Outbreak of Norovirus Associated with the Jimmy John's Restaurant – Finney County, December 2013

Background

On December 18, 2013 at 9:35 am, the Kansas Department of Agriculture (KDA) notified the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section in the Bureau of Epidemiology and Public Health Informatics (KDHE) of a foodborne illness complaint. The complainant stated that six individuals consumed food prepared at a Jimmy John's restaurant (501 East Kansas Avenue, Garden City, KS 67846) on December 12, 2013 and five subsequently became ill with gastrointestinal symptoms. KDHE notified the Finney County Health Department (FCHD) and an outbreak investigation was initiated at 3:00 pm to determine the cause and scope of illness and to determine appropriate prevention and control measures.

Methods

Epidemiologic Investigation

FCHD conducted preliminary interviews with those reporting illnesses. Additional ill patrons were identified; therefore, a case control study was conducted to determine if illness was associated with a specific food item or ingredient. Jimmy John's provided KDHE with a list of patrons and their email addresses. An online questionnaire was developed and the link was distributed by FCHD to local press and through social media. In addition, FCHD conducted telephone interviews with patrons who called the health department.

A case was defined as an individual experiencing diarrhea (three or more loose stools in a 24-hour period) or vomiting between 10 and 72 hours after eating food prepared at the Jimmy John's location between December 10, 2013 and December 24, 2013. A control was defined as an individual with no gastrointestinal symptoms after eating food prepared at the Jimmy John's location between December 10, 2013 and December 24, 2013.

One case per control was randomly selected and matched by date of exposure to the restaurant. Descriptive analyses and conditional logistic regression was performed in SAS® 9.3 to assess food exposures that were significantly associated with illness.

Laboratory Analysis

Stool specimens were collected from eight Individuals and submitted to the Kansas Health and Environmental Laboratories (KHEL). Four specimens were unable to be tested and four were tested for norovirus by polymerase chain reaction (PCR).

Environmental Assessment

KDA conducted an inspection of the Jimmy John's location on December 18, 2013. On December 24, 2013, KDA returned to conduct a second inspection to supervise the cleanup for suspected norovirus contamination. On January 29, 2014, a Hazard Analysis Critical Control Point (HACCP) inspection was completed by KDA to monitor temperatures and procedures for the handling of ready-to-eat (RTE) fresh tomatoes and lettuce as well as to monitor staff hygiene practices. KDHE conducted interviews with employees to collect information on work history, food history, and illness information.

Results

Case Finding

A total of 402 individuals either were interviewed by FCHD or completed the online survey. Of those, 296 (72%) reported illness and 216 (53%) met the case definition. The most common symptoms were nausea and diarrhea. Other symptoms included abdominal pain, muscle aches, and chills, Table 1. Eight (3.7%) individuals sought care from a healthcare provider, seven (3.3%) received care in an emergency department, and two (0.9%) were hospitalized.

Table 1: Symptoms reported among cases (n=216)

Symptom	Number Reporting Symptom	Total Reporting	Percent
Nausea	199	205	97.1%
Diarrhea	199	213	93.4%
Abdominal Pain	184	199	92.5%
Muscle Aches	177	199	88.9%
Chills	165	190	86.8%
Vomiting	150	188	79.8%
Fever	106	165	64.2%
Bloody Diarrhea	7	139	5.0%

The highest number of cases reported eating at the restaurant on Thursday, December 12 and Wednesday, December 18, Figure 1. The incubation period of cases ranged from 10.5 hours to 70 hours (median: 35 hours). Onset of illness ranged from December 11 to December 24, Figure 2. Duration of illness ranged from 1.5 hours to 188 hours (median: 49 hours) and 174 individuals had recovered. Forty-one had not recovered by time of interview.

Figure 1: Date Patrons Ate at Jimmy Johns by Number of Cases; Outbreak of Norovirus Associated with the Jimmy John's Restaurant – Finney County, December 2013 (n=216)

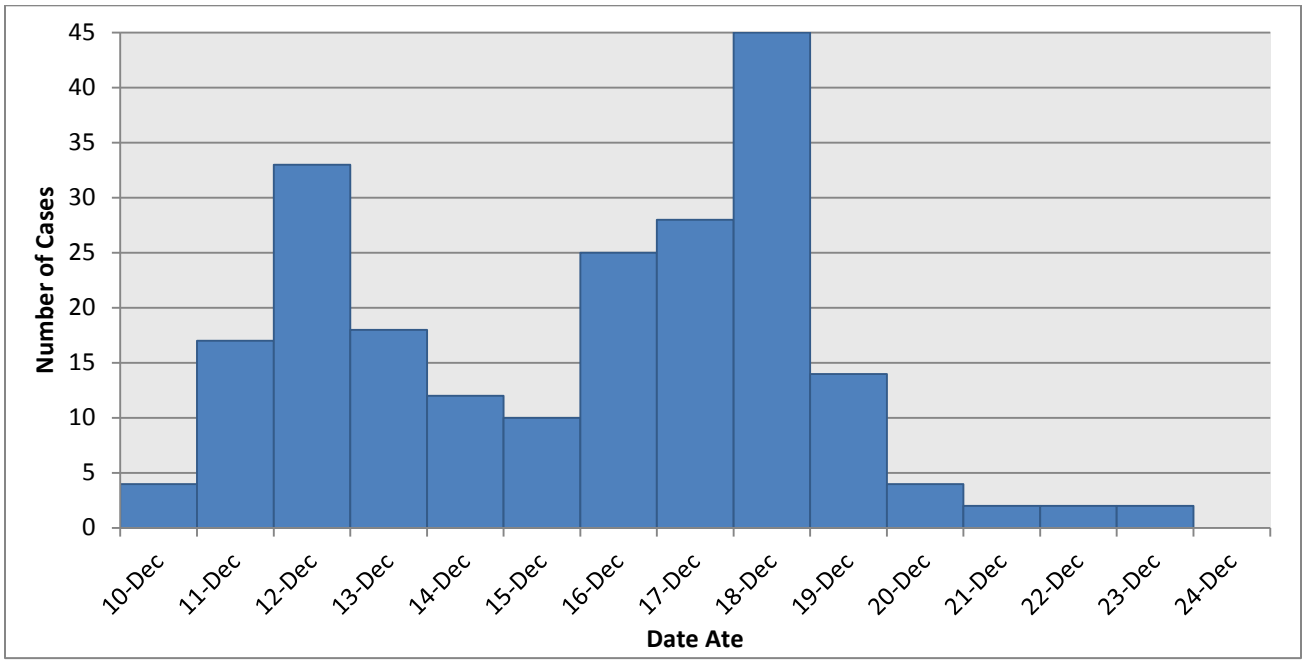
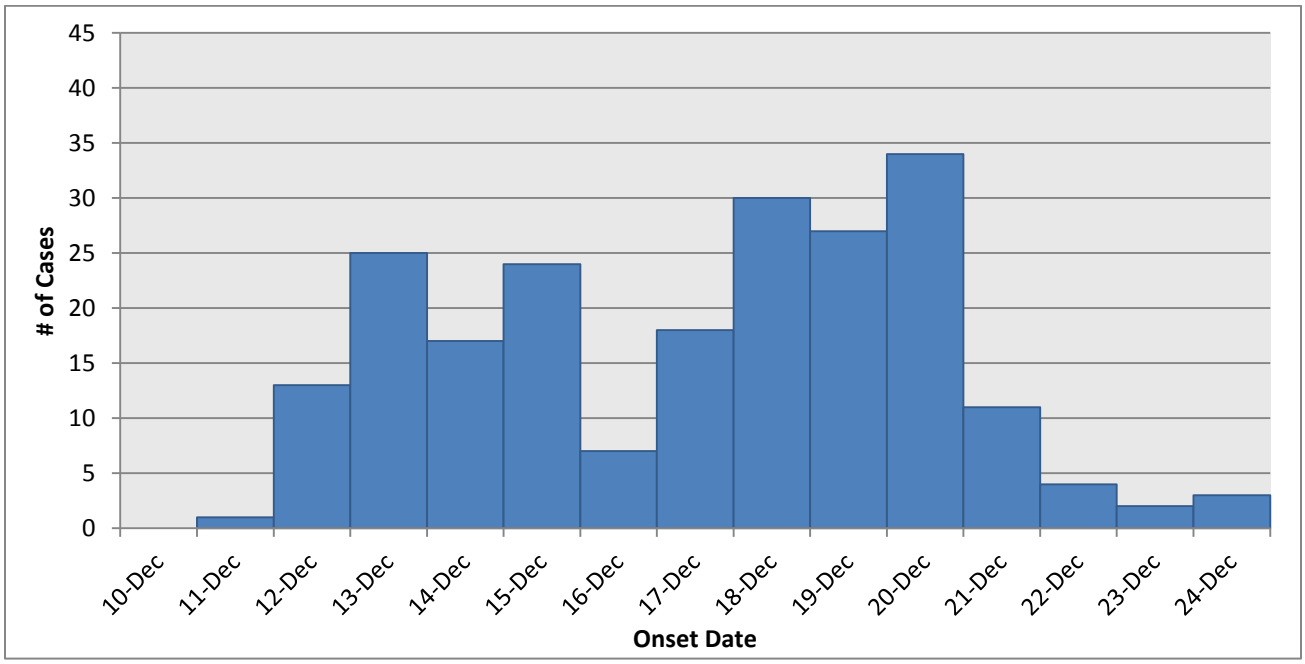


Figure 2: Onset of Illness by Number of Cases; Outbreak of Norovirus Associated with the Jimmy John's Restaurant – Finney County, December 2013 (n=216)



Case-Control Study

Two hundred sixteen individuals met the case definition and 115 met the control definition. One control was matched to one case based on the date food was eaten. The distribution for both sex and age for both cases and controls included in this study are shown, Table 2.

Table 2: Characteristics of the study population

	Cases (n=83*) No. (%)	**Controls (n=83*) No. (%)**	**Total (n=166*) No. (%)**
Sex			
Female	55 (66.3)	54 (65.1)	109 (65.7)
Male	28 (33.7)	29 (34.9)	57 (34.3)
	Cases (n=84)	**Controls (n=84)**	**Total (n=168)**
Age (years)			
Range	14 – 68	0 – 77	0 – 77
Median	37	33.5	36

*** Sex is unknown for one case and one control**

Each ingredient was analyzed for association with illness. Tomato, lettuce, and hot peppers were statistically associated with illness, Table 3. For the conditional logistic regression analysis, both tomato and hot peppers remained statistically associated with illness, while lettuce was associated with illness this association did not reach statistical significance, Table 4.

Table 3: Exposure information

Food	Odds Ratio	P-Value	95% Confidence Interval
Ham	1.00	1.00	0.54 – 1.86
Roast Beef	1.00	1.00	0.49 – 2.03
Tuna	4.32	0.05	0.89 – 20.97
Turkey	0.65	0.17	0.35 – 1.19
Salami	1.19	0.61	0.61 – 2.31
Capicola	1.19	0.61	0.61 – 2.31
Bacon	0.57	0.20	0.24 – 1.35
Cheese	1.69	0.13	0.86 – 3.31
Lettuce	**4.62**	**0.002**	**1.64 – 13.05**
Tomato	**3.69**	**<0.001**	**1.70 – 8.00**
Cucumber	1.43	0.30	0.72 – 2.84
Onion	1.27	0.49	0.64 – 2.51
Hot Peppers	**3.33**	**0.04**	**1.03 – 10.80**
Avocado	1.16	0.70	0.55 – 2.46

Table 4: Conditional logistic regression of sandwich ingredients

Food	Odds Ratio	P-Value	95% Confidence Interval
Lettuce	3.73	0.0595	0.95 – 14.69
Tomato	**3.03**	**0.0318**	**1.10 – 8.33**
Hot Peppers	**4.02**	**0.0339**	**1.11 – 14.52**

Environmental Assessment

During the December 18 inspection, three critical violations were identified: 1) Improper cooling of shredded lettuce and sliced tomatoes, 2) Improper storage of shredded lettuce and sliced tomatoes, and 3) Dirty food contact surfaces. Temperatures of the sliced tomatoes and the shredded lettuce were 47.0°F and 55.6°F respectively. These items were voluntarily destroyed by the manager and all other violations were corrected onsite. In addition, several employees reported gastrointestinal illness in the preceding week. The inspector reviewed the correct procedure for handwashing and gloving and reviewed the employee illness policy.

During the follow-up inspection on December 24, KDA went over the exclusion policy for ill employees as well as correct handwashing procedures and handwashing before gloving procedures with the manager. All potentially hazardous food was voluntarily destroyed during the December 24 inspection. Due to the continuing reported illnesses, the manager voluntarily closed the restaurant on December 24 and it remained closed until December 27 for cleaning. There have not been any additional illnesses associated with this establishment.

All four restaurant managers and three of the six in-store restaurant employees were interviewed. While only one employee interviewed reported illness between December 6 and December 19, the report completed by KDA at the time of the restaurant inspection recorded that a total of four employees had not reported to work in the past week due to gastrointestinal symptoms.

On January 29, 2014, A Hazard Analysis Critical Control Point (HACCP) inspection was conducted by KDA to evaluate the preparation of tomatoes and lettuce, the temperature control of tomatoes and lettuce, and staff hygiene practices. Recommendations were made to pre-wash all fresh produce items and to monitor all temperatures during preparation. Staff used correct handwashing and glove use procedures when preparing the tomatoes and lettuce. KDA made the following suggestions to enhance food safety:

- All fresh produce items that are going to be served as ready to eat foods should be washed before processing.
- All potentially hazardous foods' temperatures should be monitored during processing.
- Containers of lettuce that are cooling should be vented to allow for more efficient cooling.

Laboratory Analysis

Three of the four stool specimens that were collected from restaurant patrons tested positive for norovirus genogroup II.

Discussion

This was an outbreak of norovirus which affected 216 individuals and was associated with consuming food prepared at a Jimmy John's location between December 10 and December 24, 2013. The symptoms, incubation period, and duration of illness reported are consistent with norovirus infection and three of the four stool specimens were positive for norovirus. Therefore norovirus was confirmed as the causative agent of this outbreak. Four specimens were unable to be tested because of how they were submitted and one specimen tested negative but the time between the onset of illness and specimen collection was 18 days. Statistical analysis showed two food items were statistically associated with illness, tomato and hot peppers. Lettuce was associated with illness but did not reach statistical significance. Interviews with Jimmy John's employees revealed that four of the employees had missed work during the week before the KDA inspection on December 18 due to gastrointestinal illness.

Norovirus is a highly contagious pathogen with a very low infectious dose, estimated to be between 10-100 viral particles [1]. Transmitted primarily through fecal-oral route, norovirus

particles may be spread through direct contact or through consuming fecally-contaminated food or water. Spread via aerosolized vomitus is also possible. Once infected, norovirus shedding can begin prior to the onset of symptoms and can persist for weeks after clinical symptoms have ceased. Norovirus has been detected in fecal specimens 3 to 14 hours before the onset of clinical symptoms and can be detected for 13 to 56 days after exposure to the virus [2]. Approximately 20% of norovirus infected individuals do not have clinical symptoms. [3] However, these individuals can still shed norovirus and can be potential sources of contamination.

Considering the reported illnesses among restaurant employees, it is possible that the tomatoes, lettuce, and hot peppers could have become contaminated during food preparation or service. As a result of this investigation the restaurant closed and the staff thoroughly cleaned the establishment according to the "Norovirus Clean Up" handout provided by the Kansas Department of Agriculture. Simple prevention measures, including thorough hand washing after using the bathroom and before handling food items, and excluding individuals with gastrointestinal illness from food handling can substantially reduce transmission of norovirus. [4]

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