Outbreak 2018-4979
Shigellosis at a Wedding

Background

On August 14, 2018, the Oregon Health Authority (OHA) and Yamhill County Health and Human Services (YCHHS) independently received reports of persons with gastrointestinal illness days after attending a wedding and reception in Yamhill County on August 11. Over the next two days, additional wedding attendees reported gastrointestinal illness. OHA notified the Multnomah County Health Department (MCHD), and the agencies initiated an investigation to determine the cause of the outbreak and to prevent additional cases. YCHHS contacted the Oregon Department of Agriculture (ODA), which regulates some food-service establishments in Oregon.

By August 15, 10 cases had been reported to OHA. A Health Alert Network notice was sent to the ORCD1 group,[1] advising them to ask patients with gastrointestinal illness whether they had attended a wedding in Yamhill County and, if they were willing, to submit a stool sample.

Fecal samples from patients were cultured and isolates serotyped at the Oregon State Public Health Laboratory. On August 20, *Shigella flexneri* type 3a was first identified from a patient specimen. OHA consulted with subject matter experts at the Centers for Disease Control and Prevention (CDC) for information on this *Shigella* serotype.

Methods

YCHHS public health investigators obtained contact information for attendees and the caterer. The caterer is based in Multnomah County. MCHD officials contacted the caterer to obtain a menu of foods served at the wedding. Using this information, on August 16 OHA epidemiologists emailed to wedding attendees a link to an online survey asking them to identify foods they had eaten and to determine whether they had illnesses meeting the case definition.

Information from the first survey indicated that there was a cocktail hour between the wedding ceremony and the reception. Because *S. flexneri* infections have been associated with international travel,[2] and there were additional food exposures, OHA invited wedding attendees to complete a second online survey on August 20. OHA asked respondents about their illness on this survey, too.

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[1] The ORCD1 group comprises Oregon state, county, tribal, lab, and preparedness users, infection preventionists and Emergency Department managers.

[2] Kotloff KL, et al. Global burden of *Shigella* infections: implications for vaccine development and implementation of control strategies. Bull WHO 1999; 77:651–6.

‡ Colilert® is a test from IDEXX for coliforms in water. More information can be found here: https://www.idexx.com/en/water/water-products-services/colilert/

A confirmed case had *S. flexneri* cultured from a clinical specimen. A presumptive case was defined as self-reported diarrhea or vomiting in a person who attended the wedding reception.

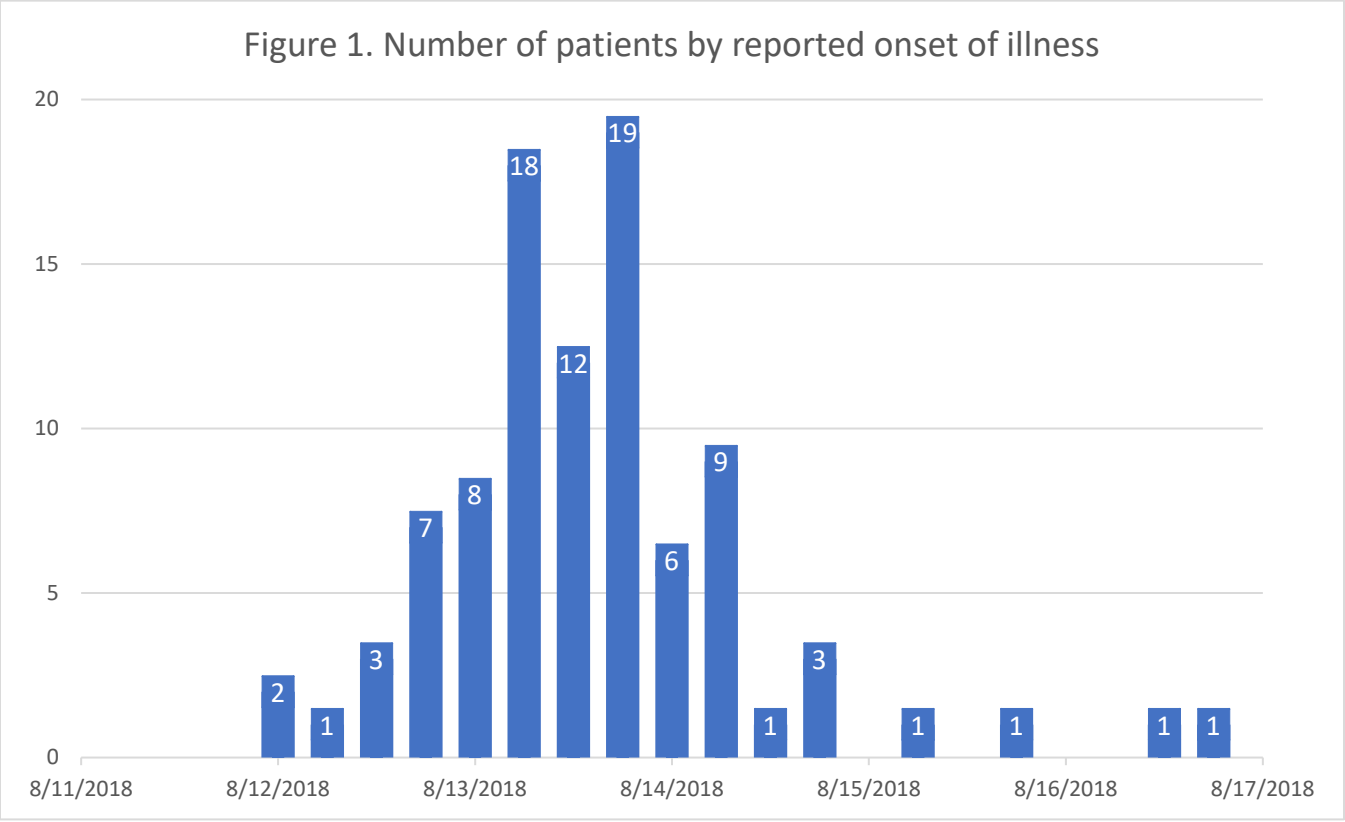
An ODA environmental health specialist inspected the venue, collected water samples and leftover strawberries and cucumbers, and examined general biosecurity. Yamhill County environmental health specialists collected leftover potatoes. Well-water samples were tested using the Colilert® test for total coliforms.‡ Food samples were tested for *Shigella* species using polymerase chain reaction testing. Multnomah County environmental health specialists inspected the caterer. They observed hygiene practices and asked that people who prepared food for the reception submit stool samples for testing.

Results

Among 263 wedding attendees and reception venue staff, 192 were represented on the first survey and 128 on the second survey; some people completed the survey for their children, spouses, or other relatives. In total, 200 people were represented by the two surveys combined.

One hundred seven cases were identified, of which 23 (21%) were confirmed. Eighty-two (77%) of the cases were Oregon residents; the remainder were residents of 11 other states. Oregon cases resided in 11 different counties.

Cases by time of illness onset are shown in Figure 1. Of the 93 cases with onset information, 89 (96%) were reported to have started on the two days between midnight on August 12th and midnight August 14th.



The median age of ill people was 30 years. Of 111 female attendees, 60 (54%) became ill. Of 88 male attendees, 47 (53%) became ill. Of 18 persons <18 years of age, 5 (28%) were ill. Of 181 persons ≥18 years of age, 102 (56%) were ill (Table 1). Persons <18 years of age were significantly less likely to become ill (p = 0.03).

Age (years)	Ill	Well	Total
<18	5	13	18
≥18	102	79	181
Total	107	92	199

Table 2 shows the symptoms reported by ill people.

Table 2. Illness profile (107 cases)	
Reported symptom	Count (%)
Diarrhea or loose stools	107 (100%)
3 or more loose stools in any 24-hour period	105 (98%)
Fatigue	100 (93%)
Abdominal cramps	98 (92%)
Fever	91 (85%)
Shaking chills	89 (83%)
Nausea	87 (81%)
Muscle aches	86 (80%)
Vomiting	51 (48%)
Any blood in stools	49 (46%)

Of ill people, 74/105 (70%) missed school or work, 57/106 (54%) saw a clinician, 38/105 (36%) visited the emergency room, and 10/106 (9%) were hospitalized overnight.

Among the 48 cases whose illness had resolved when they completed the survey, illness duration ranged from 3 to 15 (median, 11) days. Forty-two cases were still ill when they completed their survey. No deaths were reported.

Persons (n = 55) who attended the rehearsal dinner were no more likely to become ill than those who did not attend it (RR 1.1, p= 0.54); therefore, the epidemiologic investigation focused on food exposures at the wedding reception. Food was served buffet-style. Five food items were each associated with a significantly increased risk of illness: asparagus, butter, bread, au gratin potatoes, and the aioli that was served with the asparagus. Asparagus was most strongly associated with illness: of those who ate asparagus, 64% became ill, compared to 12.5% of those who denied eating asparagus (RR 5.1, 95% CI 2.0–12.9). Asparagus consumption also accounted for a higher percentage of cases (96%) than any other exposure (Table 3). In a reanalysis of the other implicated foods, stratifying by asparagus consumption, only bread remained significantly associated with illness (RR 1.6, 95% CI 1.1–2.6).

There was a children's buffet. Some persons under 10 ate food from the rest of the buffet, and some adults ate food from the children's buffet. Persons under 10 were significantly more likely to have eaten from the kid's buffet ($p < 0.01$) and significantly less likely to have eaten any adult food ($p < 0.01$).

Table 3. Attack rates, by exposure to foods significantly associated with illness

	Attack Rate				
Food	Ate	Didn't eat	RR	95% CI	p
Asparagus	96/150 (64%)	4/32 (12%)	5.1	2.0–12.9	<0.001
Butter	77/124 (62%)	22/61 (36%)	1.7	1.2–2.5	0.001
Bread	88/148 (59%)	12/38 (32%)	1.9	1.2–3.1	0.004
Potatoes	93/159 (58%)	6/24 (25%)	2.3	1.2–4.7	0.004
Aioli	47/72 (65%)	44/97 (45%)	1.4	1.1–1.9	0.016

Asparagus consumption differed by age: it was consumed by 150/172 (87%) of persons >10 but by none of 10 children ≤10 years old ($p < 0.001$). Bread consumption did not differ significantly by age.

When visiting the caterer, Multnomah County inspectors did not observe any food-handling violations. Stool samples were submitted by some of the food-handling staff; none were positive for *Shigella*. Food preparers were primarily responsible for specific dishes. When analyzing attendees' exposures by who was responsible for the foods they consumed, illness rates did not differ significantly by food preparer. Catering records revealed that the caterer served some of the same foods, including the grilled asparagus dish, at multiple events that same weekend. The asparagus was sourced domestically. No illnesses related to those other events were reported to OHA.

The ODA inspector concluded that biosecurity on the venue's water supply was sufficient to protect against intentional contamination. The water tested negative for bacterial contamination. The leftover strawberries, cucumbers and potatoes tested negative on bacterial culture; no asparagus had been left over for testing.

Conclusions

An outbreak of *Shigella flexneri* type 3a infections was most likely caused by contaminated asparagus consumed by people who attended a wedding reception in Yamhill County on August 11, 2018. Bread was also associated with illness, but it is less likely to be the cause of the outbreak. Asparagus accounts for a higher proportion of cases, and the age breakdown of illness is better explained by asparagus consumption patterns.

This is the second-largest foodborne outbreak of *S. flexneri* infections reported in the U.S. since 1988. The source of the contamination was not definitively identified. Because humans are the natural reservoir for *Shigella* species, and there were no concurrent outbreaks to suggest upstream contamination, poor food-handler hygiene is the most likely cause.