

**Wyoming Department of Health
Restaurant-Associated Outbreak of Norovirus Gastroenteritis
Natrona County, November – December 2012**

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Background

On December 10, 2012, the Casper-Natrona County Health Department (CNCHD) received a foodborne illness complaint from a patron reporting illness after eating at Golden Corral in Casper, Wyoming. Following standard protocol, CNCHD staff interviewed the single complainant and conducted an environmental health visit at the restaurant. On December 11, 2012, CNCHD received a call from a local radio station inquiring about rumors of an outbreak of gastrointestinal illness among patrons who had eaten at Golden Corral. CNCHD subsequently made an inquiry to the emergency department of Wyoming Medical Center seeking information on visits for gastrointestinal illness. A representative from Wyoming Medical Center's emergency department confirmed an increase in patients presenting with gastrointestinal symptoms beginning December 7, 2012 and reported that many of the patients had reported eating at Golden Corral. Later that day and on subsequent days, CNCHD received many foodborne illness complaints via telephone from patrons of Golden Corral reporting illness. On December 11, 2012, CNCHD notified the Wyoming Department of Health Infectious Disease Epidemiology Program (WDH) of increased reports of gastrointestinal illness among patrons of the restaurant. WDH and CNCHD worked cooperatively to investigate the illnesses. The objectives of this investigation were 1) to determine if illnesses were restaurant-associated or if there was evidence that they had been acquired elsewhere in the community, 2) to determine the etiology of the outbreak, 3) to identify public health interventions that would reduce transmission of the illness, 4) to provide specific interventions to the restaurant if the investigation found that illnesses were restaurant-associated.

Golden Corral is a buffet-style restaurant located in Casper, Wyoming. The restaurant opened to the public on November 3, 2012. Investigators used several methodologies to determine if reported illnesses were part of a community-wide increase in viral gastroenteritis-like activity in the Casper community or if they were indeed a part of a restaurant-associated outbreak. The investigation is summarized below.

Methods

Case definition

Investigators employed multiple case definitions during the investigation. Early in the investigation, a general case definition for gastroenteritis was used to assess illness among all ill persons. A case of gastroenteritis was defined as a person with diarrhea (3 or more loose stool movements in a 24h period) lasting at least 12 hours or vomiting lasting at least 12 hours between the dates of November 15, 2012 and December 20, 2012. As the investigation proceeded and investigators determined that an outbreak had occurred at the restaurant, an outbreak-specific case definition was used to identify those case patients who were most likely to be associated with the outbreak and not part of background illness in

the community. An outbreak-related case of gastroenteritis was defined as a person with diarrhea (3 or more loose stool movements in a 24h period) lasting at least 12 hours or vomiting lasting at least 12 hours between the dates of November 15, 2012 and December 20, 2012 and who had patronized Golden Corral prior to illness onset. A suspect case was defined as a person with some gastrointestinal illness (i.e., nausea, vomiting, diarrhea, or stomach cramping) who did not meet the full case definition above (i.e., did not have diarrhea or vomiting lasting at least 12 hours) and who patronized Golden Corral prior to illness onset. A secondary case was defined as a person who did not have direct exposure to the restaurant, but who got sick after having contact with a family member or close acquaintance who got sick after eating at the restaurant.

Dates and times of illness onset were defined as the day and approximate time of the first bout of diarrhea or vomiting (whichever occurred first). Recovery date and time was defined as the day and approximate time in which the respondent reported that the diarrhea or vomiting ceased (whichever occurred last). Duration of illness was measured in hours and was calculated as the length in time between the date of illness onset (first bout of diarrhea or vomiting, whichever occurs first) and the date of recovery (last bout of diarrhea or vomiting, whichever occurs last). Incubation periods were measured for Golden Corral patrons as the length of time in hours between the date and time of visit to Golden Corral and the date and time of the first bout of diarrhea or vomiting (whichever occurred first).

Passive surveillance and case finding

Investigators used a telephone call log to record calls made to the CNCHD by ill Golden Corral patrons and other ill persons. Investigators used patron phone calls to CNCHD as the primary method of case finding. Investigators made at least one attempt to call back all callers who self-identified, including persons who called about illness after eating at other restaurants. Investigators used a standardized, telephone-based epidemiologic questionnaire to assess illness status, clinical symptoms, and exposure histories among all callers and their party members who attended a meal at the restaurant at the same time as they did. Callers were asked questions about their symptoms, timing of illness, duration of illness, and healthcare utilization. Callers were also asked questions about contact with other ill people prior to getting sick, other food establishments, grocery stores, other high risk food products, and occupation. Completed interviews were entered into a Microsoft Access database and were aggregated and analyzed for descriptive statistics using both Microsoft Excel and SAS v 9.3. Descriptive statistics were calculated using the `FREQ` and `UNIVARIATE` procedures in SAS.

Active surveillance and case finding

Investigators conducted active case finding using emergency department logs from Wyoming Medical Center to identify persons with acute gastrointestinal symptoms. WDH requested a list of all emergency department patients who had presented to Wyoming Medical Center on the dates of Friday, December 7, 2012 through Tuesday, December 11, 2012 who had nausea, vomiting, or diarrhea listed as a chief complaint. WDH staff systematically called every person on this list to interview them using a standardized, telephone-based epidemiologic questionnaire. The questionnaire used by investigators for this portion of the investigation was very similar to the questionnaire used to interview the patients who self-identified (as discussed above). Emergency department patients with nausea, diarrhea, or vomiting listed as a chief complaint were asked questions about their clinical presentation and about many risk factors for gastrointestinal illness. Investigators assumed that emergency department patients were fairly representative of the Casper community and systematically interviewing these patients would assist them in determining if Golden Corral was associated with illness or not. At least two attempts

were made to contact each of these emergency department patients. Completed interviews were entered into a Microsoft Access database and were aggregated and analyzed for descriptive statistics using both Microsoft Excel and SAS v 9.3. Descriptive statistics were calculated using the FREQ and UNIVARIATE procedures in SAS.

Restaurant employee interviews

By the morning of December 12, 2012, investigators believed that they had enough information to warrant further investigation at Golden Corral. Investigators sought to interview all employees of the restaurant to determine illness status among employees and their family members, typical food-handling practices, exclusion of employees with reported gastrointestinal symptoms, and employee risk factors for gastrointestinal illness. Investigators interviewed employees on-site using a standardized questionnaire. Employees who could not be interviewed on-site were interviewed on later dates via telephone using the same standardized questionnaire. Completed interviews were entered into a Microsoft Access database and were aggregated and analyzed for descriptive statistics using both Microsoft Excel and SAS v 9.3. Descriptive statistics were calculated using the FREQ and UNIVARIATE procedures in SAS.

Cohort study

Investigators were unable to identify all patrons of the restaurant during the period of interest. The restaurant reported serving over 7,000 people during the dates of December 6, 2012 through December 13, 2012. Therefore, it was unfeasible for investigators to conduct a cohort or case control study among all restaurant patrons. However, through the log of illness complaints, investigators identified a group of 25 individuals who had eaten at the restaurant together as part of a large event at the restaurant on Sunday, December 9, 2012. Investigators chose this group to conduct a cohort study to assess illness status and to determine if any restaurant-related exposures were associated with illness. Investigators contacted the point-of-contact for the group and gathered contact information for all 25 persons in the group. Investigators systematically contacted all persons in the group to interview them using a standardized, telephone-based questionnaire, which assessed illness status, clinical presentation, and exposure history. Completed interviews were entered into a Microsoft Access database and were aggregated and analyzed using both Microsoft Excel and SAS v. 9.3. Descriptive statistics were calculated using the FREQ and UNIVARIATE procedures in SAS. Due to small sample size, Fisher's Exact Test was used to determine significant difference of risk factors between the ill and non-ill (p-value only). Fisher's Exact p-values were considered to be significant if less than 0.05. Fisher's Exact Tests were calculated using the FREQ procedure with the FISHER option in SAS.

Laboratory methods

Early in the investigation, ill persons were encouraged to submit stool samples for microbiologic testing at the Wyoming Public Health Laboratory (WPHL). Samples were tested for pathogenic enteric bacteria (*Campylobacter sp.*, shiga-toxin producing *Escherichia coli* [*E. coli*], *Salmonella sp.*, *Shigella sp.*, and *Yersinia sp.*) using standard culturing methods. Samples were also tested for noroviruses using polymerase chain reaction (PCR). Norovirus-positive samples were genogrouped and also underwent genomic sequencing, which allows a genetic comparison of the outbreak-related strain of norovirus to other norovirus specimens. Norovirus genetic sequences were later uploaded into CaliciNet, a national database of norovirus genomic sequences hosted by the US Centers for Disease Control and Prevention (CDC).

Environmental health methods

Environmental health specialists from CNCHD conducted a complaint-related inspection at Golden Corral on December, 10, 2012, the same day that the first illness complaint was received. A subsequent outbreak-related inspection was conducted on December 12, 2012 upon identification of more ill persons. On December 13, 2012, the restaurant voluntarily closed to allow for adequate cleaning and disinfection. CNCHD environmental health staff supervised this cleaning process and also conducted a re-opening inspection on December 14, 2012. CNCHD environmental health staff conducted a follow-up inspection at the restaurant on December 31, 2012 to evaluate whether or not food safety issues had been addressed.

Results

Passive surveillance and case finding results

Between December 10, 2012 and December 21, 2012, CNCHD received a total of 205 phone calls among people reporting suspected foodborne illness among at least one of their family members or restaurant party members. Among those 205 calls, 194 calls (94.6%) were plaintiff groups reporting illness after visiting Golden Corral. Among the 194 calls regarding Golden Corral, seven calls were duplicates from the same person or party. Removing duplicates, investigators identified a total of 187 individual plaintiff groups reporting illness after patronizing Golden Corral. The remaining 11 callers were persons reporting gastrointestinal illness who had not eaten at Golden Corral. Investigators made at least one attempt to contact all of these plaintiffs via telephone. Of the 198 individual parties, investigators were able to reach 152 parties (response rate: 76.8%) and interviewed ill persons using a standardized, epidemiologic questionnaire to assess clinical presentation and exposure history. Table 1 below summarizes the nature of the calls received by public health and the number of individuals in each group that were ultimately interviewed.

Among the plaintiffs reporting illness and who had not eaten at Golden Corral prior to illness onset, investigators were able to reach 6 of 11 parties (response rate: 54.5%). Among these six parties, eight individuals were identified with some form of gastrointestinal illness. Among these eight ill persons, five met the general case definition for gastroenteritis (62.5%). Investigators did not find a notable common source among these individuals. These individuals likely represent baseline illness in the community. CNCHD staff indicated that the number of non-Golden Corral complaints was consistent with the number of foodborne illness complaints that they would normally see during that time of year. Investigators determined that these illnesses were not likely related to the outbreak and are not included in case counts and descriptive statistics from this point forward.

Among the 187 callers reporting illness after visiting Golden Corral, investigators interviewed 146 of the 187 plaintiff groups (response rate: 78.1%). Interviews with these groups identified a total of 276 persons with some form of gastrointestinal illness after patronizing Golden Corral. Of those, 240 (87.0%) persons met the case definition for gastroenteritis. Thirty-six (13.0%) of those individuals had some form of gastrointestinal symptoms, but did not meet the case definition (considered suspect cases). Investigators identified 15 secondary cases (did not patronize Golden Corral but had contact with an ill family member or acquaintance who became ill after patronizing Golden Corral).

Table 1: Summary of Foodborne Illness Reports Received by the Casper-Natrona County Health Department, December 10, 2012 through December 21, 2012.

Caller Status	Number	Number interviewed (response rate %)
Total calls received	205	
Less duplicate calls	198	152 (76.8%)
Calls reporting illness in party after visiting Golden Corral	187	146 (78.1%)
Calls reporting illness in family/party with no Golden Corral exposure	11	6 (54.5%)

Investigators made at least one attempt to call back each of the 198 individual callers.

Table 2 summarizes the outbreak-related case count among ill persons who self-identified to CNCHD. Among this group of patrons, the overall attack rate was found to be 73%. Patron cases report illness onset as early as November 17, 2012 and as late as December 15, 2012. The majority of cases (95.8%) developed signs and symptoms of gastroenteritis on or after December 7, 2012. The peak of illness onset was on December 9, 2012 when 80 patron cases developed illness.

Table 2: Cases Status among Golden Corral Patrons Identified Through Health Department Call Log

Cases Status	Number
Ill patron meeting the case definition	240
Ill patron but did not meet the case definition (suspect cases)	36†
Secondary case	15

† Individual had some gastrointestinal illness but did not have diarrhea or vomiting lasting at least 12 hours.

Among outbreak-related cases, predominant symptoms included diarrhea (96.1%), nausea (95.1%), and vomiting (90.6%). Table 3 below gives a summary of symptom frequencies. The median incubation period was 31 hours (range: 1.5-124 hours). Approximately 95% of patron cases developed illness within 72 hours of patronizing the restaurant. The median duration of illness was 42 hours (range: 12-240 hours). The descriptive epidemiology was consistent with a viral etiology (causative agent). Ill persons meeting the case definition (cases) were all Wyoming residents from the following counties: Natrona (206), Converse (22), Niobrara (3), Platte (3), Hot Springs (2), Johnson (2), Carbon (1), and Sweetwater (1). More female cases (56.7%) than male cases (43.3%) were identified. The median age of cases was 40 years (range: 1-87 years).

Table 3: Frequency of Symptoms and Healthcare Utilization among Outbreak-Related Cases Associated with Golden Corral Identified Through Health Department Call Log

Symptom	Number of cases for which information is available (N=240)	Number (%)
Diarrhea (3 or more loose stool movements in 24h period)	233	224 (96.1%)
Nausea	183	174 (95.1%)
Fatigue	180	166 (92.2%)
Vomiting	235	213 (90.6%)
Stomach cramping	179	158 (88.3%)
Chills	167	122 (73.1%)
Muscle aches	166	115 (69.3%)
Headache	174	120 (69.0%)
Fever (self-reported)	150	60 (40.0%)
Highest temp	10	Median: 101F (range: 99-102F)
Bloody stools	200	5 (2.5%)
Loose stool, but not diarrhea	211	3 (1.4%)
Saw a healthcare provider for illness	235	12 (5.1%)
Visited ER due to illness	235	10 (4.6%)
Hospitalized due to illness	235	1 (0.4%)

Results from this portion of the investigation were suggestive of Golden Corral as a source for the majority of the illnesses reported. Cases reported few additional exposures. Over half (53.4%) of patron cases had not eaten at another food establishment besides Golden Corral on the dates of November 28, 2012 through the date of illness onset. All 240 primary, outbreak-related cases had eaten at Golden Corral prior to becoming ill. The second most reported restaurant among patron cases was reported 7 times (reported by 3.0% of all cases). Other exposures such as contact with ill person prior to their own illness, contact with person who attends/works at a daycare, travel outside county of residence, and attendance at a large gathering were reported infrequently among cases (reported by no more than 15% of all cases).

Active surveillance and case finding results

Wyoming Medical Center provided a list of 32 emergency department patients who had presented to the facility on the dates of December 7, 2012 through December 11, 2012 with a chief complaint listing nausea, diarrhea, and/or vomiting. Investigators were able to reach 20 of these patients (62.5%) for interview, and 15 individuals (75.0%) met the case definition for gastroenteritis. Three persons (15.0%) reported gastrointestinal symptoms, but did not meet the case definition for gastroenteritis (suspect case). Among the 15 emergency department patients who met the gastroenteritis case definition, 11 had exposure to Golden Corral prior to illness (73.3%). Three patients (20.0%) met the case definition for gastroenteritis and did not have exposure to Golden Corral. One patient met the case definition for

gastroenteritis and did not have direct Golden Corral exposure, but became ill after having contact with a family member who had been sick after eating at the restaurant (6.7%, secondary case). Descriptive statistics among emergency department patients with gastroenteritis and Golden Corral exposure was consistent with the descriptive statistics reported by patron cases that were identified by calls to CNCHD. The second most reported restaurant reported by emergency department patients meeting the case definition was reported twice (11.8%). Table 4 below summarizes the findings from the emergency department surveillance effort.

Table 4: Illness Status and Golden Corral Exposure among Emergency Department Patients Presenting with Gastrointestinal Symptoms, December 7, 2012 through December 11, 2012.

	Meets Gastroenteritis Case Definition (N=15)	Has Gastrointestinal Symptoms But Does Not Meet Case Definition (N=3)
Any direct Golden Corral Exposure	11† (73.3%)	3 (100.0%)
Indirect Golden Corral exposure (secondary case)	1* (6.7%)	0 (0.0%)
No Golden Corral exposure	3 (20.0%)	0 (0.0%)

† One patient reports eating at Golden Corral 170 hours prior to illness onset.

* One patient did not report direct Golden Corral exposure, but had contact with an ill person who had eaten there prior to illness onset (secondary case).

Results from restaurant employee interviews

Restaurant management reported a total of 112 active employees at the restaurant during the investigation. Investigators attempted to interview all employees to assess illness status among employees and their family members, typical food-handling practices, exclusion of employees with reported gastrointestinal symptoms, and employee risk factors for gastrointestinal illness. Investigators were able to complete interviews on 86 (76.8%) of the 112 active employees. Thirty-one employees (36.0%) met the case definition for gastroenteritis. Eleven employees (12.8%) reported some gastrointestinal symptoms but did not meet the formal case definition (suspect employee cases). Forty-four employees (51.2%) did not report any gastrointestinal illness. Table 5 below summarizes case status among restaurant employees.

Table 5: Case Status among Golden Corral Employees

Case Status	Number (%)
Ill and met case definition for gastroenteritis	31 (36.0%)
Ill but did not meet case definition	11 (12.8%)
No gastrointestinal illness	44 (51.2%)
Employee secondary cases	8 (n/a)

Predominant symptoms among employee cases were nausea (79.3%), diarrhea (77.4%), and fatigue (76.9%). Table 6 below provides a full summary of employee symptoms. The median duration of illness among employees was 48 hours (range: 18-96 hours). Employee illnesses started as early as November 19, 2012 and as late as December 13, 2012. Like patron cases, the peak of employee illness

onset was December 9, 2012. However, contrasting with patron cases, 6 employee cases (19.4%) reported illness prior to December 7, 2012, compared to just 4.2% of patrons with illness prior to that date. Employee cases were 58.1% male and 41.9% female. The median age of employee cases was 31 years. Over 90% of employee cases report eating food at the restaurant prior to illness onset. Twenty-five employee cases (80.6%) report patronizing another restaurant besides Golden Corral, compared to only 46.6% of patron cases. Six employee cases (19.4%) reported having contact with an ill family member prior to developing their illness.

Table 6: Frequency of Symptoms among Employee Cases

Symptom	Number of cases for which information is available	Number (%)
Nausea	29	23 (79.3%)
Diarrhea	31	24 (77.4%)
Fatigue	26	20 (76.9%)
Chills	27	20 (74.1%)
Stomach cramping	29	21 (72.4%)
Vomiting	31	21 (67.7%)
Fever (self-reported)	20	11 (55.0%)
Myalgia	26	14 (53.8%)
Headache	27	14 (51.9%)
Bloody stools	31	2 (6.5%)
Loose stools, but not diarrhea	31	2 (6.5%)

Twenty-one employee cases (67.7%) reported working while symptomatic with diarrhea or vomiting. Twenty-eight employee cases returned to work in less than 48 hours after the last bout of diarrhea or vomiting.

Cohort study results

Investigators identified a group of 25 individuals who had eaten at Golden Corral on December 9, 2012 as part of a large group event at the restaurant. The group's point-of-contact was able to provide investigators with contact information for all 25 people. A total of 18 were interviewed (response rate: 72.0%). Among the 18 interviewed, 5 individuals (27.8%) met the case definition for gastroenteritis. Six individuals (33.3%) reported some gastrointestinal illness after eating at the restaurant but did not meet the case definition. Case attack rate among this group was 27.8%. Seven individuals (38.9%) reported no gastrointestinal symptoms after eating at the restaurant. Descriptive statistics for this group were not significantly different than what was found for the cases identified through the call logs (of which this group was a subset). No one single food item or activity was found to be statistically associated with illness at the 95% confidence level. The two exposures with the most significant associations included eating anything from the dessert/ice cream bar area (reported by all 5 cases in study, Fisher's exact p-value: 0.2045) and eating anything from the salad bar (Fisher's exact p-value: 0.2222). These findings are not surprising given that viral agents like noroviruses are commonly transmitted in cold foods and are less likely to be associated with hot foods. Table 7 below provides a summary of exposures of interest among cohort study participants.

Table 7: Golden Corral-Specific Exposures of Interest among a Group of Restaurant Patrons

Exposure of Interest	No. of Cases Exposed n(%) N=5	No. of Non-Ill Exposed n(%) N=7	Fisher's Exact p-value
Any food from salad/cold bar	3 (60.0%)	1 (14.4%)	0.2222
Any food from bakery/bread station	3 (60.0%)	3 (42.9%)	1.0000
Any beef product	5 (100.0%)	6 (85.7%)	1.0000
Any beverage	5 (100.0%)	7 (100.0%)	Null
Any cheese	3 (60.0%)	2 (28.6%)	0.5581
Any chicken/poultry	3 (60.0%)	2 (28.6%)	0.5581
Any food from dessert/ice cream bar	5 (100.0%)	4 (57.1%)	0.2045
Any egg product	1 (20.0%)	0 (0.0%)	0.4167
Any fillet fish product	0 (0.0%)	2 (28.6%)	0.4697
Any gravy	2 (40.0%)	3 (42.9%)	1.0000
Any food from the hot buffet area	5 (100.0%)	7 (100.0%)	Null
Any ice cream	3 (60.0%)	4 (57.1%)	1.0000
Macaroni and cheese	3 (60.0%)	4 (57.1%)	1.0000
Mashed potatoes	2 (40.0%)	3 (42.9%)	1.0000
Any other salad (besides green salad)	1 (20.0%)	0 (0.0%)	0.4167
Any pork product	1 (20.0%)	2 (28.6%)	1.000
Use the restroom at Golden Corral	1 (20.0%)	3 (42.9%)	0.5758
Any seafood or shrimp product	3 (60.0%)	6 (85.7%)	0.5227
Any ice cream syrup topping	2 (40.0%)	3 (42.9%)	1.0000
Witness another person vomiting before own illness started	1 (20.0%)	0 (0.0%)	0.4167
Any contact with a child in a daycare	0 (0.0%)	0 (0.0%)	Null
Help clean up vomit or diarrhea from an ill person before own illness started	0 (0.0%)	0 (0.0%)	Null
Any travel away from home overnight	2 (40.0%)	2 (28.6%)	1.000

Laboratory results

Four patron cases submitted stool samples for microbiologic testing. All four specimens were sent to WPHL for testing. All four specimens were positive for norovirus genogroup II. All four specimens were negative for pathogenic bacterial infections (i.e., *Salmonella*, *E. coli*, etc.). All four specimens are being sequenced at WPHL. The sequencing results are not yet complete. Once sequencing is complete, the genomic patterns will be uploaded into CDC's CaliciNet for comparison to other outbreak-related cases around the nation. Investigators encouraged ill employees to submit stool samples for microbiologic testing; however, no employees submitted these samples.

Environmental health findings

An environmental health inspector from CNCHD conducted a routine, complaint-related inspection of Golden Corral on December 10, 2012 after receiving a single foodborne illness complaint on that day. During this inspection, no critical food safety violations were noted by the inspector. On December 11, 2012, after receiving additional complaints and the phone call from the radio station, a representative from CNCHD environmental health visited the restaurant to discuss the additional complaints with the restaurant manager and advised the restaurant to follow the Wyoming Food Safety Rule to prevent additional illness. The environmental health manager from CNCHD also attempted to contact, via telephone, the Golden Corral manager with no response. CNCHD environmental health staff conducted an outbreak-related restaurant inspection on December 12, 2012. A number of violations were noted during this inspection. On December 12, 2012, CNCHD officials met with the restaurant's franchise owners and corporate quality control office. Both parties reviewed the corporate plan for dealing with norovirus contamination. CNCHD advised the restaurant to strictly adhere to that protocol.

On the afternoon of December 13, 2012, restaurant management opted to voluntarily close the restaurant for 24 hours as a precautionary measure to thoroughly clean and disinfect the entire restaurant. CNCHD environmental health staff were on-site on both December 13, 2012 and December 14, 2012 supervising the cleaning process. Inspectors instructed the restaurant to sanitize several areas of concern, including various pieces of equipment, the chocolate fountain area, and patron bathrooms. The restaurant re-opened around 4pm on December 14, 2012 with a re-opening inspection conducted by CNCHD. A follow-up inspection was conducted by CNCHD staff on December 31, 2012. The inspector found that all previous items that had been noted in previous inspections had been corrected.

Investigators identified a number of potential environmental health concerns through both patron and employee interviews. Investigators received several reports of dirty dishes being stacked for use in the buffet line, vomitus accidents in the dining area, raw or undercooked food being set out for consumption, employees working while ill with gastrointestinal symptoms, refilling food on buffets without replacing service bowl or service utensils, lack of glove use when handling ready-to-eat foods, cross-contamination between raw and cooked foods, and other reports of general poor food-handling practices. Both patrons and employees independently reported several vomitus accidents in the dining area and in the restaurant's bathrooms. Investigators noted these events when the interviewee was able to provide a concise date of occurrence.

Conclusions

At least 305 individuals became ill with norovirus gastroenteritis after patronizing Golden Corral in Casper, WY from November 17, 2012 through December 19, 2012. Laboratory and epidemiologic findings support that the etiologic agent for this outbreak was norovirus. Norovirus causes diarrhea, vomiting, nausea, and stomach cramping approximately 10 – 72 hours after exposure, such as consumption of contaminated food or beverage items or environmental exposure. The illness typically lasts 12 – 72 hours in most healthy adults. The duration of illness can be longer in individuals with pre-existing health conditions or among older adults. The median incubation period of 31 hours among ill patrons and the median duration of illness of 42 hours among ill patrons and 48 hours among ill staff reported in this outbreak were consistent with the laboratory finding of norovirus in the stool of ill individuals (see Table 9). Restaurant-associated illnesses were reported as early as November 17, 2012. The outbreak ceased on December 19, 2012 when the last secondary case developed symptoms (Figure

1). Among patron cases, the last date of visit to the restaurant was on December 12, 2012 (Figure 2). All ill persons interviewed were Wyoming residents, but cases were residents of many different Wyoming counties. The only common exposure among all outbreak-related cases was Golden Corral. Almost 95% of all cases report patronizing Golden Corral within 72 hour period before illness onset. Investigators were aware of reported increases in viral gastroenteritis-like activity in the Casper area prior to outbreak notification. However, 35 patron cases were not residents of the Casper area and all had the Golden Corral in common. The restaurant voluntarily closed on December 13, 2012 at approximately 1pm. The restaurant re-opened on the evening of December 14, 2012. No additional cases were identified after the restaurant had thoroughly disinfected all areas, had thrown away potentially contaminated foods, had excluded ill staff from work, and had implemented other interventions recommended by public health officials.

Table 8: Summary of Case Status among Golden Corral Patrons, Employees, and Their Secondary Cases

Case Status	Number
Cases	
Ill persons meeting the case definition who self-identified to CNCHD	240
Ill persons meeting the case definition identified through emergency department surveillance	11
Patron-related secondary cases	15
Employee cases	31
Employee-related secondary cases	8
Total number of primary cases	282
Total number of individuals meeting case definition	305
Suspect cases	
Ill persons not meeting case definition who self-identified to CNCHD	36
Ill persons not meeting case definition identified through emergency department surveillance	3
Total suspect cases	39
Total ill	344

Investigators sought to determine if the outbreak was restaurant-associated or community-acquired. Investigation findings are suggestive of a restaurant-associated outbreak. From December 10, 2012 through December 21, 2012, CNCHD received 187 separate foodborne illness complaints against Golden Corral. During the same time period, CNCHD received 11 complaints against various restaurants (no other restaurant was named twice). The frequency in which Golden Corral was named among both ill persons who self-identified to CNCHD and among emergency department patients was not consistent with what is normally seen during community-wide outbreaks. Case patient interviews did not reveal a high frequency of exposures to other risk factors. The epidemic curve (Figure 1) and the graph of visitation to Golden Corral (Figure 2) are suggestive of a common source outbreak. Over 95% of cases report patronizing the restaurant on or after December 7, 2012, which indicates some event occurred that allowed a large number of people to be exposed over that weekend. Furthermore, attack rates among parties of multiple Golden Corral patrons are high (61-73%), which is not commonly seen in community-wide outbreaks and is more common during restaurant-associated outbreaks. The

environmental health findings and illness among employees are also consistent with an association with the restaurant.

Table 9: Comparison of Outbreak Descriptive Statistics to Kaplan Criteria for Identifying Outbreaks of Viral Gastroenteritis

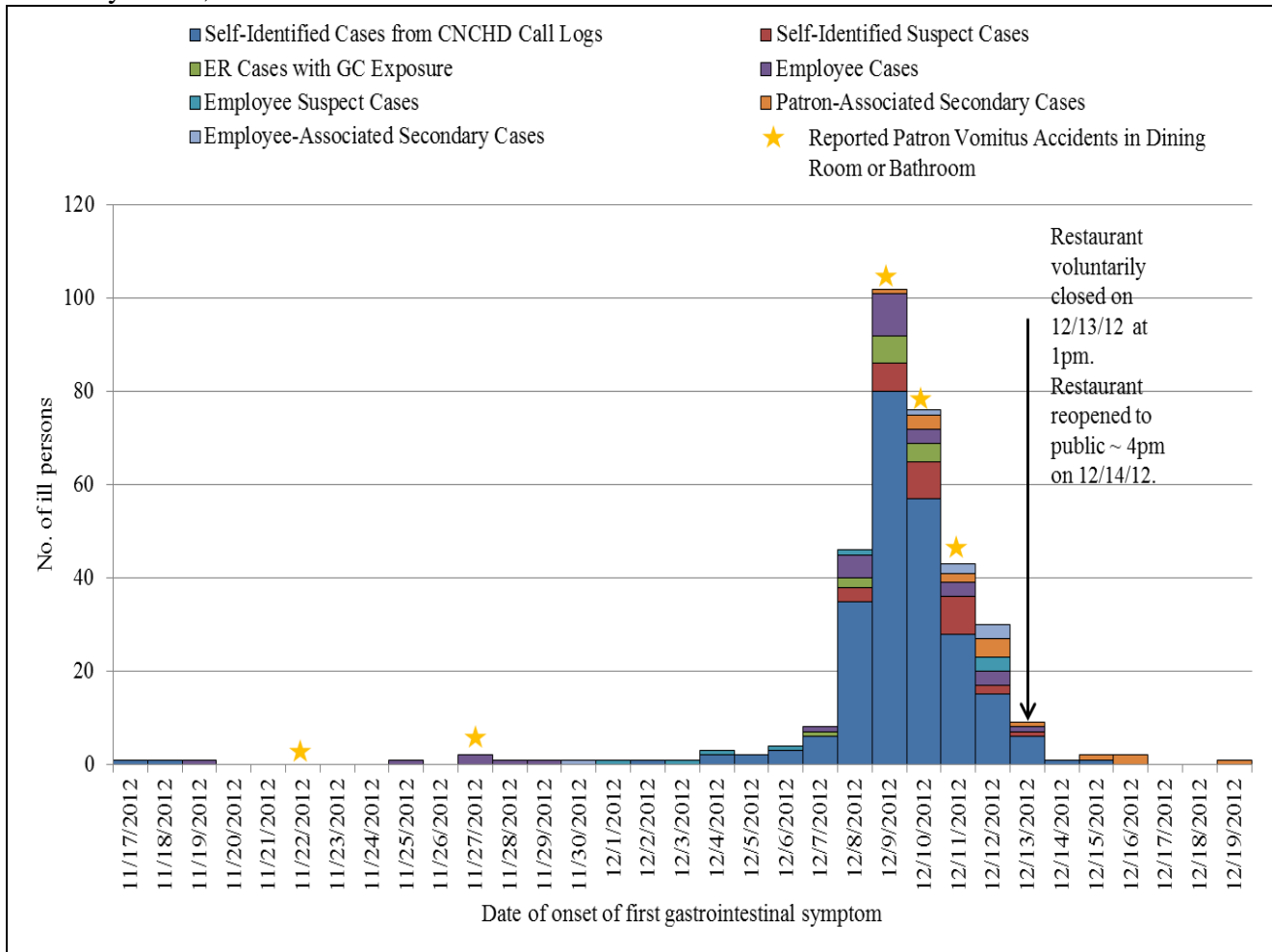
Kaplan Criteria	Patron Cases	Employee Cases
Median duration of illness is 12-60 hours	✓ Median duration of illness was 42 hours.	✓ Median duration of illness was 48 hours.
Incubation period of 24-48 hours	✓ Median incubation period was 31 hours.	✗ Incubation period for employees is unknown
≥50% of cases report vomiting	✓ 90.6% of cases report vomiting	✓ 67.7% of cases report vomiting
No bacterial cause identified	✓ 4 stool samples collected and all were negative for pathogenic bacteria.	✗ No employees submitted stool samples for testing.
Fever to vomiting ratio is ≤1.0	✓ Fever to vomiting ratio was 0.28	✓ Fever to vomiting ratio was 0.81.
Diarrhea to vomiting ratio is <2.5	✓ Diarrhea to vomiting ratio was 1.05	✓ Diarrhea to vomiting ratio was 1.14.

Kaplan, J.E., R. Feldman, D.S. Campbell, C. Lookabaugh, and G.W. Gary. 1982. The frequency of a Norwalk-like pattern of illness in outbreaks of acute gastroenteritis. American Journal of Public Health, December, 72(12):1329-1332.

Turcois, R.M., M.A. Widdowson, A.C. Sulka, P.S. Mead, and R.I. Glass. 2006. Reevaluation of epidemiological criteria for identifying outbreaks of acute gastroenteritis due to norovirus: United States, 1998-2000. Clinical Infectious Disease, April 1, 42(7):964-969.

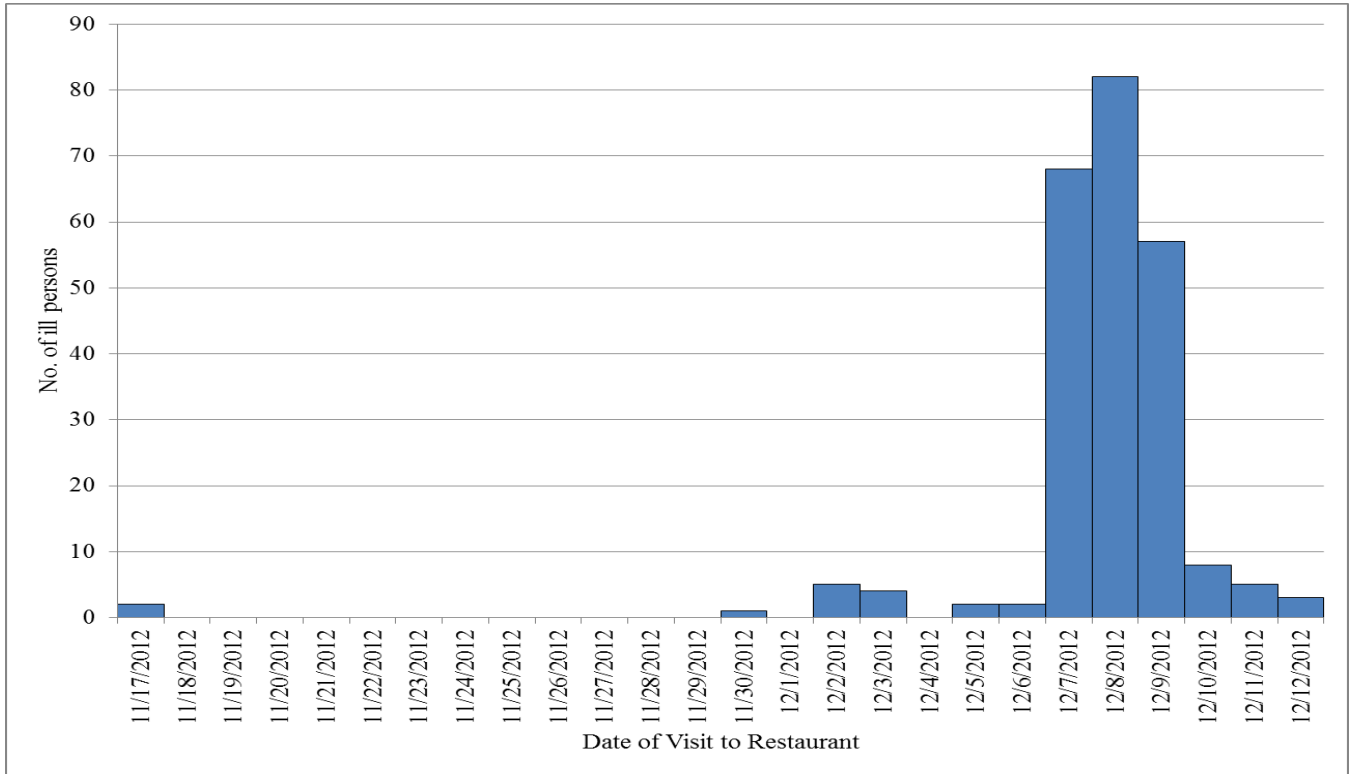
Investigators were not able to determine exactly how the virus was introduced to the restaurant environment. Both patrons and employees may have played a role in the introduction and propagation of the virus in the environment. The presence of ill and/or previously ill employees in food-handling areas of the restaurant was possibly an important contributing factor in the propagation of this outbreak. No single food item was found to be the pathogen vehicle in this outbreak.

Figure 1: Occurrence of Gastrointestinal Illness among Golden Corral Patrons and Employees and Their Secondary Cases, November-December 2012.



Noroviruses are notorious for causing outbreaks. Persons who become infected with the virus can shed the virus in their feces for over a week even after their symptoms have resolved. Noroviruses can be extremely hardy on surfaces, utensils, and human hands despite efforts to decontaminate. Norovirus outbreaks associated with food consumption at commercial establishments, potlucks, or other gatherings, are often propagated through several modes of transmission. Usually multiple food or drink vehicles are implicated, as well as environmental spread (utensils, surfaces, etc.), and direct person-to-person spread. This observation is due to the fact noroviruses are easily spread from person-to-person, are able to survive on environmental surfaces and infect persons having contact with those surfaces, and can be shed for several days by previously infected persons despite symptoms no longer being present.

Figure 2: Reported Dates of Golden Corral Visits among Patrons with Gastroenteritis, November-December 2012.



Investigation limitations

This outbreak investigation has several limitations.

- 1) Investigators were not able to identify all restaurant patrons to determine the true total burden of illness. Investigators utilized several methods to identify ill patrons, including systematically interviewing all ill patrons that self-identified to CNCHD and conducting active case finding via emergency department surveillance. Investigators asked every person about other ill persons who may have eaten with them at the restaurant or who did not go to the restaurant but who got sick after having contact with an ill person who did.
- 2) Investigators were not able to interview 100% of employees. Investigators attempted to reach every active employee either on-site or via telephone. Almost 77% of the employees were interviewed.
- 3) Small sample size during the cohort study was an issue. Ideally, investigators would have liked to identify and interview all patrons of the restaurant, both sick and not sick to examine risk factors for illness via a cohort study. However, a larger cohort study was not feasible due to the difficulty in identifying all of the restaurant’s patrons and also due to the human resource-intensive nature of conducting such studies. Investigators used a small cohort, a party of 25 guests, to examine risk factors for illness-associated with the restaurant. The small sample size affected the investigators’ ability to identify statistical differences between the ill and non-ill.
- 4) Cases were asked questions about things that happened several days to a week prior to the interview date, which may lead to recall bias in their responses (they may not have accurately remembered all details of their illness or exposure history).

- 5) While 251 cases were identified who became ill and reported eating at the Golden Corral, it is not possible to determine the extent of that illness that can be attributed to community transmission of gastroenteritis. During the time of this outbreak gastroenteritis was known to be circulating in the community and it is possible some of the cases in this investigation represent community acquisition as opposed to restaurant acquisition.

Recommendations

Recommendations were made for immediate control and as a result of the investigation.

- The restaurant must follow all rules and regulations contained in the Wyoming Food Safety Rule.
- The Wyoming Food Safety Rule currently states that any food-handling staff person who is known to be ill due to gastrointestinal symptoms such as diarrhea or vomiting should be excluded from work until at least 48 hours has passed since that individual's last bout of diarrhea or vomiting (whichever occurred last). The 48 hour recommendation is the minimum, as many foodborne pathogens, including norovirus, can be shed by previously-ill persons for longer than 48 hours.
- The Wyoming Food Safety Rule also specifies that the restaurant shall require food-handling employees (i.e., kitchen staff, servers, etc.) to report to the person-in-charge information about their health and activities as they relate to diseases that are transmissible through food. A food-handling employee shall report the information in a manner that allows the person-in-charge to reduce the risk of foodborne disease transmission, including providing necessary additional information, such as date of onset of symptoms and illness, or of a diagnosis with symptoms if the food-handling employee has diarrhea, vomiting, jaundice, sore throat with fever or lesions containing pus, an infected wound, has been diagnosed with *Salmonella*, *Shigella*, *E. coli*, Hepatitis, or norovirus.
- Enhanced surface disinfection with a product effective against norovirus. A concentrated bleach solution was suggested.
- To minimize bare hand contact with ready-to-eat foods, such as lettuce, the restaurant should consider requiring the use of gloves when employees are handling those food items. Please note that glove use does not negate the need for proper hand-washing.
- All vomitus accidents should be treated as if they are highly contagious. Staff should use gloves and a concentrated bleach solution to disinfect affected areas. Staff should try to quarantine the area of the accident until the area is adequately disinfected. Staff should quarantine any rags, towels, or mops that were used to clean up the vomitus until they are adequately disinfected to prevent further transmission.
- Report any suspected cases of foodborne illness to health officials. Public health officials provide important services to business owners which include an objective investigation of the problem and providing quick, accurate, and effective mitigation strategies.
- Continue to consult with local environmental health specialists when questions arise about safe food-handling and consider ServSafe training for all kitchen staff.

Questions regarding this report can be directed to Kelly Weidenbach-Vigil, epidemiologist, with the Wyoming Department of Health Infectious Disease Epidemiology Program at (307) 266-0052 or at Kelly.weidenbach@wyo.gov. Questions regarding the Wyoming Food Safety Rule and other food safety issues can be directed to John Drinnon, director of environmental health, with the Casper-Natrona County Health Department at (307) 235-9340x734 or at johnd@cnchd.org.