

**"Norovirus Outbreak Associated with a Banquet at Hotel Marshfield"
Marshfield, WI
April 17 - 20, 2016**

Final Report
FBO-16-002

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BACKGROUND

On 4/19/2016, the Wood County Health Department (WCHD) notified the Wisconsin Division of Public Health (DPH), Communicable Diseases Epidemiology Section (CDES) of two ill individuals who had both attended a company (Company A) banquet event at the Hotel Marshfield in Marshfield, WI on 4/16/16. Onset of gastrointestinal symptoms in these individuals began early morning 4/18/2016. Appetizers, snacks, and entrees served during the event were prepared by Hotel Marshfield staff. Cupcakes were purchased from Bakery A, and cookies were provided by Company B. Leftover entrees from the banquet were boxed up immediately after the event and donated to Organization A (12 boxed meals total) where some were eaten by staff and residents of that organization. Upon recognition of a suspected outbreak, Organization A was asked by WCHD to hold the leftover food in their refrigerator and not serve it to anyone. WCHD collected a list of food and drink items served at the banquet from both the Hotel Marshfield manager and the Employee Relations Officer for Company A. CDES began creation of an investigation questionnaire, as well as an online survey to collect food and hotel exposure information from attendees. WCHD began dissemination of stool kits to ill banquet attendees and Hotel Marshfield employees to submit for laboratory testing.

METHODS

Surveillance

Case Finding and Assessment

Hotel Marshfield reported that 276 Company A employees and guests attended the banquet on 4/16/16. A Company A representative provided WCHD with a list of 21 ill banquet attendees and their contact information. These individuals were interviewed by phone by either WCHD or the DPH Surveillance and Outbreak Support (SOS) Team. During interviews, individuals were asked about others in their household who had attended the event and whether or not they were ill, and also about any other ill co-workers or friends. Names and contact information for these individuals were gathered and interviews were attempted with both ill and well individuals.

A list of kitchen, banquet, bartending, and serving employees was obtained from the Hotel Marshfield. All employees listed who had worked during the three weeks prior to the banquet were asked to complete employee questionnaires.

CDES created and maintained a line list of all ill and well banquet attendees, Hotel Marshfield employees, and restaurant patrons. CDES also created and maintained a listing of all Hotel Marshfield employees, their regular job duties and job duties performed the day of the banquet, and shifts worked during 4/8 – 4/18.

Epidemiologic Investigation

Case Definition

Clinical case definition: A gastrointestinal illness characterized by vomiting and/or diarrhea and at least one additional symptom (abdominal cramps, fever, chills, fatigue, sweats, muscle aches, body aches, headache, nausea) lasting at least one day in an individual who attended, ate food from, or worked at the banquet held on 4/16/16 at Hotel Marshfield and had illness onset within 60 hours of exposure.

Laboratory-confirmed case: An illness meeting the clinical case definition in an individual that had a laboratory confirmed case of norovirus infection.

Probable case: An illness in an individual that meets the clinical case definition but was not tested.

Secondary case: A clinical case in an individual who had contact with a primary case-patient and had onset of illness more than 60 hours (one maximum incubation period) after the banquet.

Questionnaire Design & Administration

An investigation questionnaire was developed by CDES which gathered demographic information, information about illness and symptoms experienced, whether others at work or in the household were ill, banquet attendance, food and beverage items consumed at the banquet, overnight stay at the hotel, occupation, and any additional comments. The questionnaire was administered by phone by either WCHD staff or the SOS Team. In addition, an online survey was developed and launched by DPH to attempt to reach the approximately 250 banquet attendees for whom phone numbers were not provided. The online survey was modeled after the investigation questionnaire but did not gather any personally identifying information. The online survey was administered by DPH using Select Survey. The link to the online survey was sent to the Employee Relations Officer at Company A for distribution to their employees. Employees were asked to also have their guests complete a copy of the survey. Banquet attendees were asked to complete the survey within 24 hours. However, responses were collected for 80 hours. The survey link was not distributed to individuals who had already been interviewed by phone and respondents were asked to only complete one copy of the survey.

A separate investigation questionnaire (employee questionnaire) was developed for employees of the Hotel Marshfield which gathered information about job duties, shifts worked before and after the day of the event, illness and symptoms experienced, food and beverage items consumed during the event and day of, and any additional information. Environmental Health Specialist (EHS) staff from WCHD distributed hard copies of employee questionnaires to employees of Hotel Marshfield while onsite performing inspections. This questionnaire was filled out individually by each employee. WCHD contacted the remaining employees who were not onsite at the time to attempt interviews by phone.

A third questionnaire was developed for individuals reporting illness associated with dining at Libby McNeill's, the restaurant within the Hotel Marshfield. This questionnaire gathered information about demographics, symptoms and illness, and included a list of all menu items available at the restaurant. Patrons were also asked about any modifications they made to menu items.

Epidemic Curve

An epidemic curve was constructed to assess the magnitude of the outbreak and likely mode of transmission. An exposure time of 6pm on 4/16/16, the time the banquet entrees were served, was used to calculate incubation periods.

Analysis

Case-Control Study

A case-control study was conducted to evaluate the associations between food and beverage items consumed (exposures) and risk of developing illness. In both phone interviews and the online survey, banquet attendees and hotel employees were asked about consumption of a large list of food and beverage items served during the banquet on 4/16/16, or in goodie bags given to overnight guests (Appendix A). Exposure odds ratios, 95% confidence intervals, and Pearson or Fisher exact p-values were calculated using SAS 9.4. Individuals with illnesses meeting the case definition were used as cases and well individuals were used as controls in the exposure analysis. To more accurately discern associations between exposures and risk of illness, restaurant patrons, banquet attendees reporting onset of illness during or before the banquet, hotel employees, individuals whose illness did not meet the clinical case

definition, and individuals with onset of illness more than 60 hours after the 6pm banquet meal (likely secondary cases) were excluded from the case-control study.

Laboratory Investigation

Bacteriologic and Viral Testing of Human Specimens

Seven stool specimens from three symptomatic banquet attendees, three Hotel Marshfield employees, and one ill restaurant patron were submitted to the Wisconsin State Laboratory of Hygiene (WSLH) to be tested for norovirus via PCR. Individuals who tested negative for norovirus were then tested for enteric bacterial pathogens and Shiga toxin. Genetic sequencing was performed on all norovirus positive specimens to identify the norovirus strain(s) present and determine if the same strain was shared among all positive specimens.

Environmental Investigation

Onsite Assessments

Lists of food items served during the banquet event were obtained from both the hotel management and the Company A employee relations contact and compared to identify all items and where the items were prepared. A comprehensive onsite NEARS assessment was conducted during two separate visits to the hotel on 4/20/16 and 4/21/16 by Wood County Environmental Health Specialists (EHSs). During the onsite assessment the EHSs and facility management reviewed policies and procedures, observed food handling and kitchen practices, verbally reviewed menus for the banquet event with kitchen staff, and constructed a food flow. All three chefs at the hotel were interviewed by an EHS to collect information on how and by whom all banquet food items were prepared. The specifics of the preparation, including purchasing and receiving, storage, preparation, cooking, cooling, reheating, plating and serving were recorded for each food and drink item. An inspection of the kitchen and meat areas of the facility was also conducted. A list of employees and their job duties was obtained from the hotel management. Employee interview questionnaires were distributed to all employees, including kitchen staff, servers, bartenders, managers, and front desk staff. The Front of House Manager and Banquet Captain were also interviewed. Hotel employee work schedules, responsibilities on the day of the banquet, and food and drink consumed were reviewed in conjunction with their illness information.

Left-over food was collected from Organization A on 04/21/2016 and held at the Wood County Health Department for possible testing. Both Bakery A and Company B were contacted and were asked about the techniques used to prevent bare hand contact, and if there were any ill employees or complaints from customers.

RESULTS

Surveillance

Case Finding and Assessment

Interviews were completed with 151 people. Among persons who completed interviews, 55 illnesses were identified that met the case definition; five in hotel employees and 49 in banquet attendees (employees and guests). 54 illnesses were included as cases (the suspected index illness was excluded), 13 people had illnesses that did not meet the case definition, and 84 people were well. Of those 54 cases, 4 cases were laboratory-confirmed and 50 were probable cases. 51 cases were primary cases and three were secondary cases. Secondary transmission occurred within the households of banquet attendees and among hotel employees. No cases of illness meeting the case definition were identified among Libby McNeil's restaurant patrons, other hotel guests, residents of Organization A, or attendees of other organized banquets held in the days immediately before and following the Company A's banquet on 4/16/16.

Although two Libby McNeil’s restaurant patrons from separate parties became ill after meals on 4/14/16 and 4/15/16, respectively, these illnesses were determined to not be cases because one individual’s incubation period was too short to be consistent with norovirus infection, and the other tested negative for norovirus. No additional complaints of illness in the community were received from individuals who reported eating at the hotel’s restaurant. One individual from Organization A reported illness but symptoms were not consistent with norovirus infection.

Epidemiologic Investigation

Clinical and Descriptive Epidemiologic Features

The most frequently reported signs and symptoms among the 51 primary case-patients included fatigue, diarrhea, nausea, muscle aches, body ache, abdominal cramps, vomiting, and sweating (table 1). Nineteen (35.1%) of the cases occurred in females. Case-patient age ranged from 21 to 73 years (median 53 years; n=32). Case-patients were residents of thirteen different states with the majority (38) being residents of Wisconsin. The median incubation period among primary cases was 32.5 hours (range 15 – 60 hours; n=45). The duration of illness ranged from one to nine days (median 2 days; n=41). Four individuals sought medical attention for their illness. No case-patients were seen in an emergency room or hospitalized for their illness.

Table 1. Percentage of primary case-patients reporting various clinical signs and symptoms.

Symptom/clinical sign	No. cases	N	%	Symptom/clinical sign	No. cases	N	%
Fatigue	51	51	100.00%	Sweats	39	50	78.00%
Diarrhea	50	51	98.00%	Headache	37	49	75.50%
Nausea	49	50	98.00%	Chills	36	51	70.60%
Muscle aches	44	49	89.80%	Fever	32	48	66.70%
Body aches	19	22	86.40%	See MD	4	51	7.80%
Watery diarrhea	25	29	86.20%	Bloody diarrhea	1	50	2.00%
Abdominal cramps	42	50	84.00%	Seen in ER	0	51	0.00%
Vomiting	41	51	80.40%	Hospitalized overnight	0	51	0.00%

Epidemic Curve

The epidemic curve of illness among case-patients with onset of illness dates during 4/17 – 4/20 (Figure 1) indicates a point-source outbreak with norovirus exposure occurring on 4/16 at approximately 6pm.

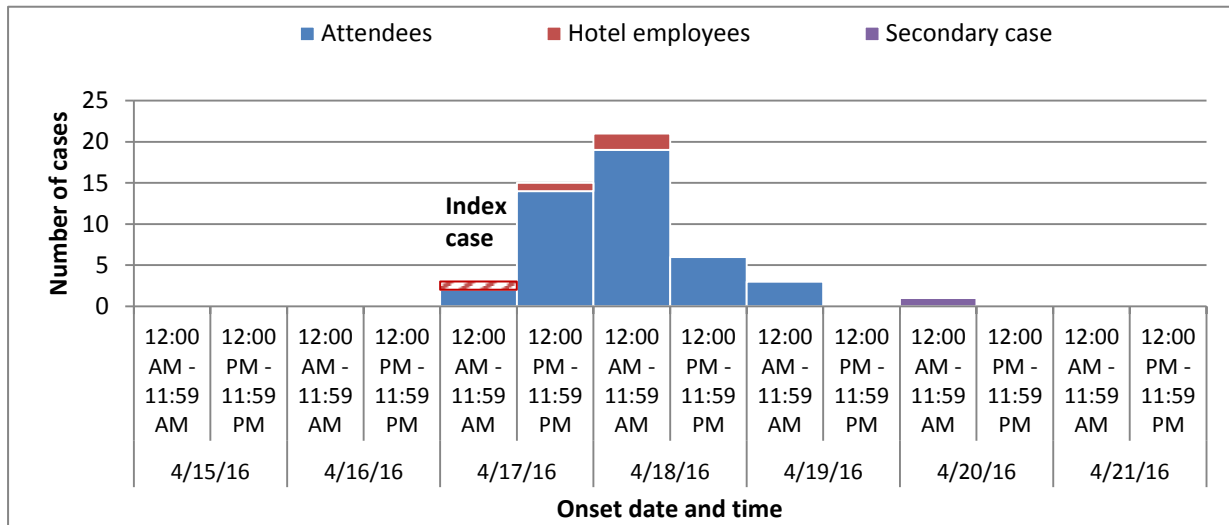


Figure 1. Cases of confirmed and probable norovirus gastroenteritis by 12-hour interval of onset, Wood Hotel Marshfield Banquet, 4/17/2016 - 4/20/16 (n=49).

The earliest onset of symptoms occurred in a food worker who prepared food for the banquet (index case).

Employee Illnesses

A total of six employee illnesses were identified among Hotel Marshfield employees from completed employee questionnaires, five of which were related to this outbreak. Illnesses occurred in food workers, bartenders, and banquet servers. The earliest reported illness occurred in a chef and began less than 8 hours after the banquet meal. Other than the first illness, the onset dates and times of three employee illnesses suggests the employees were exposed at the same time as banquet attendees, while an additional employee illness with onset 4/20/16 was likely a secondary case. One employee reported illness lasting from 4/6– 4/9/16 that was unrelated to this outbreak. This individual did not work or visit the Hotel in the two weeks before the banquet and could not have introduced the virus to the facility.

Analysis

Case-control study

The case-control study analysis was conducted using exposure information from 48 case-patients and 61 well controls. Consuming any item from the New York strip steak plate (New York strip steak with red wine reduction, buttery garlic chive mashed potatoes, and glazed carrots) was statistically associated with illness (table 2). Each item on the steak plate was also statistically significant individually. People who consumed any item from the steak plate were 2.59 times more likely to become ill than persons who did not consume an item from the steak plate (OR=2.59, 95% confidence interval 1.18-5.72, p-value=0.0171). People who consumed New York strip steak, buttery garlic chive mashed potatoes, or glazed carrots were 2.56, 2.45, and 3.01 times more likely to be ill than persons who did not consume these items, respectively.

Table 2. Attack rate table excerpt showing statistically significant exposures identified from the case-control study. A full list of food and drink items analyzed can be found in the Appendix.

Food/drink item	People who consumed item				People who did NOT consume item				Statistical Analysis				
	Ill	Well	Total	% Ill	Ill	Well	Total	% Ill	Odds ratio	Lower 95% confidence limit	Upper 95% confidence limit	p value	Method
Glazed carrots	23	14	37	62%	24	44	68	35%	3.01	1.31	6.91	0.0082	Pearson
Any steak plate item	33	28	61	54%	15	33	48	31%	2.59	1.18	5.72	0.0171	Pearson
NY strip steak	32	25	57	56%	16	32	48	33%	2.56	1.15	5.68	0.0194	Pearson
Garlic chive mashed potatoes	25	18	43	58%	21	37	58	36%	2.45	1.09	5.49	0.0286	Pearson

Employee Exposures

The earliest onset of illness among hotel staff was reported by Chef A, who reported preparing all of the banquet food on 4/16/16. Other than Chef A, the onset dates and times of the other employee illnesses suggest they were exposed at the banquet at the same time as the attendees. One additional employee appears to be a secondary case based on his onset two days later than others.

Both ill and well employees reported eating pizza ordered and made specifically for employees on the afternoon of the banquet. Both ill and well employees reported eating a variety of banquet food items. No common food or drink items were consumed by all ill employees. None of the ill employees reported

consuming items from the steak plate. Chef A denied eating any banquet food or pizza and only brought power bars from home. The second positive food worker, a bartender, reported drinking soda during the banquet and reported eating the pizza made specifically for the employees by the restaurant side of the kitchen earlier that day. A server who only worked the day of the banquet and became ill reported eating the pizza made for employees, having a root beer from the restaurant, and consuming ranch dressing and water with ice from the faucet in the banquet set-up area. Another ill employee (bartender) ate the employee pizza and did not consume any food during the banquet but drank a bottle of water and a Squirt soft drink. The onset of this individual's illness on 4/20/16 suggests they were not infected at the banquet but likely from contact with a symptomatic employee or contact with a contaminated surface at work. Another ill employee did not consume any food or drink during the banquet but ordered an apple grape salad with chicken from the hotel restaurant after their shift was over. No ingredients in the salad had been prepared by staff on the banquet side of the kitchen and there were no shared ingredients used in this meal.

Laboratory Investigation

Bacteriologic and Viral Testing of Human Specimens

On 4/26/16 the WSLH confirmed norovirus genogroup II infection from five of seven stool specimens submitted by ill individuals. Sequencing at WSLH showed five of the five norovirus positive stool specimens collected from three banquet attendees and two Hotel Marshfield employees were positive for the same norovirus strain, norovirus genogroup II.17B (Kawasaki). The two GII.17B positive specimens from Hotel Marshfield employees were submitted by Chef A and a bartender. One ill Hotel Marshfield employee and one ill restaurant patron were negative for norovirus, Shiga toxin, and enteric bacterial pathogens at WSLH.

Environmental Investigation Results

Facility and Event Description

Hotel Marshfield is a licensed establishment that operates a banquet facility/conference center, a restaurant (Libby McNeil's), and hotel. The hotel has a single kitchen which is divided into two halves—one half for Libby McNeil's and one half for banquet food preparation. The halves of the kitchen are completely separate, however kitchen staff is shared between the restaurant and banquet kitchen. The banquet was held on Saturday, April 16, 2016. Food for the banquet was prepared during Thursday 4/14 through Saturday 4/16.

During the banquet, food was served in three rounds. From 4-6pm, a self-service appetizer bar was available. At 6:15pm, a sit-down meal was served by banquet servers. Later in the evening at 8:30pm, a second "late night" self-service appetizer bar was available. Banquet tables were set with a house salad for each attendee, boats of ranch and French dressing, single-serve creamer and sugar, salt and pepper shakers, and a basket of dinner rolls and butter. There was an open bar offering bottled beer, wine, mixed drinks, and soft drinks. Water with ice in carafes was available on each banquet table. A plate of mixed flavor cupcakes purchased from Bakery A and plated by the Company A Employee Relations Officer was placed on each table at 6:40pm. A goodie bag of cookies from Company B was provided to overnight guests in their hotel rooms.

On-site Assessment

At the time of assessment, the kitchens were found to be clean and well-constructed with recent model appliances. Food items stored and maintained in refrigeration units met adequate control measures for reducing growth and survival of hazardous microorganisms. No problems were observed or reported

with hot holding, cold holding or cooking temperatures. Cleaning of work spaces between tasks or food items was adequate.

During the assessment, the food handling practices of three chefs in the banquet kitchen were observed. When asked about the glove use policy during a verbal interview with the EHS, Chef A stated that no ready-to-eat food is touched without using gloves. However, one of the chefs was observed having bare-hand contact with ready-to-eat food items twice during the same observation period, and a member of the wait staff was observed taking and eating fried potato chips from a hot holding bowl in the kitchen. During the assessment, Chef A's glove use consistency with ready-to-eat food could not be observed because Chef A only handled raw products which were going to be cooked at the time of the observation.

No hotel employees reported illness onset in the days before the banquet. Review of employee work schedules in conjunction with their self-reported illness onset and well dates indicated that Chef A continued to work while symptomatic with norovirus infection. Review of policies with facility management revealed that the facility did not have any formal written policies regarding glove use, employee illness, or hand washing. The only written document available was an Employee Health Reporting Food Code Fact sheet the hotel uses when hiring kitchen staff which had been signed by employees.

Another concern identified during the facility inspection was related to the proximity of employee restrooms to food preparation areas in the kitchen. Two restrooms for employee use were located in the kitchen area approximately 15 feet from food preparation areas. The restrooms did not have exterior self-closing doors and it did not sound like the exhaust fans were working at the time of inspection. This created a concern that aerosolized virus particles generated by toilet flushing after use by an ill employee could enter the kitchen preparation areas, pulled by the stronger exhaust fans above the ovens and grills. This could result in contamination of food and the kitchen environment.

Food Flow

Banquet Menu

Side dishes for each entrée selection are cooked and prepared in the two days prior to the banquet. On the day of the event, the pre-prepared banquet plates are reheated to 165°F and the protein (e.g. steak, fish) is added to the reheated plate while hot. All three chefs were involved in the plating and cooling of side dishes the day(s) prior to the event. However, only Chef A prepared and plated food on the day of the banquet due to short staffing. Food prep staff is shared between the hotel restaurant and the banquet sides of the kitchen when extra help is needed by the banquet side. Salads for banquets are prepared as a team; one person prepares lettuce, one prepares tomatoes, and one prepares onions. Front of House staff add croutons and crackers, set all the banquet tables, and place prepared food in the banquet halls. No banquet leftovers were used for the restaurant. No leftover food items or garnishes are used in the hotel breakfast buffet.

Food flows were constructed for all food items served. The food flow for all statistically significant food exposures is shown below.

New York Strip Steaks:

1. Thursday – Retrieve steaks from cooler, cut into 10 oz. pieces, and place in container.
2. Thursday – Retrieve container from cooler, put steak seasoning on steak, and begin to pan sear on flattop. Place on sheet tray and put in banquet cooler.

3. Saturday – Take seared steaks from cooler, put into oven, and cook till 165°F and put on banquet plates from oven. Steak temperature is measured with a thermometer.

Butter Garlic Chive Mashed Potatoes:

1. Wednesday – Peel potatoes from dry storage, cut, and place into container with water. Let sit overnight in the cooler.
2. Thursday – Take potatoes from cooler and steam for 1 hour.
3. Thursday – Put potatoes in mixing bowl with half & half, butter from dairy cooler, dried chives, salt, pepper, and garlic powder, and mix. Place mashed potatoes in 2 inch hotel pan and put in banquet cooler.
4. Friday – Place potatoes on banquet plate with carrots.
5. Saturday – Reheat plate to 165°F. Add cooked steak to plate with red wine reduction and parsley, and put in hot box.

Glazed Carrots:

1. Thursday – Take carrots from cooler and steam for 10 minutes.
2. Thursday – Place cooked carrots in ice water and put into banquet cooler.
3. Friday – When needed, take and drain water and place carrots on banquet plate.
4. Saturday – Reheat plate. Squeeze honey from squirt bottle onto carrots.

Red Wine Reduction:

1. Saturday – Take wine and cook in stock pot.
2. Saturday – Add water and beef stock, bring to a boil, and add corn starch. Put in hot box and ladle on steak.

Garnishes:

Raw parsley was freshly chopped the day of the banquet by Chef A and transferred to a bowl or shaker to later be sprinkled as garnish. Originally Chef A stated the raw parsley was chopped and transferred it to a shaker for application to the entrees. However, later Chef A stated that the parsley was sprinkled from a bowl using fingers. Chef A reported to have worn gloves during the sprinkling of the parsley. The chef stated that the parsley was used as garnish on all entrée choices. Food flows for other entrees identified parsley as a garnish on all three entrée choices.

Employee Pizza

Four employee pizzas were made by the front of house manager on the Libby McNeil's side of the kitchen on 4/16- a cheese pizza, a sausage pizza, a pepperoni pizza, and a chicken bacon ranch pizza. The preparer reported using a salt and pepper shaker when making the pizzas which may have also been used for banquet prep. No ingredients prepared for the banquet food were used in the making of the pizzas. Only two pieces of pizza were left over after the employees had eaten and they were discarded. The Front of House Manager stated that everyone who was on banquet staff that evening ate some pizza.

CONCLUSIONS/DISCUSSION

Noroviruses are a collection of related viruses that are the most common cause of acute gastroenteritis in the United States. According to the CDC, these pathogens account for about 19-21 million illnesses per year in the U.S.¹ They are also the leading cause of foodborne illness outbreaks in the U.S., most of which occur in food service settings like restaurants. These outbreaks are often due to improper

¹ U.S. Centers for Disease Control and Prevention. Norovirus. Available at <http://www.cdc.gov/norovirus/index.html>

handling of food items by infected workers. However, foods such as shellfish, fruits, and vegetables may also be contaminated at their source.

Norovirus infection causes acute gastroenteritis (i.e., inflammation of the stomach and/or intestines), which can lead to diarrhea, vomiting, nausea, and stomach pain. Other signs and symptoms associated with infection include fever, headaches, and body aches. Most people recover within 1 to 3 days. People can become infected through ingestion of food or water contaminated with infectious material (stool or vomit), close contact with an infected individual, or touching contaminated surfaces or objects (e.g. door handles, toilet seats). Most outbreaks of norovirus illness occur when infected people spread the virus to others.

While most norovirus outbreaks occur between November - April in the U.S., people may become infected at any time of the year. Noroviruses are highly contagious, and it takes a relatively small number of virus particles—as low as 18—to make someone sick.² People with norovirus shed the virus in very high concentrations in the stool and vomit (millions of viral particles per gram³). Infected individuals are most contagious while they are having symptoms and during the first few days of recovery. However, norovirus particles may be present in an infected person's vomit and/or stool before they even feel sick (up to 30% of norovirus infections are asymptomatic⁴), and they can remain in the stool for up to 2 weeks after recovery.^{5,6} Food service workers, health care providers and workers, and those who attend or work in daycare settings should not return to work until after they have been symptom-free for 48 hours.

This investigation identified a foodborne outbreak of norovirus gastroenteritis associated with consuming food from a banquet event held at the Hotel Marshfield banquet facility in Marshfield, WI on 4/16/2016. The causative agent was Norovirus genogroup II.17B (Kawasaki). Confirmed and probable cases were identified among banquet attendees and employees of Hotel Marshfield. Based on the epidemiologic, laboratory, and environmental evidence gathered during this outbreak, improper food handling by a Hotel Marshfield employee who was infected with norovirus is the most likely cause of this outbreak. Because specific food items were identified that were associated with higher risk of illness and all of these items were served on the same plate, this suggests the ill employee was a chef rather than a server or bartender. The challenge of being short-staffed in the banquet kitchen on the day of the banquet may have contributed to a breakdown in hand hygiene or glove use.

The pattern of illness onset dates and times in the epidemic curve supports the conclusion that exposure to the virus occurred at the same time among banquet attendees and hotel staff. This means that the virus was not introduced to the hotel by an ill banquet attendee. Although one banquet attendee reported becoming ill during the event, the epidemic curve indicates a point source exposure consistent with a foodborne outbreak, rather than the pattern of illnesses typically seen with person-to-person transmission from an ill attendee. Since ill attendees do not come in contact with kitchen staff, outbreaks where both food workers and attendees are ill at the same time generally indicate the food worker was the source, rather than a victim.

² Teunis PF, Moe CL, Liu P, et al. Norwalk virus: how infectious is it? *J Med Virol* 2008;80:1468--76.

³ Atmar RL, Opekun AR, Gilger MA, et al. Norwalk virus shedding after experimental human infection. *Emerg Infect Dis.* 2008;14:1553--7.

⁴ Hall A, Vinjé J, Lopman B, et al. Norovirus Outbreak Management and Disease Prevention Guidelines. *MMWR.* March 4, 2011/60(RR03);1-15.

⁵ U.S. Centers for Disease Control and Prevention. Norovirus Transmission. Available at <http://www.cdc.gov/norovirus/about/transmission.html>

⁶ Guo Z, Huang J, Shi G, et al. A food-borne outbreak of gastroenteritis caused by norovirus GII in a university located in Xiamen City, China. *Intl J of Infectious Dis*, Vol. 28;101 – 106.

Additionally, the same strain of norovirus, norovirus GII.17B (Kawasaki) was isolated from both food workers and banquet attendees. The Kawasaki strain is a rare strain of norovirus only recently introduced to the United States in the last five years.⁷ In Wisconsin, it tends to be associated with foodborne outbreak settings rather than person-to-person transmission in the community; during 2015-2016, 62.5% of the outbreaks caused by the Kawasaki strain in Wisconsin were foodborne.⁸ The rarity of the strain, its recovery from both employees (including Chef A) and attendees, and the fact that the same strain was identified in all norovirus positive specimens support the conclusion the illnesses were all acquired from a single source.

Chef A reported illness onset at 1:45am on the night of the banquet (4/16/16) while the majority of other illnesses began in the evening of the next day. The length of Chef A's incubation period (time between exposure and start of symptoms) was 7.75 hours, which is shorter than the range of 10-50 hours observed during volunteer studies of norovirus infection where exact time of exposure is known,^{9,10} as well as the median incubation period length of 32.5 hours observed in this outbreak. Assuming the onset date and time of Chef A's illness was accurately reported, this indicates Chef A was likely exposed to the virus 1-2 days prior to the banquet (not at the same time as banquet attendees and other staff). Although Chef A's symptoms did not begin until after the banquet was over, shedding of norovirus in the stool of infected asymptomatic individuals has been documented¹¹ and it was likely Chef A was shedding virus at the time he/she was preparing and plating the food for the banquet. Additionally, carriage and shedding of norovirus has been documented in individuals who never develop symptoms.¹² It is also possible that an unidentified asymptomatic shedding employee could have served as a source of contamination during food prep, or that an ill employee did not accurately disclose his/her illness status and onset date/time.

While Front of House staff were involved in adding croutons to salads, none of these items were statistically associated with illness. Only items that were prepared and finished in the kitchen were statistically associated with illness, increasing the likelihood the contamination event occurred during banquet meal preparation. If a banquet server was the source, we would expect to see no statistically significant association with a specific food item because all types of entrée plates would be handled by the ill individual.

Results of the case-control study showed that individuals who consumed the New York strip steak (served with a red wine reduction), buttery garlic chive mashed potatoes, and glazed carrots were more than two times more likely to become ill than those who did not. These three items were plated together on the same plate. A significant statistical association with illness existed for each item individually and for all three items combined. No other food or beverage items were statistically associated with illness. The fact that all food items with a significant association with illness were cooked items (except the chopped parsley garnish and honey glaze) suggests that contamination occurred after the items were cooked. Foodborne norovirus outbreaks commonly involve food items that are handled and served raw, such as salads and fruit. The only raw ingredients on the steak plates reported by the establishment were chopped fresh parsley used as garnish and the honey squeezed onto the carrots

⁷ Parra GI, Green KY. Genome of emerging norovirus GII.17, United States, 2014. *Emerg Infect Dis*. 2015 Aug [accessed 8/1/2016].

⁸ Wisconsin Department of Health Services, unpublished data.

⁹ Dolin R, Blacklow NR, DuPont H, et al. Transmission of Acute Infectious Nonbacterial Gastroenteritis to Volunteers by Oral Administration of Stool Filtrates. *J Infect Dis*. 1971. 123(3):307-312.

¹⁰ Lee RM, Lessler J, Lee RA, et al. Incubation periods of viral gastroenteritis: a systematic review. *BMC Infectious Diseases*. 2013;13:446. doi:10.1186/1471-2334-13-446.

¹¹ Hall A, Vinjé J, Lopman B, et al. Norovirus Outbreak Management and Disease Prevention Guidelines. *MMWR*. March 4, 2011/60(RR03);1-15.

¹² Hall A, Vinjé J, Lopman B, et al. Norovirus Outbreak Management and Disease Prevention Guidelines. *MMWR*. March 4, 2011/60(RR03);1-15.

after reheating. Since the chef stated that the same parsley was used as garnish for all three entrees, if the parsley was contaminated at its source (in the field), we would expect to see no statistically significant food item, since all entrees would have contained the same parsley. However, the fact that only the steak plate was statistically associated with illness suggests contamination by food worker during kitchen prep is more likely than contamination in the field. Contamination could have been introduced if parsley was chopped while wearing gloves, but then added to the steak plates by an ungloved hand. Alternatively, the parsley may have only been added to the steak plates. Also, contamination could have also been introduced if the honey squeeze bottle or bottle nozzle was contaminated with norovirus.

Although no additional illnesses were reported among attendees of subsequent banquets, one secondary case occurred in an employee, suggesting person-to-person transmission or transmission from contact with contaminated environmental surfaces also occurred among staff the day after the banquet. Chef A continued to work the next couple days while symptomatic with diarrhea and could have contaminated surfaces or transferred the virus via contact, serving as the source of infection for the secondary case identified among staff. Hotel employees with primary cases who became ill but did not consume banquet food may have been exposed to contaminated food during serving, table clearing, or cleaning, or to contaminated surfaces such as tables in kitchen prep areas, sinks, bathrooms, or door handles.

Several contributing factors were identified during this outbreak investigation, and multiple violations of Wisconsin Food Code which could contribute to the likelihood of an outbreak occurring were observed during the on-site assessments conducted by WCHD sanitarians. Bare-handed contact of ready-to-eat food items by food workers was observed multiple times during the same visit, suggesting that bare-handed contact occurs frequently during routine food prep activities at the facility. The facility did not have any formal written employee illness, hand washing, or glove use policies. Review of the employees' work schedules in conjunction with their illness onset and resolution dates indicated that Chef A worked preparing food for more banquets at the facility while symptomatic with diarrhea, which violates Wisconsin Food Code. Additionally, hotel employee restrooms did not have functioning fans and are located near (approx. 15ft) food preparation areas. While the case-control study results point to contamination of specific food items as the source of illness during this outbreak, the close proximity of the employee bathrooms to prep areas could contribute to kitchen contamination and future outbreaks.

RECOMMENDATIONS

According to the CDC, while there is no vaccine to prevent norovirus infection, illness can be prevented through proper hand hygiene; washing fruits and vegetables and cooking seafood thoroughly before consuming; avoiding food preparation and caring for others when sick; cleansing and disinfecting contaminated surfaces; and carefully washing laundry.

Individuals who work in the food service industry should be aware of practices that can prevent the spread of noroviruses:

- not preparing food for others when sick and for at least 48 hours after symptoms stop,
- practicing proper hand hygiene,
- rinsing fruits and vegetables and cooking shellfish,
- regularly cleaning and sanitizing kitchen utensils, counters, and surfaces, and
- carefully washing table linens, napkins, and other laundry.

It is particularly important for food establishment employees to inform their manager when they are ill and to not work while sick with gastroenteritis and for at least 48 hours following recovery. Complying with this recommendation means that employees need to be both aware of it and have the motivation and responsibility to comply with it.

The following recommendations were developed for Hotel Marshfield following the assessment conducted on 4/20 and 4/21/2016:

- Review internal procedures regarding employee illness, glove use, and hand washing to ensure they are consistent with standard food safety regulations, and create written policies outlining these procedures.
- Review and update sick leave policy for management and employees.
- All personnel, including management, should undergo comprehensive food handling training that includes at a minimum: personal hygiene, proper use of disposable gloves, and employee illness policies to ensure complete understanding.
- Consider installing negative pressure ceiling fans in employee restrooms to minimize movement of aerosolized particles into the kitchen, or, discontinue use of the employee restrooms in the kitchen area.

As a result of these recommendations, the hotel has reviewed their procedures for reporting illness, glove use, and hand washing with all staff. The sick leave policy has been reviewed with all staff, and the fact that all staff that earn paid time off (sick leave) has been reinforced. The WCHD conducted an onsite food safety training at Hotel Marshfield that discussed personal hygiene, glove use, and employee illness, as well as other risk factors for foodborne illness. The information provided during the training presentation and via brochures has been incorporated into the hotel’s employee training program.

The employee restroom fans were verified operational (low-flow, constant-on fans) and the employee restroom doors have had spring hinges installed to self-close and keep closed. Ready-to-use spray bottles of bleach solution have been added as an additional option for sanitizing in the kitchen.

APPENDIX

Table 3. Line List of case-patients (identifying information of hotel staff has been removed).

No.	Class	Case type	Affiliation	Age	Sex	Onset date	Onset time (24:00)	IP (hrs)	N	V	D	BD	WD	AC	HA	MA	BA	CH	SW	FE	FA	MD
	Conf	INDEX	HE			4/17/2016	1:45	7.75	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	N
1	Prob	1°	A	57	M	4/17/2016	9:00	15.00	Y	Y	Y	N	Y	Y	N	N		N	Y	Y	Y	N
2	Prob	1°	A	57	M	4/17/2016	16:00	22.00	N	N	Y	N	Y	N	Y	N		N	N	N	Y	N
3	Prob	1°	A		F	4/17/2016	16:00	22.00	Y	Y	Y	N		Y	Y	N	N	Y	Y	Y	Y	N
4	Prob	1°	A	59	M	4/17/2016	17:00	23.00	Y	Y	Y	N	Y	Y	Y	Y		N	Y	N	Y	N
5	Prob	1°	A	51	M	4/17/2016	19:00	25.00	Y	Y	Y	N		Y	N	Y		Y	Y	Y	Y	N
6	Prob	1°	A		F	4/17/2016	19:30	25.50	Y	Y	Y	N		Y	Y	Y	N	N	N	N	Y	N
7	Conf	1°	A		F	4/17/2016	20:00	26.00	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	Y
8	Prob	1°	A	21	F	4/17/2016	22:00	28.00	Y	N	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N

9	Prob	1°	A		M	4/17/2016	22:00	28.00	Y	Y	Y	N		Y	Y	Y	Y	N	Y	N	Y	N
10	Prob	1°	A	34	F	4/17/2016	22:30	28.50	Y	Y	Y	N	Y	Y	N	Y		N	N	N	Y	N
11	Prob	1°	A	61	F	4/17/2016	23:00	29.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
12	Prob	1°	A	28	M	4/17/2016	23:00	29.00	Y	Y	Y	N	Y	Y	Y	Y		N	N	Y	Y	N
13	Prob	1°	A	67	M	4/17/2016	23:00	29.00	Y	Y	Y	N	Y	N	Y	Y		N	Y	N	Y	N
14	Conf	1°	HE			4/17/2016	23:00	29.00	Y	Y	Y				Y	Y	Y	Y	Y		Y	N
15	Prob	1°	A		M	4/17/2016	23:59	29.98	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	N
16	Prob	1°	A	23	F	4/17/2016			Y	Y	Y	N	Y	Y	Y	Y		N	Y		Y	N
17	Prob	1°	A	73	F	4/17/2016	pm		Y	Y	Y	N		N	N	Y		Y	N	N	Y	N
18	Prob	1°	A	48	M	4/17/2016			Y	Y	Y	N	Y	N	N	N		Y	Y	N	Y	N
19	Prob	1°	A	51	M	4/18/2016	0:00	30.00	Y	Y	Y	N	Y	N	Y	Y		Y	N	N	Y	N
20	Prob	1°	A		M	4/18/2016	0:00	30.00	Y	Y	Y	N		N	Y	Y	N	N	N	Y	Y	N
21	Prob	1°	A	59	M	4/18/2016	0:30	30.50	Y	Y	Y	N		Y		Y		N	Y	N	Y	N
22	Prob	1°	A		F	4/18/2016	1:00	31.00	Y	Y	Y	N		Y	N	Y	Y	Y	Y	Y	N	Y
23	Prob	1°	HE			4/18/2016	1:30	31.50	Y	Y	Y	N		Y	N	Y	Y	Y	Y	Y	Y	N
24	Prob	1°	A	42	M	4/18/2016	2:00	32.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
25	Prob	1°	A	37	M	4/18/2016	2:00	32.00	Y		Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
26	Prob	1°	A		M	4/18/2016	2:30	32.50	Y	N	Y	N		Y	N	Y	Y	Y	Y	Y	Y	N
27	Conf	1°	A		F	4/18/2016	3:00	33.00	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	N
28	Conf	1°	A		M	4/18/2016	3:15	33.25	Y	N	Y	N		N	N	N	Y	Y	N	Y	Y	N
29	Prob	1°	A		F	4/18/2016	3:25	33.42	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	N
30	Prob	1°	A		F	4/18/2016	4:00	34.00	Y	Y	N	N		Y			Y	Y	Y		Y	N
31	Prob	1°	A		M	4/18/2016	4:00	34.00		N	Y	N		Y			Y	Y	Y		Y	N
32	Prob	1°	A		F	4/18/2016	4:30	34.50	Y	Y	Y	N		Y	N	Y	Y	Y	Y	Y	Y	N
33	Prob	1°	A	61	M	4/18/2016	7:00	37.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	N	Y	N
34	Prob	1°	A		M	4/18/2016	7:00	37.00	N	N	Y	N		N	Y	Y	Y	Y		Y	Y	Y
35	Prob	1°	HE			4/18/2016	7:00	37.00	Y	Y	Y	N		Y	N	Y	Y	N	Y	N	N	Y
36	Prob	1°	A		F	4/18/2016	7:00	37.00	Y	Y	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	N
37	Prob	1°	A		M	4/18/2016	7:00	37.00	N	N	Y	N		N	N	N	N	N	N	N	N	N
38	Prob	1°	A	44	M	4/18/2016	8:00	38.00	Y	Y	N	N		Y	Y	Y		Y	Y	Y	Y	N
39	Prob	1°	A	54	M	4/18/2016	10:00	40.00	Y	Y	Y	N	Y	Y	Y	Y		N	N	N	Y	N
40	Prob	1°	A	60	F	4/18/2016	12:00	42.00	Y	N	Y	N	Y	Y	Y	Y		N	Y	Y	Y	N
41	Prob	1°	A	62	M	4/18/2016	12:00	42.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
42	Prob	1°	A		M	4/18/2016	12:00	42.00	Y	N	Y	N		N	Y	Y	Y	N	N	N	Y	N
43	Prob	1°	A	40	M	4/18/2016	16:30	46.50	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
44	Prob	1°	A	61	M	4/18/2016	22:00	52.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	Y
45	Prob	1°	A		F	4/18/2016	23:59	53.98	Y	Y	N	N		Y	Y	N	Y	Y	Y	Y	Y	N
46	Prob	1°	A	57	M	4/18/2016			Y	N	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
47	Prob	1°	A	58	M	4/18/2016			Y	N	Y	Y	Y	Y	Y	Y		Y	N	Y	Y	N
48	Prob	1°	A	33	M	4/18/2016			Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N
49	Prob	1°	A	33	M	4/19/2016	2:00	56.00	Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N

50	Prob	1°	A	56	M	4/19/2016	3:00	57.00	Y	Y	N	N	N	N	N	N	N	Y	N	N	N	
51	Prob	1°	A	54	M	4/19/2016	6:00	60.00	Y	Y	Y	N	N	Y	Y	Y		Y	Y	Y	Y	N
52	Prob	2°	HE			4/20/2016			N	N	Y	N		Y	N	Y	Y	N	N	N	Y	N
53	Prob	2°	A	32	F	4/20/2016	11:30	65.50	Y	Y	Y	N	Y	Y	Y	Y		Y	N	Y	Y	N
54	Prob	2°	A	48	M	4/20/2016			Y	Y	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	N

M/F=Male/Female; Conf=Confirmed case, Prob=Probable case; 1°=Primary case, 2°=Secondary case; Affiliation A=Attendee, HE=Hotel employee; IP=Incubation period; N=Nausea; V=Vomiting; D=Diarrhea; BD= Bloody diarrhea; WD= Watery diarrhea; AC=Abdominal cramps; FE=Fever; CH=Chills; SW=Sweats; ; HA=Headache; MA=Muscle aches; FA=Fatigue; MD=Saw a physician for this illness.

Table 4. Complete Attack Rate Table from Case-Control Study

Food/drink item	People who consumed item				People who did NOT consume item				Statistical Analysis				
	Ill	Well	Total	% Ill	Ill	Well	Total	% Ill	Odds ratio	Lower 95% confidence limit	Upper 95% confidence limit	p value	Method
glazedcarrots_2	23	14	37	62%	24	44	68	35%	3.01	1.31	6.91	0.0082	Pearson
anysteakplate	33	28	61	54%	15	33	48	31%	2.59	1.18	5.72	0.0171	Pearson
NYstripsteak	32	25	57	56%	16	32	48	33%	2.56	1.15	5.68	0.0194	Pearson
Garlicchivemashedpotatoes	25	18	43	58%	21	37	58	36%	2.45	1.09	5.49	0.0286	Pearson
Mashedpotatoes	16	29	45	36%	32	31	63	51%	0.53	0.24	1.17	0.1161	Pearson
Wine	4	11	15	27%	44	48	92	48%	0.4	0.12	1.34	0.1265	Pearson
Creammilkincoffeetea	7	16	23	30%	39	42	81	48%	0.47	0.18	1.27	0.1312	Pearson
anyporkplate	19	33	52	37%	29	28	57	51%	0.56	0.26	1.2	0.132	Pearson
BlackForestchocolate	21	17	38	55%	27	40	67	40%	1.83	0.82	4.09	0.1391	Pearson
Ranchdressing	30	30	60	50%	16	29	45	36%	1.81	0.82	4.01	0.1399	Pearson
Salmonwlemondillcreamsa uce	9	18	27	33%	38	40	78	49%	0.53	0.21	1.31	0.1659	Pearson
Otherentreeorsidedish	6	3	9	67%	39	55	94	41%	2.82	0.56	18.3	0.174	Fisher's exact
Swedishmeatballs	9	6	15	60%	37	51	88	42%	2.07	0.68	6.31	0.196	Pearson
Strawberries	5	11	16	31%	42	47	89	47%	0.51	0.16	1.58	0.2378	Pearson
Greenbeansalmandine	12	20	32	38%	36	37	73	49%	0.62	0.26	1.44	0.2633	Pearson
Mixeddrinks	11	19	30	37%	36	38	74	49%	0.61	0.26	1.46	0.266	Pearson
Gravy	12	20	32	38%	36	38	74	49%	0.63	0.27	1.48	0.2898	Pearson
Crackers	5	10	15	33%	42	46	88	48%	0.55	0.17	1.73	0.3009	Pearson
Frenchdressing	18	28	46	39%	28	29	57	49%	0.67	0.3	1.46	0.3105	Pearson
Iceinanydrinks	31	42	73	42%	17	15	32	53%	0.65	0.28	1.5	0.3129	Pearson
Cherrymappleorkloin	11	19	30	37%	37	41	78	47%	0.64	0.27	1.52	0.3131	Pearson
Stuffedmushroomcaps	5	10	15	33%	41	46	87	47%	0.56	0.18	1.78	0.3214	Pearson
Bruschetta	10	8	18	56%	37	49	86	43%	1.66	0.6	4.6	0.3313	Pearson
anylatenight	18	26	44	41%	24	23	47	51%	0.66	0.29	1.52	0.3315	Pearson
Dicedgarlicredpotatoes	12	21	33	36%	33	38	71	46%	0.66	0.28	1.54	0.3325	Pearson
Chickenwings	3	8	11	27%	42	47	89	47%	0.42	0.07	1.91	0.3364	Fisher's exact
Carrots	9	7	16	56%	37	48	85	44%	1.67	0.57	4.9	0.3486	Pearson

anysalmonplate	15	24	39	38%	33	37	70	47%	0.7	0.32	1.56	0.3815	Pearson
Sodasoftdrinkpop	15	14	29	52%	33	45	78	42%	1.46	0.62	3.44	0.384	Pearson
Celery	2	5	7	29%	44	50	94	47%	0.45	0.04	2.97	0.4501	Fisher's exact
Asparagus	12	19	31	39%	35	40	75	47%	0.72	0.31	1.69	0.4532	Pearson
Butter	32	34	66	48%	16	23	39	41%	1.35	0.61	3.01	0.4585	Pearson
Bottledwater	3	6	9	33%	44	51	95	46%	0.58	0.09	2.92	0.5076	Fisher's exact
anyappetizer	10	15	25	40%	37	41	78	47%	0.74	0.3	1.85	0.516	Pearson
Fruitplatter	6	10	16	38%	42	49	91	46%	0.7	0.23	2.09	0.521	Pearson
Beer	24	26	50	48%	24	33	57	42%	1.27	0.59	2.73	0.5407	Pearson
Otherappetizer	7	6	13	54%	41	49	90	46%	1.39	0.43	4.48	0.5754	Pearson
Tortillachips	10	10	20	50%	38	50	88	43%	1.32	0.5	3.48	0.5796	Pearson
Leftoverstrawberrycheesecake	2	1	3	67%	42	54	96	44%	2.57	0.13	154.46	0.5834	Fisher's exact
Ranchdippingsauce	2	1	3	67%	44	54	98	45%	2.45	0.12	147.44	0.5901	Fisher's exact
Dinnerolls	38	45	83	46%	10	15	25	40%	1.27	0.51	3.14	0.61	Pearson
Stawberrycheesecake	12	16	28	43%	35	38	73	48%	0.81	0.34	1.96	0.6463	Pearson
Tomatoes	3	2	5	60%	43	51	94	46%	1.78	0.19	22.09	0.661	Fisher's exact
anybaritem	43	53	96	45%	5	8	13	38%	1.3	0.4	4.26	0.6661	Pearson
Honeydewmelon	2	4	6	33%	45	55	100	45%	0.61	0.05	4.51	0.691	Fisher's exact
Cauliflower	4	3	7	57%	41	49	90	46%	1.59	0.25	11.45	0.701	Fisher's exact
Chipsforartichokedip	8	8	16	50%	40	49	89	45%	1.23	0.42	3.55	0.7086	Pearson
Housesalad	45	54	99	45%	3	6	9	33%	1.67	0.33	10.83	0.7283	Fisher's exact
Pineapple	3	5	8	38%	44	53	97	45%	0.72	0.11	3.97	0.7286	Fisher's exact
anyrawveg	45	55	100	45%	3	5	8	38%	1.36	0.25	9.23	0.7305	Fisher's exact
Coffee	20	26	46	43%	28	32	60	47%	0.88	0.41	1.9	0.7438	Pearson
Cheese	9	10	19	47%	38	49	87	44%	1.16	0.43	3.14	0.7693	Pearson
Waterfromcarafeontable	32	41	73	44%	15	17	32	47%	0.88	0.38	2.04	0.7731	Pearson
Spinachartichokedip	6	8	14	43%	41	47	88	47%	0.86	0.28	2.68	0.7946	Pearson
Milk	6	6	12	50%	42	49	91	46%	1.17	0.35	3.89	0.8018	Pearson
Tacodip	8	9	17	47%	40	50	90	44%	1.11	0.39	3.14	0.8424	Pearson
Carrotcake	10	11	21	48%	38	46	84	45%	1.1	0.42	2.87	0.8447	Pearson
any_cupcake	29	36	65	45%	12	16	28	43%	1.07	0.44	2.63	0.8755	Pearson
Cupcakes	35	43	78	45%	13	17	30	43%	1.06	0.46	2.49	0.8854	Pearson
Sausage	8	10	18	44%	39	46	85	46%	0.94	0.34	2.62	0.9114	Pearson
Cheesesausagecrackerplatter	9	11	20	45%	38	45	83	46%	0.97	0.36	2.58	0.9497	Pearson
Leftoverblackforestchoc	2	2	4	50%	42	53	95	44%	1.26	0.09	18.04	1	Fisher's exact
Leftovercupcakes	2	2	4	50%	42	53	95	44%	1.26	0.09	18.04	1	Fisher's exact
Vegetableplatter	5	6	11	45%	37	47	84	44%	1.06	0.24	4.53	1	Fisher's exact
Grapes	4	5	9	44%	43	53	96	45%	0.99	0.18	4.9	1	Fisher's exact
Water	11	5	16	69%	7	3	10	70%	0.94	0.11	6.89	1	Fisher's exact

Dilldip	3	4	7	43%	43	51	94	46%	0.89	0.12	5.58	1	Fisher's exact
Broccoli	2	3	5	40%	43	52	95	45%	0.81	0.06	7.39	1	Fisher's exact
Cantaloupe	4	6	10	40%	43	51	94	46%	0.79	0.15	3.59	1	Fisher's exact
anycookie	2	3	5	40%	45	51	96	47%	0.76	0.06	6.93	1	Fisher's exact
Cookies	1	2	3	33%	47	54	101	47%	0.57	0.01	11.42	1	Fisher's exact
Chocolatetoffeeteasercookie	1	0	1	100%	47	57	104	45%	U	U	U	U	
Otherappetizersnack	1	0	1	100%	44	53	97	45%	U	U	U	U	
Otherbeverages	2	0	2	100%	17	8	25	68%	U	U	U	U	
anyrawfruit	47	57	104	45%	0	0	0	0%	U	U	U	U	
Otherfruit	0	0	0	0%	48	56	104	46%	U	U	U	U	
Othervegetable	0	0	0	0%	45	53	98	46%	U	U	U	U	
Pastaprimavera	0	0	0	0%	47	57	104	45%	U	U	U	U	
BBQdippingsauce	0	2	2	0%	45	51	96	47%	U	U	U	U	
Buffalodippingsauce	0	2	2	0%	46	53	99	46%	U	U	U	U	
Caramelapplecookie	0	1	1	0%	48	55	103	47%	U	U	U	U	
Chocolateexplosioncookie	0	1	1	0%	47	54	101	47%	U	U	U	U	
Peanutbuttermeltscookie	0	1	1	0%	47	55	102	46%	U	U	U	U	
Leftovercarrotcake	0	1	1	0%	45	54	99	45%	U	U	U	U	
Othercheeseplatteritem	0	1	1	0%	48	53	101	48%	U	U	U	U	
Otherdessertitem	0	1	1	0%	48	53	101	48%	U	U	U	U	

U=undefined value (0 value in at least one cell precludes analysis)

Attendee investigation questionnaire (company identifying information has been redacted):

Investigation Questionnaire v2

DEMOGRAPHIC INFORMATION

Name: _____
Age: _____ Gender: M F
Parent/Guardian Name: _____
Address: _____
City: _____ County: _____ State: _____ Zip: _____
Phone (home): _____ Phone (cell): _____
Occupation: _____
High risk activities: Daycare Food handler Health care provider/worker (*Provide appropriate exclusion and education if individual is ill / was ill*)

Did you attend the [redacted] Event at Hotel Marshfield on Saturday April 16, 2016 in Marshfield, WI? Yes / No

Did anyone else in your household attend the [redacted] Event? Yes / No
Name: _____ Phone Number: _____
Name: _____ Phone Number: _____

Did you stay overnight at the Hotel Marshfield before or after the dinner event? Yes / No
If yes, please provide dates of stay: _____

CLINICAL INFORMATION

Have you been ill with gastrointestinal symptoms (diarrhea, abdominal cramping, vomiting, nausea, etc.) anytime during the last two weeks (approximately April 5th to present)?
Y N *If no skip to Other Ill Persons*

Onset Date: ____/____/____	Onset Time: ____:____ AM PM
Well Date: ____/____/____	Well Time: ____:____ AM PM <input type="checkbox"/> Still ill at time of interview

Nausea	Y	N	Vomiting	Y	N	Diarrhea	Y	N	(defined as 3 or more loose stools 24 hours)
Bloody diarrhea	Y	N	Abdominal cramps	Y	N	Fever (____°)	Y	N	
Chills	Y	N	Sweats	Y	N	Headache	Y	N	
Body aches	Y	N	Muscle aches	Y	N	Fatigue	Y	N	
Other:	Y	N	_____						

Did you see a physician? Y N Date: ____/____/____
Were you seen in an ER/ED Y N Where: _____
Were you hospitalized overnight? Y N Where: _____
Was a stool specimen collected? Y N Results: _____

If no stool specimen collected, would you be willing to submit a stool specimen for free testing? Y N
Daytime contact number if different from above: _____

OTHER ILL PERSONS

Has anyone in your household been ill with GI symptoms during the last two weeks? Y N

1) If yes, who: _____ Onset date: ____/____/____ Time: ____:____ AM PM
 What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____
Did this person attend the [REDACTED] Event? Yes / No

2) If yes, who: _____ Onset date: ____/____/____ Time: ____:____ AM PM
 What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____
Did this person attend the [REDACTED] Event? Yes / No

Do you know anyone else (friend, co-worker, etc.) who was ill with GI symptoms during this same time period? Y N

1) If yes, who: _____ When/Onset: ____/____/____
 What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____
Did this person attend the [REDACTED] Event? Y / N-- > If yes, contact number: _____

2) If yes, who: _____ When/Onset: ____/____/____
 What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____
Did this person attend the [REDACTED] Event? Y / N-- > If yes, contact number: _____

EXPOSURES

Did you eat any food or have anything to drink at the [REDACTED] Event? Yes / No

Food Item	Yes/No			Details
APPETIZERS (served 4- 6 p.m.)				
Layered taco dip	Y	N	Unk	
Tortilla chips	Y	N	Unk	
Fruit platter	Y	N	Unk	
Honeydew melon	Y	N	Unk	
Cantaloupe	Y	N	Unk	
Pineapple	Y	N	Unk	
Grapes	Y	N	Unk	
Strawberries	Y	N	Unk	
Other fruit	Y	N	Unk	Specify:
Bruschetta	Y	N	Unk	
Baked spinach & artichoke dip	Y	N	Unk	
Chips for artichoke dip	Y	N	Unk	
Other appetizer	Y	N	Unk	Specify:
DINNER ITEMS				
House salad	Y	N	Unk	
Ranch dressing	Y	N	Unk	
French dressing	Y	N	Unk	
Dinner rolls	Y	N	Unk	
Butter	Y	N	Unk	
Salmon with lemon dill cream sauce	Y	N	Unk	
Steamed asparagus	Y	N	Unk	
Diced garlic red potatoes	Y	N	Unk	

Cherry maple pork loin w/ cherry sauce	Y	N	Unk	
Mashed potatoes	Y	N	Unk	
Gravy	Y	N	Unk	
Green beans almandine	Y	N	Unk	
New York strip steak w/ red wine sauce	Y	N	Unk	
Garlic chive mashed potatoes	Y	N	Unk	
Honey glazed carrots	Y	N	Unk	
Pasta primavera	Y	N	Unk	
Other entrée or side dish:	Y	N	Unk	Specify:
DESSERT				
Cupcakes	Y	N	Unk	
Black Forest chocolate	Y	N	Unk	
Carrot cake	Y	N	Unk	
Strawberry cheesecake (white)	Y	N	Unk	
Cookies (for overnight guests)	Y	N	Unk	
Caramel apple	Y	N	Unk	
Chocolate Toffee Teasers	Y	N	Unk	
Chocolate explosion	Y	N	Unk	
Peanut butter melts	Y	N	Unk	
Other dessert item	Y	N	Unk	Specify:
BEVERAGES (throughout the night)				
Water	Y	N	Unk	
Water from carafe on table	Y	N	Unk	
Bottled water	Y	N	Unk	
Soda/soft drinks/pop	Y	N	Unk	Specify:
Hot tea	Y	N	Unk	
Coffee	Y	N	Unk	
Cream/Milk in coffee or tea	Y	N	Unk	
Milk	Y	N	Unk	
Beer	Y	N	Unk	Specify:
Wine	Y	N	Unk	Specify:
Mixed drink(s)	Y	N	Unk	Specify:
Other beverage(s)	Y	N	Unk	Specify:
Was there ice in any of your drinks?	Y	N	Unk	
LATE NIGHT APPETIZERS/SNACKS served at 8:30 p.m.				
Cheese/sausage/cracker platter	Y	N	Unk	
Cheese	Y	N	Unk	
Sausage	Y	N	Unk	
Crackers	Y	N	Unk	
Other platter item	Y	N	Unk	Specify:
Vegetable platter	Y	N	Unk	
Carrots	Y	N	Unk	
Broccoli	Y	N	Unk	

Cauliflower	Y	N	Unk	
Tomatoes	Y	N	Unk	
Celery	Y	N	Unk	
Other vegetable	Y	N	Unk	Specify:
Dill dip	Y	N	Unk	
Chicken wings	Y	N	Unk	
Buffalo dipping sauce	Y	N	Unk	
BBQ dipping sauce	Y	N	Unk	
Ranch dipping sauce	Y	N	Unk	
Swedish meatballs	Y	N	Unk	
Stuffed mushroom caps with sausage stuffing	Y	N	Unk	
Cupcakes (leftover)	Y	N	Unk	
Black Forest chocolate	Y	N	Unk	
Carrot cake	Y	N	Unk	
Strawberry cheesecake (white)	Y	N	Unk	
Other appetizer/snack	Y	N	Unk	Specify:
Which of the following best describes when your table went through the food line/received food?			Choose one: <input type="checkbox"/> My table was among the first to be served (~ first 25%) <input type="checkbox"/> My table was among the last to be served (~ last 25%) <input type="checkbox"/> My table was served about midway through (~middle 50%)	

Did you witness anyone vomiting or see evidence of any vomiting accident? Yes / No

If yes, where and when did you hear/see anyone vomiting?

Additional Comments: _____

Thank you very much for your time!!

Employee Investigation Questionnaire:

**Investigation Questionnaire
Hotel Marshfield Employees**

DEMOGRAPHIC INFORMATION

Employee Name: _____

Age: _____ Gender: M F

Address: _____

City: _____ County: _____ State: _____ Zip: _____

Phone (home): _____ Phone (cell): _____

Job Duties/Position: _____

WORK HISTORY

How long have you worked at this establishment? _____ years / months / days (circle one)

Do you work at any other food establishments? Y N

If yes, where? Name: _____ Address: _____

Do you work anywhere else? Y N

If yes, where? Name: _____ Address: _____

Did you work on:

Fri, Apr 8:	Y	N	If yes, shift: _____	Duties: _____
Sat, Apr 9:	Y	N	If yes, shift: _____	Duties: _____
Sun, Apr 10:	Y	N	If yes, shift: _____	Duties: _____
Mon, Apr 11:	Y	N	If yes, shift: _____	Duties: _____
Tues, Apr 12:	Y	N	If yes, shift: _____	Duties: _____
Weds, Apr 13:	Y	N	If yes, shift: _____	Duties: _____
Thurs, Apr 14:	Y	N	If yes, shift: _____	Duties: _____
Fri, Apr 15:	Y	N	If yes, shift: _____	Duties: _____
Sat, Apr 16:	Y	N	If yes, shift: _____	Duties: _____
Sun, Apr 17:	Y	N	If yes, shift: _____	Duties: _____
Mon, Apr 18:	Y	N	If yes, shift: _____	Duties: _____

CLINICAL INFORMATION

Have you been ill with gastrointestinal symptoms (vomiting, diarrhea, abdominal cramping, nausea, etc.) in the last 2 weeks? Y N

If no skip to Other Ill Persons

Onset Date: ___/___/___

Onset Time: ___:___ AM PM

Well Date: ___/___/___

Well Time: ___:___ AM PM Still symptomatic at time of interview

Nausea	Y	N	Vomiting	Y	N	Diarrhea	Y	N
						<i>(3 or more loose stools 24 hours)</i>		
Bloody diarrhea	Y	N	Abdominal cramps	Y	N	Fever (____°)	Y	N
Chills	Y	N	Sweats	Y	N	Headache	Y	N
Body aches	Y	N	Muscle aches	Y	N	Fatigue	Y	N
Other:	Y	N	_____					

Did you see a physician? Y N Date: ___/___/___

Were you seen in an ER/ED Y N Where: _____

Were you hospitalized overnight? Y N Where: _____

Was a stool specimen collected? Y N Results: _____

OTHER ILL PERSONS

Has anyone in your household been ill with GI symptoms during the last two weeks? Y N

1) If yes, who: _____ Onset date: ___/___/___ Time: ___:___ AM PM

What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____

2) If yes, who: _____ Onset date: ___/___/___ Time: ___:___ AM PM

What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____

Do you know anyone else (friend, co-worker, etc.) who was ill with GI symptoms during this same time period? Y N

1) If yes, who: _____ When/Onset: ___/___/___

What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever/ Headache / Other: _____

2) If yes, who: _____ When/Onset: ____ / ____ / ____

What were their symptoms(circle)? Nausea / Vomiting / Diarrhea / Abd. cramps / Fever / Headache / Other: _____

EXPOSURES

Did you work at the [redacted] Event on Saturday, April 16th? **Y** **N**

If yes, did you eat any of the food items served at the [redacted] Event? **Y** **N**

Do you ever eat food items from Hotel Marshfield (during shifts or otherwise)? **Y** **N**

Do you ever bring food items home with you for other members of you household? **Y** **N**

Which of the following items served at the [redacted] Event on April 16th did you eat/drink? *(please ask each item individually and note when additional details are requested. Please note any items consumed that are not on this list)*

Food Item	Yes/No			Details
APPETIZERS (served 4- 6 p.m.)				
Layered taco dip	Y	N	Unk	
Tortilla chips	Y	N	Unk	
Fruit platter	Y	N	Unk	
Honeydew melon	Y	N	Unk	
Cantaloupe	Y	N	Unk	
Watermelon	Y	N	Unk	
Grapes	Y	N	Unk	
Other fruit	Y	N	Unk	Specify:
Bruschetta	Y	N	Unk	
Baked spinach & artichoke dip	Y	N	Unk	
Chips for artichoke dip	Y	N	Unk	
Other appetizer	Y	N	Unk	Specify:
DINNER ITEMS				
House salad	Y	N	Unk	
Ranch dressing	Y	N	Unk	
French dressing	Y	N	Unk	
Dinner rolls	Y	N	Unk	
Butter	Y	N	Unk	
Salmon with lemon dill cream sauce	Y	N	Unk	
Steamed asparagus	Y	N	Unk	
Diced garlic red potatoes	Y	N	Unk	
Cherry maple pork loin w/ cherry sauce	Y	N	Unk	
Mashed potatoes	Y	N	Unk	
Gravy	Y	N	Unk	
Green beans almandine	Y	N	Unk	
New York strip steak w/ red wine sauce	Y	N	Unk	
Garlic chive mashed potatoes	Y	N	Unk	
Honey glazed carrots	Y	N	Unk	
Pasta primavera	Y	N	Unk	

Other entrée or side dish:	Y	N	Unk	Specify:
DESSERT				
Cupcakes	Y	N	Unk	
Black Forest chocolate	Y	N	Unk	
Carrot cake	Y	N	Unk	
Strawberry cheesecake (white)	Y	N	Unk	
Cookies (for overnight guests)	Y	N	Unk	
Caramel apple	Y	N	Unk	
Chocolate Toffee Teasers	Y	N	Unk	
Chocolate explosion	Y	N	Unk	
Peanut butter melts	Y	N	Unk	
Other dessert item	Y	N	Unk	Specify:
BEVERAGES (throughout the night)				
Water	Y	N	Unk	
Water from carafe on table	Y	N	Unk	
Bottled water	Y	N	Unk	
Soda/soft drinks/pop	Y	N	Unk	Specify:
Hot tea	Y	N	Unk	
Coffee	Y	N	Unk	
Cream/Milk in coffee or tea	Y	N	Unk	
Milk	Y	N	Unk	
Beer	Y	N	Unk	Specify:
Wine	Y	N	Unk	Specify:
Mixed drink(s)	Y	N	Unk	Specify:
Other beverage(s)	Y	N	Unk	Specify:
Was there ice in any of your drinks?	Y	N	Unk	
LATE NIGHT APPETIZERS/SNACKS served at 8:30 p.m.				
Cheese/sausage/cracker platter	Y	N	Unk	
Cheese	Y	N	Unk	
Sausage	Y	N	Unk	
Crackers	Y	N	Unk	
Other platter item	Y	N	Unk	Specify:
Vegetable platter	Y	N	Unk	
Carrots	Y	N	Unk	
Broccoli	Y	N	Unk	
Cauliflower	Y	N	Unk	
Tomatoes	Y	N	Unk	
Celery	Y	N	Unk	
Other vegetable	Y	N	Unk	Specify:
Dill dip	Y	N	Unk	
Chicken wings	Y	N	Unk	What flavor sauce(s)?
Swedish meatballs	Y	N	Unk	
Stuffed mushroom caps with sausage stuffing	Y	N	Unk	

Cupcakes (leftover)	Y	N	Unk	
Black Forest chocolate	Y	N	Unk	
Carrot cake	Y	N	Unk	
Strawberry cheesecake (white)	Y	N	Unk	
Other appetizer/snack	Y	N	Unk	Specify:

Additional Comments: _____

THANK YOU FOR YOUR TIME!