

Gastrointestinal Illness Outbreak at
Manhattan High School West Campus —
Riley County, Kansas, August 2016



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Background

On Wednesday, August 24, 2016 at 11:45 a.m., the Riley County Health Department (RCHD) notified the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section (KDHE) of a suspected outbreak of gastrointestinal illnesses among students at Manhattan High School's West Campus (MHSW), where up to fifteen students had been sent home with symptoms of nausea and vomiting. An outbreak investigation was immediately initiated to determine the cause and scope of illness and to implement appropriate control measures.

Methods

Epidemiologic Investigation

An outbreak-specific questionnaire was developed. Initially, RCHD investigators contacted parents of absent students, reported to the health department by the school, to conduct phone interviews using the questionnaire. When the outbreak grew larger, an online version of the questionnaire was distributed to parents of Manhattan High School (MHS) students, including both MHSW and the Manhattan High School's East Campus (MHSE). The online survey was active from September 7 through September 21, 2016.

An outbreak case was defined as vomiting or diarrhea in a student or employee of MHSW between August 15 and September 12, 2016. Data was analyzed using SAS® 9.4.

Environmental Assessment

The Kansas Department of Agriculture (KDA) conducted an inspection of the MHSW cafeteria on August 31, 2016. Water samples from the high school were collected by Riley County Environmental Health on September 6, 2016.

Laboratory Analysis

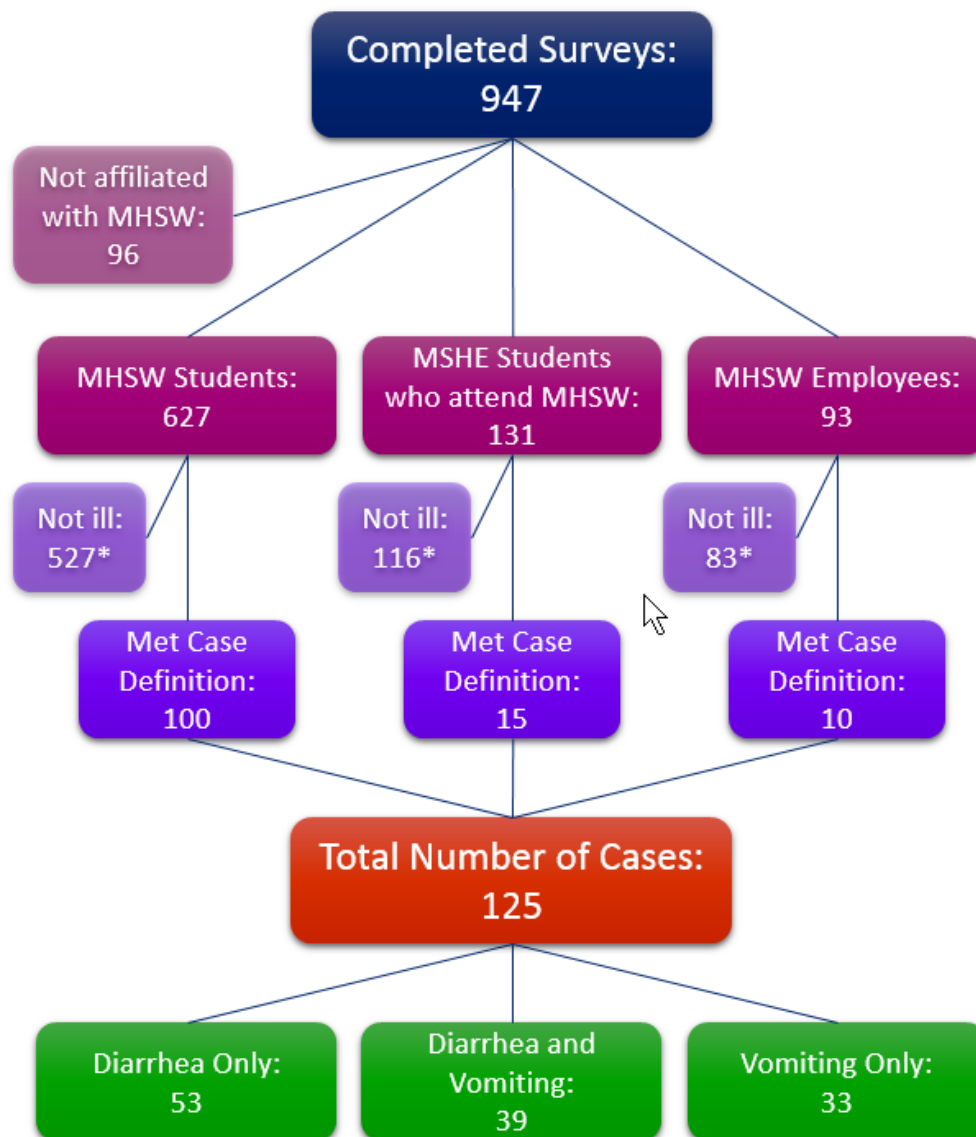
Stool specimens were collected from ill persons. Culture, multiplex PCR, and rt-PCR were conducted by the Kansas Health and Environmental Laboratories (KHEL). Additional rt-PCR testing was performed by the Minnesota Department of Health. Water samples from the high school were tested by KHEL for total coliforms.

Results

Epidemiologic Investigation

Overall, 947 surveys were completed, with 125 persons reported illness meeting the outbreak case definition. Among the 1,535 MHSW students, 627 (41%) completed the survey with 100 (7%) reporting illness meeting the case definition. Among the 289 MHSE students who also take classes at MHSW, 131 (45%) completed the survey with 15 (5%) reporting illness meeting the case definition. There were 93 MHSW employees that completed the survey and 10 reported illness meeting the case definition (Figure 1).

FIGURE 1: SURVEY RESULTS



*Some survey respondents reported illness that did not meet the outbreak case definition (e.g. respiratory symptoms, nausea only)

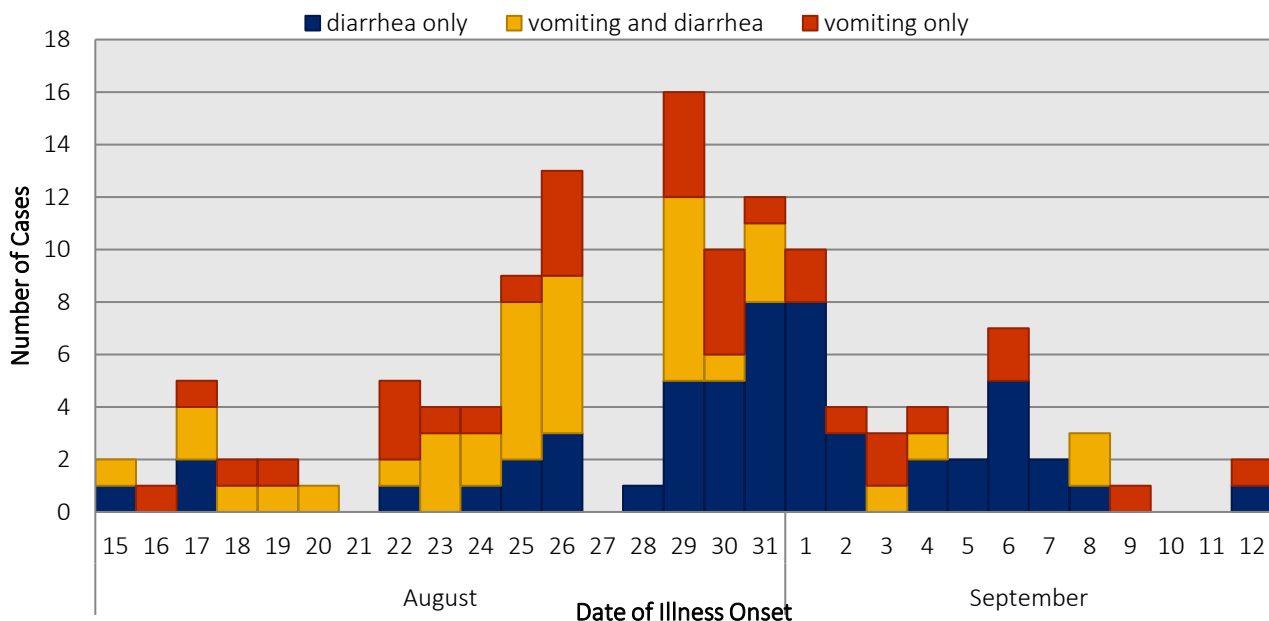
Of the 125 persons meeting the case definition, 74 (59%) were female, 43 (35%) were male, and eight (6%) were unknown. Ten (8%) ill persons were MHSW employees (teachers, faculty, and staff), 25 (20%) were 12th graders, 33 (26%) were 11th graders, 37 (30%) were 10th graders, 16 (13%) were 9th graders at MHSE who take classes at MHSW, and 4 (3%) were MHSW students who did not respond when asked about grade level. Persons with outbreak cases of illness ranged in age from 14 to 65 years of age (median = 18 years).

In addition to diarrhea and vomiting, the symptoms most commonly reported were nausea, abdominal cramps, and headache (Table 1). Thirteen persons sought healthcare for their illness, three persons visited the emergency department, and no hospitalizations were reported. Onset dates ranged from August 15 to September 12 (Figure 2).

TABLE 1: SYMPTOMS REPORTED AMONG PERSONS WITH OUTBREAK CASES OF ILLNESS

	Predominant Symptom Reported			Overall (n=125)
	Diarrhea Only (n=53)	Diarrhea and Vomiting (n=39)	Vomiting Only (n=33)	
Nausea	37	39	31	107
Abdominal Cramps	40	32	24	96
Diarrhea	53	39	0	92
Headache	35	25	20	80
Vomiting	0	39	33	72
Chills	20	17	10	47
Muscle Aches	23	15	9	47
Fever	9	7	7	23
Bloody Stool	0	2	0	2

FIGURE 2: NUMBER OF CASES BY DATE OF ONSET AND REPORTED SYMPTOMS (N=125)



Environmental Assessment

The [August 31, 2016 inspection](#) of the MHSW cafeteria by KDA found 2 priority violations and 1 priority foundation violation. The first priority violation was that refrigerated, ready-to-eat foods were held longer than 7 days after preparation. This violation was corrected on site by discarding food. The second priority violation was that sanitizer was not being used in accordance with the manufacturer's directions. This violation was corrected on site by replenishing sanitizer buckets with solution meeting the manufacturer's guidelines for appropriate sanitization. The priority foundation violation was that dried food debris was found on metal scoops that had been stored as clean. This violation was corrected on site by moving the utensils to the wash area.

Instructions on appropriate handwashing techniques and a norovirus-appropriate cleaning protocol were distributed to the school by the inspector.

Laboratory Analysis

Coliforms were not found in the water samples collected from the high school. Laboratory testing on six stool specimens collected from ill persons did not provide a confirmed etiology for the outbreak. Two specimens tested positive by PCR for enteropathogenic *E. coli* (EPEC) at KHEL. However, due to the high number of commonalities between these two ill persons, this was insufficient to confirm EPEC as the etiologic cause of the outbreak. All other specimens tested negative for EPEC. All other tests performed on all specimens were negative (Figure 3).

Discussion

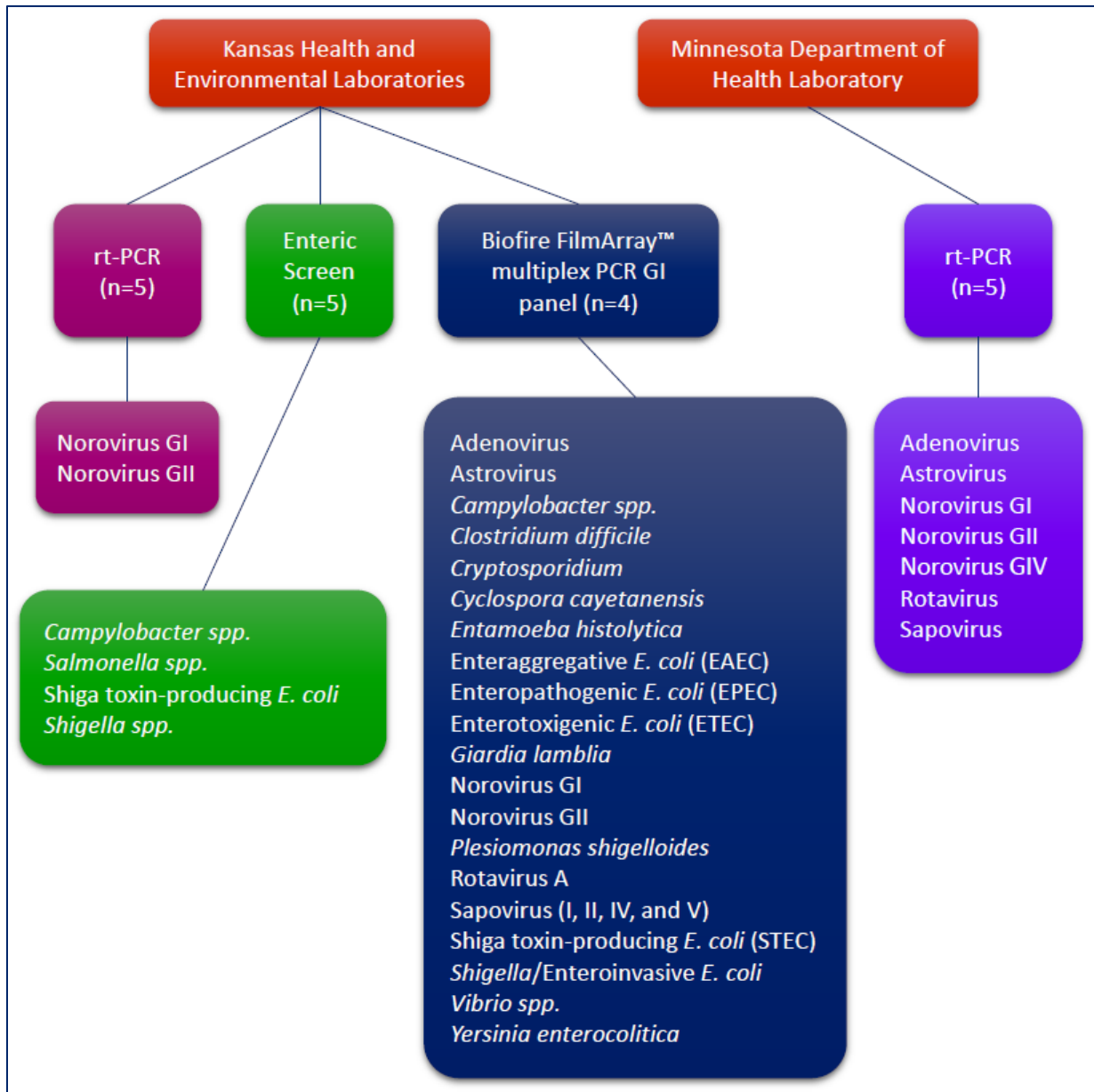
This outbreak investigation was aided by the cooperation and quick response of the Riley County Health Department, the Kansas Department of Agriculture, the Kansas Health and Environmental Laboratories, and the assistance of the Minnesota Department of Health.

Outbreak Etiology

The etiologic cause of this outbreak remains unknown, despite extensive laboratory testing on the specimens that were submitted. The epidemiologic curve for this outbreak indicates that transmission was likely person-to-person. Illness onset dates for persons reporting vomiting only were fairly steady throughout the outbreak period, whereas illness onset dates for persons reporting diarrhea peaked between August 29 and September 1, 2016. It is possible that more than one infectious agent caused multiple outbreaks in August and September.

A [boil-water advisory](#) was issued for the city of Manhattan on August 15, 2016 because of a power outage resulting in a loss of water pressure. The [advisory was rescinded](#) the following day following restoration of water pressure and laboratory testing of water samples showed no evidence of contamination. There was no indication that this outbreak was waterborne. During this outbreak, absenteeism at other local schools did not rise above expected baseline.

FIGURE 3: LABORATORY TESTS



Environmental Cleaning

A norovirus clean-up procedure was distributed to MHS by RCHD and KDA. Although norovirus was not found to be the cause of the outbreak, this procedure provides cleaning and disinfection guidance that is effective against many other pathogenic viruses and bacteria.

School Exclusions

To stop the spread of illness, students reporting vomiting or diarrhea were excluded from school for 2 days following the resolution of their symptoms. Many gastrointestinal illnesses can be spread person-to-person for a few days after illness subsides.

Survey Limitations

Not all survey respondents provided their names, so it is unknown if there is additional overlap between the online survey and the telephone interviews with ill students reported to RCHD by the school. Survey respondents not reporting illness could have become ill after taking the survey. Ill persons may have been more likely to complete the survey than persons who were not ill. Not all questions were required to be answered on the survey. Sex was not available for 6% of outbreak cases, and 3% of outbreak cases did not report their grade level. The survey did not address possible illness among members of the community who were not affiliated with MHS.

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