



# Investigation of a Norovirus Outbreak at a San Diego County California Elementary School

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(1) CDC/CSTE Applied Epidemiology Fellowship, Class XIII

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### BACKGROUND

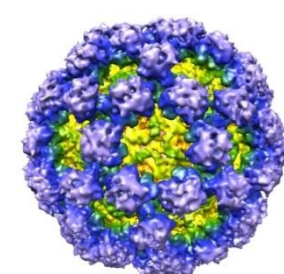
- Norovirus is a highly contagious virus, and it is known to be the most common cause of acute gastroenteritis.
- The Centers for Disease Control and Prevention estimate that norovirus is responsible for 685 million cases yearly, most cases occurring among children younger than 5 years old.
- Norovirus infections lead to an estimated 50,000 child deaths every year, the majority occurring in developing countries.
- Norovirus mode of transmission is usually person to person through the fecal-oral route.

### INITIAL CALL

- On May 25, 2016, the San Diego County Epidemiology Program was notified of an outbreak of acute gastroenteritis at an elementary school.
- 60 students and 14 teachers were reported to be ill with vomiting and nausea.
- Duration of symptoms was unknown – suspected etiology was initially unclear. Foodborne transmission was not suspected as the school does not participate in a school lunch program.

### EPIDEMIOLOGIC INVESTIGATION

- Specimen testing at the San Diego County Public Health Laboratory was performed. An online survey was developed for parents to report student illness, identify risk factors for infection, and to encourage stool specimen submission.
- A case was defined as a student or staff member who reported at least one episode of vomiting and/or three episodes of diarrhea with onset between May 17 and June 8. An epidemic curve was created based on absenteeism data, online survey results, and interviews with ill teachers.
- The Epidemiology Program provided recommendations based on California Department of Public Health Guidance for Prevention and Control of Viral Gastroenteritis, including:



- Exclusion of ill staff and students until symptom-free for at least 48 hours.
- Notification of parents regarding reported illness.
- Disinfection of shared environmental surfaces with a diluted bleach solution, and emphasis on handwashing.

### EPIDEMIOLOGIC INVESTIGATION RESULTS

Figure 1. Percentage of Students Meeting Case Criteria



Figure 1:

- Of 760 students at the school, 74 (9.7%) students were identified as cases; 44 cases were identified using an absenteeism log and 30 additional cases were identified via the online questionnaire.

#### Teachers:

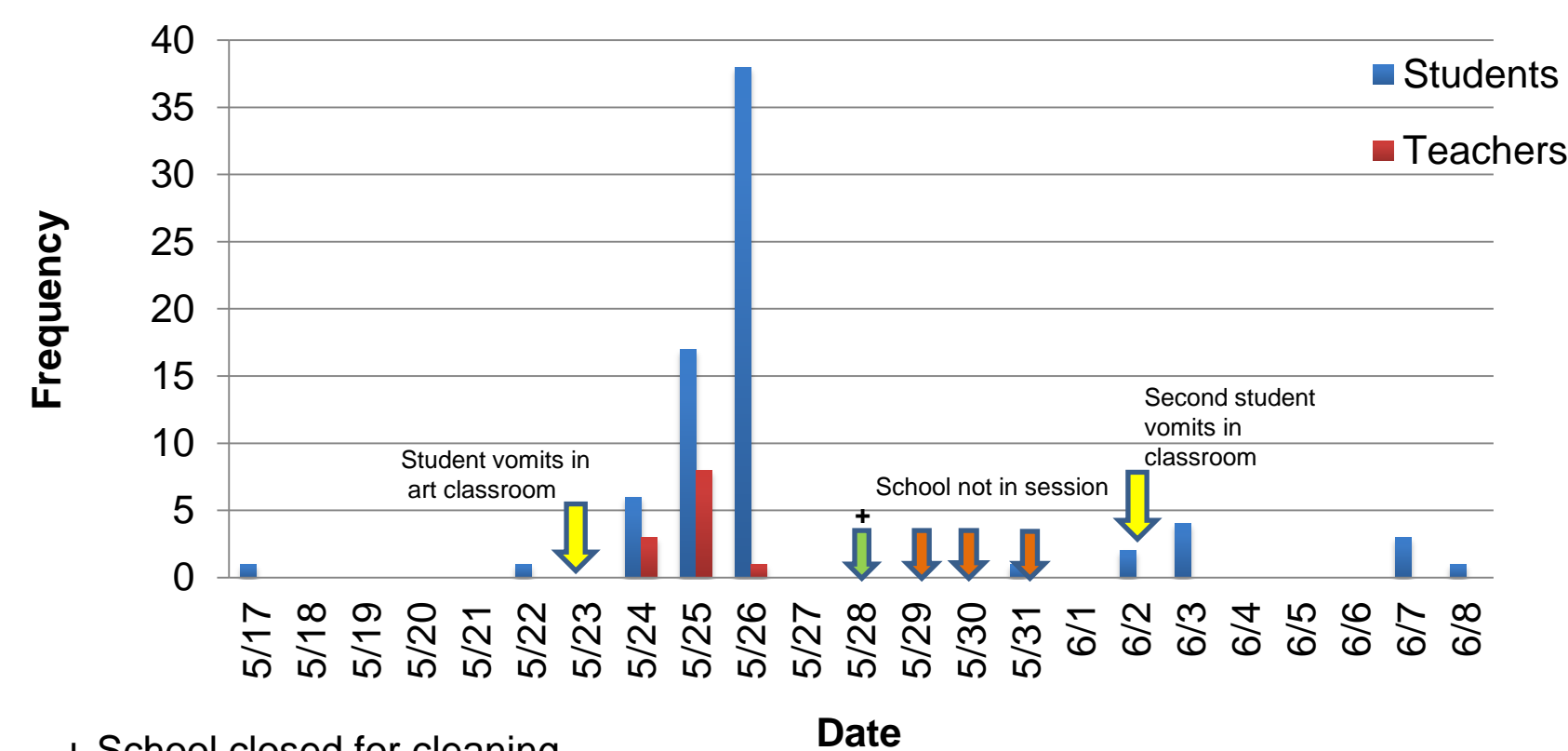
- Ten teachers also met case criteria. There were a total of 12 teachers interviewed.

Table 1. Demographics of Student Cases (n=74)	
Age (yrs.)	n (%)
5-7	19 (25.7)
8-10	29 (39.0)
11-12	26 (35.3)
Gender	
Male	28 (38)
Female	46 (62)
Demographics of Teacher Cases (n=10)	
Age (yrs.)	n (%)
25-35	6 (60.0)
36-40	1 (10.0)
41-50	2 (20.0)
> 51	1 (10.0)
Gender	
Male	2 (20.0)
Female	8 (80.0)

Table 1:

- The estimated median age of students based on school grade, and ages reported by parents was 7 years (range: 5-12 years).
- Teachers median age was 44 years (range: 25-60 years).

Figure 2. Epidemic Curve Based on Absenteeism Data and Online Survey Results\* (n=84)



+ School closed for cleaning

Figure 2:

- An estimated onset occurred on May 17, with an increase in the number of cases on May 26.
- Art, music and science classes are performed in one classroom, where the students from different grades get rotated. On May 23, it was reported that a student vomited in the art classroom on a the desk on another student. The art class teacher reported ill on May 24, as well as the next door teacher, who witnessed the student vomiting.

Figure 3. Symptoms Reported by Students and Teachers

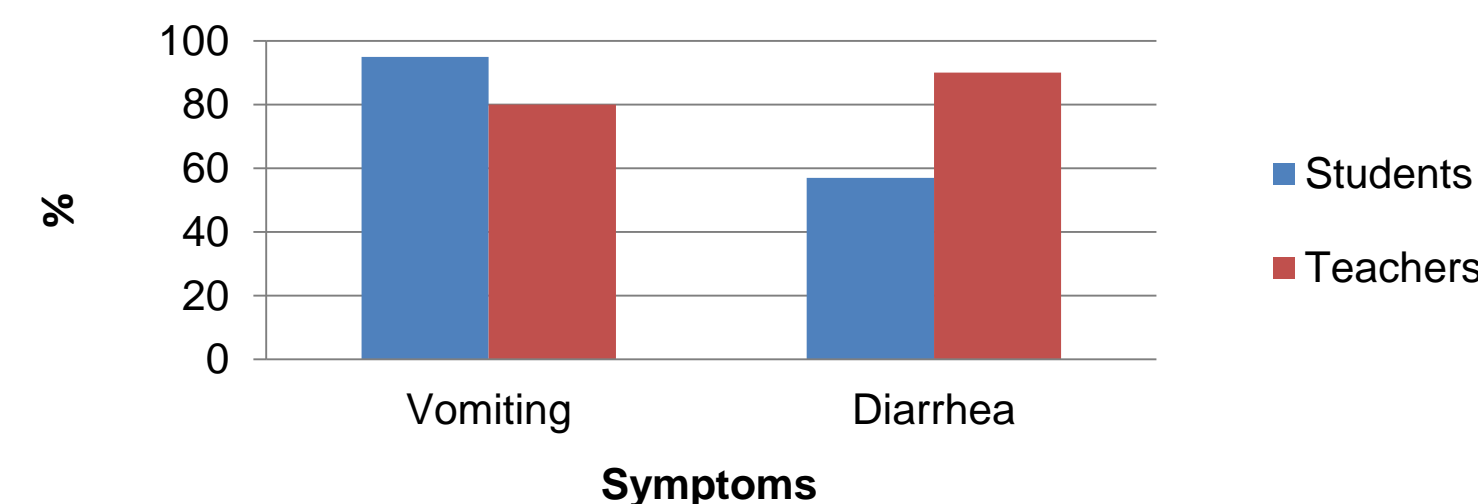


Figure 3:

- Symptoms reported by students included: vomiting (95%), and diarrhea (57%). Median illness duration based on survey results was 13.6 hours (range: 1-96 hours).
- Symptoms reported by teachers included: vomiting (80%) and diarrhea (90%). Median illness duration was 13.5 hours (range: 12-24 hours).

### LABORATORY INVESTIGATION RESULTS

- Stool-specimen collection kits were delivered to the school on May 26. Specimens (2 vomitus; 3 stool) were received from four ill persons.
- On May 27, the school was closed for cleaning and disinfection. Samples were tested by reverse transcription--polymerase chain reaction (RT-PCR) for norovirus and DNA sequencing.
- Laboratory results were available June 6. Two (50%) of the specimens were positive for norovirus genogroup I (GI).
- The two positive stool specimens were forwarded to the California Microbial Disease Laboratory for further genetic testing. Genetic classification was not performed due to low viral load.

### LESSONS LEARNED

#### Stool Specimen Containers:

- Specimen containers were provided to the school, but parents and staff were unavailable to obtain due to school closure.
- Specimen containers were made available over the holiday weekend at the Epidemiology Program building. No specimen containers were picked up by parents; distance was likely a barrier to collection. The school might had been the ideal point of distribution given location.

#### Online Survey:

- The survey link was sent to parents using district e-mail distribution system. The school district required username and password to access the link; this was a known barrier to survey completion.

### CONCLUSION

- On May 23, a 5th grade student vomited inside an art classroom. Students from all grades are rotated through the art classroom throughout the day, increasing the opportunity for environmental contamination.
- Five of the teachers who were interviewed commented that the illness among students and staff was likely spread through fomites in the art classroom.
- The number of cases decreased significantly after the school closed for a day to implement infection control measures.

### ACKNOWLEDGMENTS

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