



Outbreak of Norovirus Infection Among Diners of a Restaurant Suspected to be Associated with Food Servers Using Bare Hands to Garnish Beverages --Las Vegas, Nevada

Public Health Investigation Report

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This report represents the findings of the Southern Nevada Health District in the investigation of a gastroenteritis outbreak that was associated with norovirus infections at a restaurant located in Clark County, Nevada.

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ABSTRACT

We describe an investigation of an outbreak of norovirus infection at a restaurant in Las Vegas, Nevada that was suspected to be associated with restaurant staff using bare hands to place garnishes into beverages. We conducted a case-control study and surveillance for additional illnesses, performed inspections of the restaurant, and collected stool specimens to test for norovirus. Eight ill restaurant patrons and 23 control subjects were interviewed. Univariate analysis showed several food items were associated with illness, but only ice water and margarita were consumed by members of all affected dining groups. Four stool specimens were positive for norovirus by real-time reverse transcriptase-polymerase chain reaction, with all four sequenced specimens being identical and closely related to norovirus strain GII.4J Apeldorn NLD07. To prevent such outbreaks, restaurant workers whose job duties include preparing food and beverages must minimize bare hand contact with ready-to-eat food, including items used as garnishes for food and drinks.

BACKGROUND

On October 18, 2011, the Southern Nevada Health District (SNHD), Office of Epidemiology received reports of gastrointestinal illness from two independent groups of patrons of Restaurant A located in Las Vegas. People from both groups ate during dinner hours at the restaurant on October 14, 2011. Of the eight people from the two groups, seven reported symptoms of diarrhea and/or vomiting after they consumed

food from Restaurant A. In response to these illness reports, the SNHD initiated an investigation.

On October 18, 2011, the SNHD performed an investigative inspection of the restaurant to determine if there was ongoing risk of illness or exposure to the greater community. The SNHD Office of Epidemiology (EPI), Environmental Health (EH), Southern Nevada Public Health Laboratory (SNPHL), and the Nevada State Public Health Laboratory (NSPHL) collaborated on the investigation and response to this outbreak. The Nevada State Health Division was also apprised of the outbreak investigation.

METHODS

Epidemiology

EPI staff performed telephone interviews with ill people to obtain more information regarding symptoms, food history, and illnesses among their close contacts. The SNHD foodborne illness complaint database was searched to identify other complaints against the restaurant in the 30 days prior to, and since, these complaints.

On October 19, 2011, EPI and EH staff arrived at the restaurant. EPI staff interviewed restaurant management regarding reports or complaints of recent illnesses in restaurant staff and patrons, and whether the restaurant had a sick employee policy.

The SNHD staff also interviewed employees of Restaurant A to identify staff members who were recently ill with symptoms compatible with acute gastroenteritis. Restaurant staff was queried of their job duties, specifically whether they cook or serve food, pour or serve beverages, and whether they place garnishes (e.g. lemons, limes,

and fruits) into drinks. We also attempted to determine whether there were common wait-staff members who served members of the two affected dining parties.

Case and Control Definitions: A primary-case is defined as a person who consumed food and/or beverages served by Restaurant A on October 14, 2011 and experienced ≥ 3 loose stools and/or ≥ 1 episodes of vomiting during a 24-hour period after eating. A secondary-case is defined as a contact of a primary-case, who did not eat at Restaurant A and experienced ≥ 3 loose stools and/or ≥ 1 episodes of vomiting during a 24-hour period within 72 hours after the onset of symptoms of the primary-case. Controls were identified through an electronic survey as a person who dined at Restaurant A on October 14, 2011 and did not experience diarrhea and/or vomiting within 72 hours after eating.

Case and Control Finding Activities: The EPI staff attempted to identify additional restaurant patrons who dined on October 14 during the hours of 3-7 pm via contact information from guest comment cards, from online reservation lists, and from credit card receipts. Case and control subjects were interviewed on consumption of specific food and drinks using an electronic questionnaire. The total number of people who ate at Restaurant A during this time period was estimated from the number of food entrées sold.

Descriptive statistics (medians, ranges, and percents) were used to describe age, gender, and gastrointestinal symptoms. Univariate analysis (odds ratio (OR) and 95% exact confidence limits) was calculated for each food item served during dinner hours at

Restaurant A using Statcalc (Epi Info, version 6). Only food items with Fisher's exact 2-tailed p-values ≤ 0.05 , which were considered significant, were reported.

Environmental Health

EH staff performed an EPI Field Investigation and a Routine Inspection of the restaurant on October 19, 2011, including risk assessments for ongoing foodborne illness. A Routine Inspection was also performed on Restaurant A bar area on October 31, 2011.

Laboratory

Ill persons were asked to provide stool specimens for testing. The SNPHL performed cultures for enteric pathogens (*Salmonella*, *Shigella*, *Campylobacter*, strain O157 of *Escherichia coli*, and *Yersinia*) and Shiga toxin-producing *E. coli* (STEC). Norovirus (NoV) testing was done by real-time reverse transcriptase-polymerase chain reaction.

The SNPHL submitted specimens that were positive for NoV to the NSPHL for genetic sequencing and analysis to determine if illnesses among cases from the two groups were linked.

RESULTS

Epidemiology

The epidemiologic curve is presented in Figure 1, and shows a total of 14 ill persons. Of the initial eight people from the two groups of diners, seven met the primary case definition. All but two cases reside in Clark County. Six secondary cases were also identified among household contacts of both groups. No ill person was hospitalized, and no death was reported.

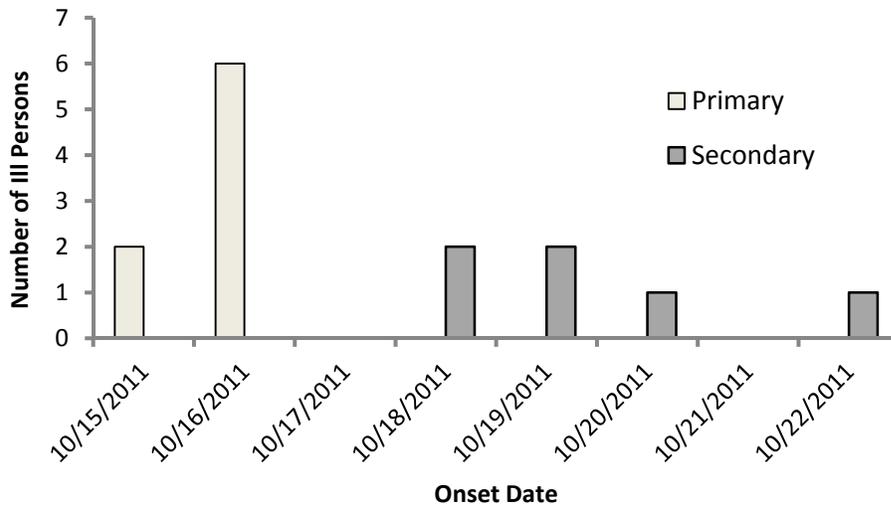


Figure 1. The number of ill persons who met the primary (n=8) and secondary (n=6) case definitions by illness onset date. Restaurant A. Las Vegas, NV. October 15-22, 2011.

The median age of ill persons was 36 (n=11, range 0-85 years). Among 14 cases, eight (57%) were females and six (43%) were males, 13 (93%) experienced diarrhea and 11 (79%) vomiting.

There was no other reported illness associated with Restaurant A in the foodborne illness complaint database in the 30 days prior to, and 30 days since, these illness clusters.

There were approximately 40 employees who work at the restaurant, 15 of whom worked the dinner shift at Restaurant A on October 14, 2011. The management of Restaurant A reported that all staff members had been asymptomatic in the past two weeks and no employee was currently ill. There were no customer complaints of illness to the restaurant. The restaurant has a sick employee policy and employees may call-in sick when necessary. As many restaurant employees could have prepared and served food to each affected dining party, we were not able to identify common wait-staff members who provided services to both original dining parties.

In interviews, all 31 staff members neither admitted to being recently ill with symptoms consistent with NoV infections, nor recalled emetic episodes among themselves, co-workers or guests of the restaurant. The proportion of staff members who performed specific job duties are listed in Table 1, and shows that staff members' job duties often overlapped. About three-quarters of respondents reported serving food, and many employees (ranges 39-61%) reported pouring and/or filling drinks. Additionally, 14 (45%) respondents reported that they place garnishes such as lemons, limes, and other fruits in drinks prior to serving them to customers.

Approximately 346 food entrées were sold at Restaurant A on October 14 between the hours of 3-7 pm. Food and drinks sold at the bar, the number of appetizers, desserts, side dishes, soup/salad, and other beverages sold were not

included in this estimate of the number of customers who ate at Restaurant A during this time period.

Table 1. The proportion of staff members who performed specific job duties (n=31). Restaurant A. Las Vegas, NV.

Job Duty	Response (%)	n
Prep food (wash, cut, etc.)	58.1%	18
Cook food	35.5%	11
Serve food	77.4%	24
Make salsa	22.6%	7
Make guacamole	12.9%	4
Garnish plate	19.4%	6
Pour/fill drinks at bar (ie. water, soda, wine)	38.7%	12
Pour/fill drinks at fountain	51.6%	16
Pour/fill drinks at table	61.3%	19
Garnish drinks (place lemons, cherries, etc in drinks)	45.2%	14
Serve chips	77.4%	24
Set table	48.4%	15
I do not perform any of these duties	0.0%	0
Range	0 - 77	0 - 24

Ten email addresses and/or phone numbers were obtained from guest comment cards, online reservations, and/or credit card receipts. These diners and people from their dining parties were asked to respond to an electronic survey. Of the respondents, one patron met the primary-case definition (Fig. 1) and 23 people served as control-diners.

Primary-case patrons were significantly more likely than control patrons to have consumed four food items (Table 2). Of these, the taquitos and burritos were consumed by members of only one group of primary-case diners. Ice water was

consumed by all, and margaritas were consumed by seven (87%) of eight, primary-case patrons. The significance of associations for less frequently consumed food was precluded due to the small number of cases.

Table 2. The significances of diners who reported illness after consuming specific food items.

Food	Ate			Did Not Eat			Odds-Ratio ¹	95% CI	p-value
	Ill	Not Ill	Total	Ill	Not Ill	Total			
Short rib taquitos	4	0	4	4	23	27	Undefined	----	0.002
Carne asada burrito	4	2	6	4	21	25	10.5	1.06 - 133	0.026
Ice water	8	9	17	0	14	14	Undefined	----	0.003
Margarita	7	8	15	1	15	16	13.13	1.18 - 339	0.015

1 Undefined = The odds-ratio was undefined when an expected cell value is zero.

Environmental Health

Several infractions related to food cooling practices were noted during the EH inspection of Restaurant A. Specific infractions included a walk-in refrigerator kept at higher than appropriate temperature, lack of proper cooling practices for sauces, and no food cooling temperature log.

Notable infractions observed during the inspection of Restaurant A bar area include employees observed handling ready-to-eat food with bare hands. Employees were also observed handling dirty dishes and money, then preparing food without changing gloves or washing hands.

Laboratory

SNPHL: Of the six stool specimens collected from ill persons, four were positive for NoV genogroup II, and two results were negative for NoV. Of the four NoV-positive specimens, three came from ill persons who were associated with one group of diners, and one specimen was provided by a diner in the second group.

All STEC and stool culture tests were negative.

NSPHL: Genetic sequencing of the PCR products of the D-region of the NoV genome was performed on four NoV-positive specimens. All four genetic sequences appeared to be identical and had 97.4% nucleotide identity to the Centers for Disease Control and Prevention (CDC) CaliciNet Reference NoV strain GII_4J_Apeldorn_NLD07.

DISCUSSION

The NoV outbreak at Restaurant A affected at least fourteen people, with all primary case-diners dining on October 14, 2011 during the dinner hours. Ill people had similar symptoms, and identical NoV genetic sequences were detected from ill persons of two independent dining parties. No ill person was hospitalized, and no death occurred.

NoV can spread via direct contact with NoV-containing fecal matter or aerosolized vomitus, or by indirect contact with them via environmental surfaces [1]. The high propensity of NoV for person-to-person spread might explain illnesses among primary-cases and their household contacts. The outbreak appeared to have been confined to Restaurant A and did not spread to the general community.

NoV was detected from stool samples from members and/or household contacts of both groups of diners who ate on October 14, with all genetic sequences being identical. Although the relatedness of illnesses among the two dining groups cannot be based solely on molecular evidence, given that NoV sequences from related outbreaks are typically identical [2] and the common dining date among the two independent groups, it is likely that illnesses between diners from the two groups were associated with Restaurant A.

Ice water and margaritas were significantly more likely to be consumed among primary-cases when compared to controls diners, and were consumed by nearly all primary-case diners. Drinking water or ice contaminated with NoV has resulted in outbreaks in food-service settings [3, 4]. However, the contamination of frequently served food items such as water and ice (also a main ingredient for margarita) in a high-volume restaurant would have resulted in numerous diners becoming ill, and cannot explain the relatively small number of diners who complained of illness after eating at Restaurant A on and after October 14. An alternative explanation may be that infected staff member(s) might have contaminated the food prior to serving them to customers. For example, the CDC reported that when contributing factors in reported foodborne disease outbreaks are known, the most commonly reported contaminating factor was "bare-handed contact by handler/worker/preparer" [5]. The low inoculums (≥ 18 viral particles) [6] required for transmission of NoV, and prolonged period [7] of fecal shedding [8] of the virus can enable infected food handlers to contaminate food products [9, 10]. Additionally, the majority of interviewed staff at Restaurant A

admitted to pouring and serving drinks, and frequently placing garnishes (e.g. lemons, limes, and other fruits) into beverages prior to serving them to customers. Coupled with EH observations that employees handled ready-to-eat food using bare hands, the contamination of beverages with NoV could have occurred via infected worker(s) using bare hands to dispense or garnish beverages. Minimizing bare hand contact with ready-to-eat food is recommended as a mean of interrupting disease transmission [11].

Workers whose job duties include preparing food and beverages must minimize bare hand contact with ready-to-eat food, including items used as garnishes for food and drinks.

There were several limitations in our investigation. One limitation was the interview process was complicated by language barriers, since a portion of the restaurant staff was not proficient in speaking or writing English. This necessitated face to face interviews in both English and Spanish. Although employees were assured of confidentiality, they may have been reluctant to admit illness in themselves or their co-workers in oral interviews. Furthermore, oral interviews conducted in multiple languages required increased SNHD staff resources than written ones, as trained staff members are needed to translate questionnaires, trained interviewers who are proficient in the language spoken by restaurant staff, and increased staff time spent conducting face to face interviews. Second, although the testing of employees could have identified infected persons who might have transmitted NoV to restaurant patrons, employee testing was precluded since no illness was reported among the 40 employees, common

food servers among primary-cases were not identified, and the outbreak was not ongoing and appeared to be confined to Restaurant A.

Once recognized, the public health investigation led to the rapid identification of this NoV outbreak. Testing of ill persons was instrumental in identifying an association among ill diners and Restaurant A. Food-service facilities must observe established food handling guidelines to reduce the spread of pathogens, especially practices that minimize bare hand contacts with ready-to-eat foods including garnishes for beverages.

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