was for “any eggs consumed away from home.” This result was also significant with a P value of 0.00055.

LABORATORY INVESTIGATION

Clinical Specimens

20 isolates collected during this outbreak have undergone Whole Genome Sequencing (WGS) at the NSPHL with a confirmed serotype as *Salmonella* Typhimurium. Pulsed-Field Gel Electrophoresis (PFGE) was performed on 18 of the specimens and they all have matching patterns. Twelve of the WGS sequences can be viewed on the National Center for Biotechnology Information (NCBI) Pathogen Detection Browser and are 0-2 single nucleotide polymorphism (SNP) differences from each other, representing minimal variation and supposition of a common point-source.

DISCUSSIONS AND CONCLUSIONS

Salmonella is a rod-shaped gram-negative bacteria that live in the intestinal tracts of humans and animals. People can get *Salmonella* infection from a variety of sources, including contaminated food or water and improperly or inadequately washed hands after touching infected animals.

Most of *Salmonella* cases develop diarrhea, fever, and abdominal cramps 12 to 72 hours after contracting the infection. The illness usually lasts 4 to 7 days, and most individuals recover without treatment. In some cases, symptoms can be severe requiring hospitalization. In such patients, *Salmonella* infection may spread from the intestines to the blood stream, and other body sites. Severe cases of *Salmonella* can cause death unless patients are promptly treated. The elderly, infants, and those with impaired immune systems are more likely to have severe forms of *Salmonella* infection.

The confirmed etiology of this outbreak was *Salmonella* Typhimurium. Although food samples were negative, analysis from the case-control study showed statistical significance for the “American Breakfast” meal at Restaurant A. Additionally, binomial analysis using Oregon’s model was statistically significant for egg consumption. The results from the case-control study coupled with the binomial analysis shows strong epidemiologic evidence of eggs being the potential source of infection.

RECOMMENDATIONS FOR CONTROLLING DISEASE AND/OR PREVENTING/MITIGATION EXPOSURE

The following recommendations were implemented at Restaurant A as a result of the outbreak investigation:

- Restaurant A employees with symptoms of gastroenteritis were excluded from work until 48 hours after symptoms have resolved.
- Bare hand contact with ready-to-eat foods is prohibited.
- All raw foods are properly stored away from or below ready-to-eat foods.
- Deep cleaning of the facility is conducted on a regular basis.