Salmonella Newport Infections Associated with Onions

June – July | Multiple counties/Multiple states

On July 14, 2020, the Centers for Disease Control and Prevention (CDC) notified the Minnesota Department of Health (MDH) that one *Salmonella* Newport isolate from Minnesota submitted through routine surveillance was closely related by whole genome sequencing (WGS) to isolates in a multi-state cluster. CDC had opened the investigation on July 10, with 13 cases in three states. By the time the first case was identified in Minnesota, there were 38 cases in eight states (Michigan, Minnesota, North Carolina, Ohio, Oregon, South Dakota, Utah, and Wyoming). At that time, notable exposures among the 12 cases interviewed included chicken (11), beef (9), pork (9), eggs (9), leafy greens (5), onions (10), tomatoes (8), and cheese (9). Many cases in other states reported eating at Mexican restaurants. The next day, the MDH Public Health Laboratory (PHL) identified two additional clinical isolates closely related to the cluster. The three isolates were 0 to 1 allele different from each other.

A case was defined as a Minnesota resident with a laboratory-confirmed infection with *S*. Newport closely related by WGS (0-5 alleles by cgMLST). Cases were interviewed with a routine surveillance questionnaire and a CDC supplemental questionnaire focusing on ingredients often served in Mexican restaurants.

Attempts were made to collect detailed shopping location, grocery store loyalty or membership numbers, credit card receipts, and credit card numbers. All the information obtained was shared with the Minnesota Department of Agriculture (MDA) for traceback investigations.

Additionally, invoices from two restaurants where cases ate were collected by environmental health inspectors (EH) from the Washington County Department of Public Health and Environment and Horizon Public Health and shared with MDA for traceback of select ingredients.

Onions from one grocery store chain mentioned by a high proportion of cases were also traced back by MDA.

Case and traceback information was shared with CDC and the United States Food and Drug Administration (FDA) as part of the investigation.

Binomial probability calculations using foods reported by culture-confirmed *Salmonella* cases in Minnesota from 2011 through 2018, and Minnesota respondents to the FoodNet Population Survey Atlas of Exposures, 2006-2007, were conducted.

National and International Investigation

Overall in the United States, 1,127 cases from 48 states were identified in this outbreak. The median age of cases was 41 years (range, <1 to 102 years), and 58% were female. Dates of illness onset ranged from June 19 to September 11. Of the 705 cases with information available, 167 (24%) cases were hospitalized, but none died.

Ninety-one percent of cases interviewed reported eating onions or foods likely containing onions in the week before their illness started. Of the 208 cases who were asked what types of onions they ate, 137 (66%) ate red onions, 130 (63%) ate white onions, and 110 (53%) ate yellow onions. Most cases reported eating more than one type of onion. [1]

In Canada, there were 515 confirmed cases: British Columbia (121), Alberta (293), Saskatchewan (35), Manitoba (26), Ontario (14), Quebec (25) and Prince Edward Island (1). The age range for Canadian cases was between 1 to 100 years, and 54% were female. Seventy-nine (15%) of the Canadian cases were hospitalized, and three died. [2]

Minnesota Investigation

Nineteen confirmed cases were identified in Minnesota, with all isolates within 0 to 1 alleles by WGS, and 0 to 4 alleles from the national case isolates. Illness onset dates ranged from June 24 to July 23. The median age of cases was 33 years (range, 19 to 85 years), and 79% were female. Among the 17 cases who provided symptom information when interviewed, all reported cramps, 16 (94%) reported diarrhea, 12 (71%) reported headache, 10 (59%) reported fever, 8 (47%) reported bloody diarrhea, and 5 (29%) reported vomiting. Illness onsets ranged from June 24 to July 24. The median duration of illness was 8.6 days (range, 5 to 18 days). Three (16%) cases were hospitalized.

Of the 18 cases who answered all or some of the food exposure questions, 16 cases reported eating onions: 8 (44%) cases reported red onions, 8 (44%) cases reported eating yellow or white onions, and 3 (17%) cases reported eating an unknown type of onion. Ten (53%) cases reported shopping at Grocery Chain A, and 9 (50%) reported buying onions from Grocery Chain A. Among cases who reported purchasing onions from Grocery Chain A, three shopped at the same location in Mankato, and one at a different location in Mankato. Five (28%) cases reported eating foods that contained onions at different restaurants, none at the same restaurant. Incubations from the restaurant meals for the three cases who reported a meal date ranged from 10 hours to 5 days.

Using a binomial probability model, 16 of 18 (89%) cases reporting onions was significantly higher ($p < 0.001$) than the 49% of the historical culture-confirmed *Salmonella* cases in Minnesota who reported onion consumption among. However, when compared to the 67% of Minnesota respondents to the FoodNet Population survey, eating onions was not significant ($p = 0.07$).

National and International Tracebacks

Tracebacks of onions served at restaurants that had sub-clusters in Oregon, Montana, and Wyoming identified two distributors in common. FDA and the Food Safety Agency of Canada traceback investigations identified a packing facility and multiple farms that supplied red onions during the time period of interest, as the likely source. Joint FDA, California Department of Public Health (CDPH), and California Department of Food and Agriculture (CDFA) field-level investigations were conducted at multiple locations of the packing facility and surrounding areas. However, most product had already been harvested and distributed by that time. FDA tested over 2,000 product and environmental samples from multiple packing facility locations and surrounding areas, including water, soil, and scat samples. Although a variety of genetic strains of *Salmonella* Newport were detected, as well as multiple other *Salmonella* serotypes, a genetic match to the outbreak strain was not identified in any of the samples collected. The traceback investigation concluded that red onions from the

packing facility were the likely primary source of this outbreak. Other onion types (such as white, yellow, or sweet yellow) were also likely to be contaminated because the onions were grown and harvested together.

Minnesota Tracebacks

Invoices from two restaurants where cases reported eating onions were obtained and were used to conduct tracebacks, but the sources of onions did not converge with each other or with onions reported from tracebacks in other states.

Purchase receipts, loyalty card numbers, or credit card numbers and purchase dates were obtained from four other cases. Three of these were not traceable for a variety of reasons. One case provided a Grocery Chain A receipt that showed a red onion purchase. By the time this traceback was conducted, a recalled had already been issued. MDA and Grocery Chain A deemed that the onions on that receipt were not part of the recall.

Since a high proportion of cases in Minnesota reported shopping at Grocery Chain A, MDA obtained additional information regarding the source of onions reported that Grocery Chain A. The retailer received onions from one of the same distributors identified in the restaurant sub-clusters in other states. However, according to Grocery Chain A, they did not receive recalled onions from the implicated packing house.

Recall

On July 30, the Public Health Agency of Canada issued a public health notice of the outbreak linked to red onions imported from the United States and an advisory to not eat any red onions or any food products that contain raw red onions from the U.S. [2]

On August 1, the implicated packing house conducted a voluntary recall of red, yellow, white, and sweet yellow onions in the U.S and Canada. [3]

Subsequently, additional onions sold under different brands or sold at specific grocery stores, and of products containing onions were recalled. [4]

This was an international *S*. Newport foodborne outbreak associated with red onions, and likely yellow, white, and sweet onions from a packing house in Bakersfield, California. The source and mechanism of contamination were not identified.

References

1. Centers for Disease Control and Prevention. Outbreak of *Salmonella* Newport Infections Linked to Onions, Final Update. October 8, 2020. https://www.cdc.gov/salmonella/newport-07-20/index.html
2. Public Health Agency of Canada. Public Health Notice: Outbreak of *Salmonella* infections linked to red onions imported from the United States. July 20,2021. https://www.canada.ca/en/public-health/services/public-health-notices/2020/outbreak-salmonella-infections-under-investigation.html
3. U. S. Food and Drug Administration. Thomson International Inc. Conducts Voluntary Recall of Red, Yellow, White, and Sweet Yellow Onions Because of Possible Salmonella Risk. https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/thomson-international-inc-conducts-voluntary-recall-red-yellow-white-and-sweet-yellow-onions-because
4. U. S. Food and Drug Administration. September 16, 2020. Recalls of Food Products Associated with Onions from Thomson International, Inc. due to the Potential Risk of Salmonella https://www.fda.gov/safety/major-product-recalls/2020-recalls-food-products-associated-onions-thomson-international-inc-due-potential-risk-salmonella