

***Salmonella* Typhimurium Infections Associated with a Pre-packaged Salad Mix**

April

Multiple states

On May 5, 2010, the Minnesota Department of Health (MDH) Public Health Laboratory (PHL) notified epidemiologists of three *Salmonella* Typhimurium isolates indistinguishable by pulsed-field gel electrophoresis (PFGE), pattern designation TM36 (PulseNet pattern designation JPXX01.0050).

The isolates had been received through routine surveillance. The PFGE pattern had not been seen in Minnesota since 2004. An investigation was initiated.

In Minnesota, cases were identified through routine surveillance and were defined as Minnesota residents from whom *S. Typhimurium* of PFGE pattern TM36 had been isolated. MDH staff interviewed cases about exposure history using a standard questionnaire. On May 9 and 10, a case-control study was conducted in Minnesota using three age-matched controls per case. The controls were recruited using a list of sequential phone numbers generated using the case's phone number's area code and prefix from a commercial phone directory database. Cases and controls were asked about consumption of several food items with specific detail on type, brand, and purchase information for salad consumption.

Staff from the Wisconsin Department of Health Services interviewed a Wisconsin case and also recruited matched controls. Data from the case-control study were analyzed using an unmatched analysis due to the small number of cases. Cases in other states were also interviewed using the Minnesota outbreak interview form.

Information notifying other states of the investigation was posted to the PulseNet web board on May 7. Centers for Disease Control and Prevention (CDC) OutbreakNet staff were notified of the investigation on May 10. Additional information was shared with all states using the OutbreakNet listserv on May 21.

The Minnesota Department of Agriculture (MDA) conducted a traceback investigation using shopper card information obtained from consenting cases. MDA worked directly with the producer of the implicated vehicle in an attempt to identify a contaminated lot or lots, and a specific contaminated ingredient.

Four cases of *S. Typhimurium* TM36 were identified in Minnesota. The cases had illness onset dates from April 22 to 28. Two (50%) cases were female. The median age of cases was 46 years (range, 14 to 55 years). All four cases reported diarrhea and fever, three (75%) had blood in their stool, and two (50%) had vomiting. The two cases who had recovered at the time of interview reported illness durations of 5 days and 23 days, respectively. One case (25%) was hospitalized for 5 days, and none of the cases died.

There were an additional six cases nationwide with the outbreak subtype: two in Mississippi, one in Illinois, one in Missouri, one in Texas, and one in Wisconsin. Information was obtained on three of those cases (Illinois, Missouri, and Wisconsin). Illness onset dates for these cases were April 23, 24 and 29. All three cases were females, aged 69, 71, and 75 years. All three had diarrhea and fever, one (33%) had

blood in her stool, and none had vomiting. Duration of illness was unknown. One case was hospitalized for 4 days, and none of the cases died.

On initial routine interview of the first three Minnesota cases, all three mentioned eating pre-packaged salads, and no other common exposures. A case-control study was initiated.

At the time of the case-control study there were three Minnesota cases, for which a total of nine matched controls were recruited. In an unmatched univariate analysis, consumption of pre-packaged lettuce/salad (3 of 3 cases vs. 1 of 8 controls; odds ratio [OR], undefined; 95% confidence interval [CI], 1.50 to undefined; $p = 0.02$), and Brand A Variety A pre-packaged salad (2 of 2 cases vs. 0 of 9 controls; OR, undefined; 95% CI, 1.93 to undefined; $p = 0.02$) were significantly associated with illness. Consuming Brand A pre-packaged lettuce/salad purchased from a Grocery Store Chain A location (2 of 2 cases vs. 0 of 9 controls; OR, undefined; 95% CI, 1.93 to undefined; $p = 0.02$) was also significantly associated with illness. Variety A pre-packaged salad contains iceberg lettuce, romaine lettuce, carrots, pea pods, red cabbage, and radishes. Several of these ingredients were associated with illness, including: pre-packaged carrots (3 of 3 cases vs. 1 of 9 controls; OR, undefined; 95% CI, 1.73 to undefined; $p = 0.02$), pre-packaged cabbage (3 of 3 cases vs. 1 of 9 controls; OR, undefined; 95% CI, 1.73 to undefined; $p = 0.02$) and romaine lettuce (3 of 3 cases vs. 0 of 9 controls; OR, undefined; 95% CI, 3.44 to undefined; $p = 0.005$).

With the Wisconsin case and matched controls combined with the Minnesota cases and controls, there were four cases and 12 controls evaluated with an unmatched univariate analysis. Consumption of pre-packaged lettuce/salad (4 of 4 cases vs. 3 of 11 controls; OR, undefined; 95% CI, 1.40 to undefined; $p = 0.03$), Brand A pre-packaged lettuce/salad (3 of 3 cases vs. 2 of 10 controls; OR, undefined; 95% CI, 1.22 to undefined; $p = 0.03$), Brand A Variety A pre-packaged salad (3 of 3 cases vs. 0 of 11 controls; OR, undefined; 95% CI, 4.26 to undefined; $p = 0.003$), Brand A pre-packaged lettuce/salad purchased from a Grocery Store Chain A location (3 of 3 cases vs. 0 of 11 controls; OR, undefined; 95% CI, 4.26 to undefined; $p = 0.003$), pre-packaged carrots (4 of 4 cases vs. 2 of 12 controls; OR, undefined; 95% CI, 2.28 to undefined; $p < 0.005$), pre-packaged cabbage (4 of 4 cases vs. 2 of 12 controls; OR, undefined; 95% CI, 2.28 to undefined; $p < 0.005$) and pre-packaged romaine lettuce (4 of 4 cases vs. 1 of 11 controls; OR, undefined; 95% CI, 3.55 to undefined; $p = 0.003$) were all significantly associated with illness.

The fourth Minnesota case was identified after the case-control study was conducted. This case also consumed Brand A Variety A pre-packaged salad.

Of the seven total nationwide cases that were interviewed, all seven reported eating pre-packaged lettuce salads. Five (71%) of the cases reported eating Brand A Variety A pre-packaged salad. Another case reported eating a Brand A pre-packaged salad with romaine and iceberg lettuce, and the seventh case ate pre-packaged salad of an unknown brand containing iceberg lettuce, cabbage, and carrots.

Shopper card records were available for two of the Minnesota cases and the Wisconsin case, and showed that they had purchased Brand A Variety A pre-packaged salad. The traceback of the Brand A Variety A salad consumed by the Minnesota and Wisconsin cases identified two possible lot numbers in common. These two lots were produced on April 8 and April 9 at a facility in Illinois. MDA and MDH worked with the producer, to try to identify common ingredients in salad varieties produced on those two dates, and ingredients that were used exclusively for the Variety A mix. No ingredients were used exclusively

in Variety A pre-packaged salads. All the ingredients were also used in many other varieties of salad. The U. S. Food and Drug Administration (FDA) was notified; and they visited the production facility in Illinois; however, no findings were reported back to MDA or MDH. Although a specific contaminated ingredient was not identified, the company reported deploying inspection teams to fields where ingredients used on those production dates were grown, to check water sources, animal intrusion, or any changes at those locations.

By the time the investigation occurred, lots in question were well past their Use By Dates. Additionally, it was clear that the outbreak had ended and no new cases were being identified. Therefore, no product recall was issued.

This was a multi-state outbreak of *Salmonella* Typhimurium infections associated with eating Brand A Variety A pre-packaged salad. Four cases were identified in Minnesota. Although two lots were identified that could have explained the outbreak, a specific contaminated ingredient was not identified.