

Outbreak of Norovirus Associated with a High School Band Trip, Johnson County, March 2012



Background

On March 14, 2012, at 12:53pm, the Bureau of Epidemiology and Public Health Informatics at the Kansas Department of Health and Environment (KDHE BEPHI) was notified of a possible gastrointestinal illness outbreak that occurred during a high school band trip to New York City from March 9 to March 15, 2012. The attendees (students, staff, and family members) stayed at a hotel in New Jersey and traveled back and forth to New York City. On their return trip back to Kansas, they stopped at the emergency room at a hospital in Mount Pleasant, Pennsylvania due to the number of individuals that were ill. There were 62 band trip attendees that reported gastrointestinal symptoms between March 9 and March 18. In response to this report, an outbreak investigation was initiated by staff at Johnson County Department of Health and Environment (JCDHE) and KDHE BEPHI to determine the cause of illness and to implement prevention and control measures.

Methods

Epidemiologic Investigation

A retrospective cohort study was conducted among individuals that attended the band trip to determine if illness was associated with riding on a particular bus, rooming with an ill individual, or any specific food items consumed during the trip. A questionnaire was developed and the adults who chaperoned the band trip were interviewed by staff from JCDHE. The students who attended the trip were given the questionnaire to complete during band class on March 26, 2012.

A case was defined as an individual who attended the band trip and became ill with vomiting and/or diarrhea from March 9, 2012 to March 21, 2012 (72 hours after returning home).

Descriptive analysis was conducted using SAS® 9.3. Relative risk (RR) and 95% confidence intervals (CI) were calculated to assess the association between bus assignments, rooming with ill persons, and food items with the development of illness.

Laboratory Analysis

One stool specimen was collected during the band trip by Pennsylvania’s Department of Health and submitted to their Bureau of Laboratories for testing. Two additional stool specimens were collected and submitted to the Kansas Health and Environmental Laboratories (KHEL) for testing.

Environmental Assessment

The Bergen County Department of Health Services and Rutherford Health Department in New Jersey obtained menus of the continental breakfast items served at the hotel. They also assessed whether any hotel employees had become ill either during or after the band trip.

Results

Epidemiologic Investigation

Overall 133 (82%) of 163 individuals that attended the high school band trip to New York City were either interviewed by JCDHE or completed a self administered questionnaire. JCDHE interviewed 18 individuals (staff and family members) and 115 students completed paper questionnaires during band class. Seventy individuals reported illness and of those 62 (47% of those interviewed) met the case definition. The age of cases ranged from 10 years to 51 years (median = 16 years). Thirty-four (55%) cases were female.

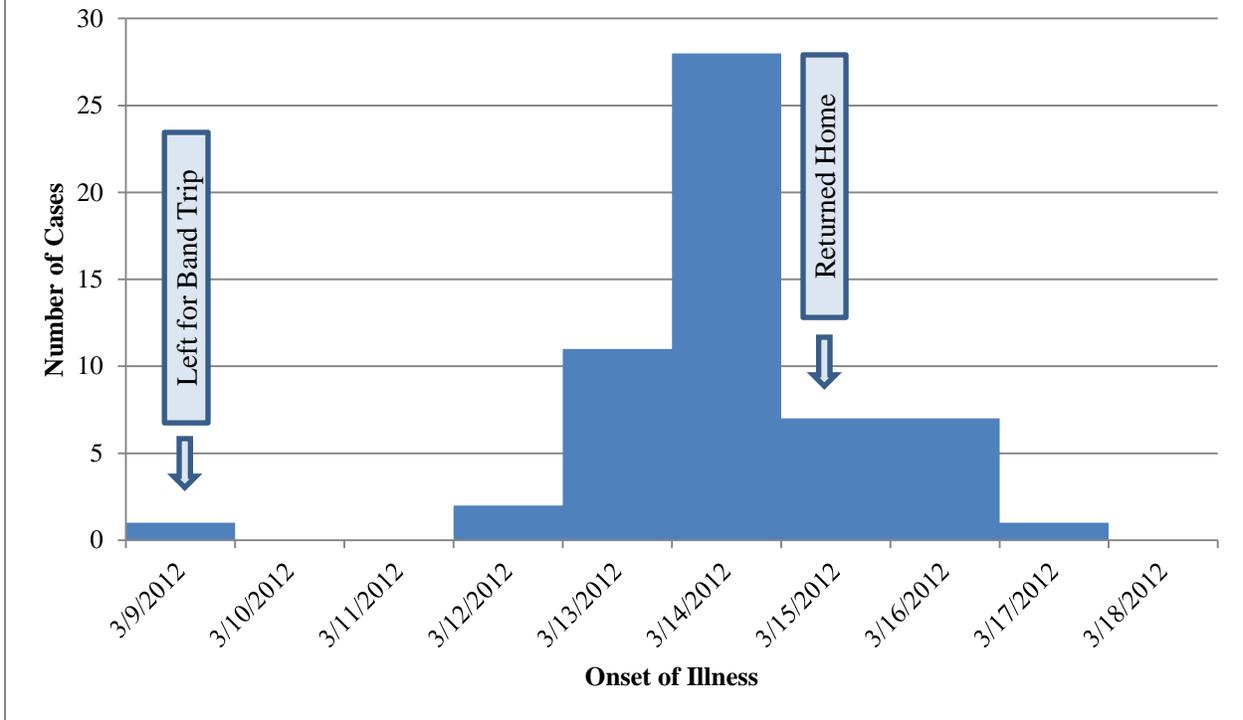
The most commonly reported symptoms included nausea, vomiting, muscle aches, and headache (Table 1). Other symptoms included abdominal cramps, fever, and diarrhea. Thirty-four (55%) reported visiting the emergency department and no one was hospitalized.

Table 1: Symptoms Reported Among Cases – High School Band Trip, Johnson County, Kansas March 2012 (n=62)

Symptom	# of Cases / Total Reporting	% of Cases
Nausea	53/57	93%
Vomiting	54/62	87%
Muscle Aches	40/56	71%
Headache	40/58	69%
Abdominal Cramps	34/55	62%
Fever	29/53	55%
Diarrhea	31/59	53%

Onset dates of illness ranged from March 9 to March 17 (Figure 1). Duration of illness ranged from 2 hours to 8 days (median = 1 day).

Figure 1: Onset Date of Illness by Number of Cases, High School Band Trip - Johnson County (n=57)*



*Five onset dates are unknown

Statistical analysis demonstrated that no food items eaten on the trip or bus assignments were significantly associated with illness. However, rooming with an ill person was found to be significantly associated with illness (relative risk [RR] = 1.73; 95% confidence interval [95% CI] = 1.12 – 2.68).

Laboratory Analysis

One stool specimen collected and tested in Pennsylvania was positive for norovirus and two stool specimens collected by JCDHE and tested at KHEL were positive for norovirus genogroup I.

Environmental Assessment

The hotel in New Jersey reported that no employees were out ill March 10 to March 16, 2012.

Conclusions

This was an outbreak of norovirus associated with a Johnson County high school band trip to New York City. Attendees became ill on March 9 and continued to become ill 72 hours after returning home on March 15. Neither consuming any specific food item nor riding on a specific bus were significantly associated with illness. However, rooming with an ill individual was significantly associated with illness.

One attendee reported illness on March 9, three days prior to the onset of symptoms of other attendees. It is not known whether this person could have been infected with norovirus during the band trip, which might have resulted in the transmission of norovirus during the trip. Given the low infectious dose of norovirus, it is possible that various environmental surfaces could have been contaminated by this ill individual or by someone who was infected with norovirus, but asymptomatic. Once several attendees became ill the virus spread very quickly from person to person affecting many band members and chaperones.

Norovirus is a highly contagious pathogen with a very low infectious dose, estimated to be between 10-100 viral particlesⁱ. 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 onset of clinical symptoms and can be detected for 13 to 56 days after exposure to the virusⁱⁱ. Approximately 20% of norovirus infected individuals do not have clinical symptomsⁱⁱⁱ. However, these individuals can still shed norovirus and can be potential sources of contamination.

Simple prevention measures, including cohorting ill individuals to one bus, having sick attendees room with other sick attendees, thoroughly cleaning the bus after vomiting incidences and thorough hand washing after using the bathroom could have limited the spread of this outbreak^{iv}.

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

ⁱⁱ Atmar RL, Opekum AR, Gilger MA, et al. Norwalk virus shedding after experimental human infection. *Emerg Infect Dis* **2008**; 14:1553-1557.

ⁱⁱⁱ Moe CL. Preventing norovirus transmission: How should we handle food handlers? *Clin Infect Dis* **2009**; 48:38-40.

^{iv} Centers for Disease Control and Prevention. "Updated Norovirus Outbreak Management and Disease Prevention Guidelines." *Morbidity and Mortality Weekly Report*, no.60. Retrieved May 7, 2012 from http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm?s_cid=rr6003a1_e.