Outbreak of Norovirus
Associated with a Daycare Center

Allen County, Kansas
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Outbreak Investigators
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Background

On October 17, 2007, the Southeast Kansas Multi County Health Department (SEKMCHD) received a report of gastrointestinal illnesses among eleven enrollees at Daycare Facility X, located in Iola. The daycare's total enrollment was 13; it employed 3 staff members.

SEK distributed two stool kits to test symptomatic individuals, and notified the Office of Surveillance and Epidemiology (OSE) at the Kansas Department of Health and Environment (KDHE) of the outbreak. An outbreak investigation was initiated. The purpose of the investigation was to determine the cause of the outbreak and to implement appropriate prevention and control measures.

Methods

Using OSE's standard Seven Day Exposure Questionnaire, SEKMCHD collected clinical information on all Daycare Facility X children and staff. A case was defined as a daycare enrollee or staff member with onset of vomiting and/or diarrhea (3 or more loose stools within a 24-hour period) since October 8, 2007. Attendance information was also obtained.   Information on other exposure variables, such as foods eaten, was not collected, because the small number of non-ill persons precluded statistically significant exposure analyses. In addition, enrollees were considered too young to give an accurate food history.
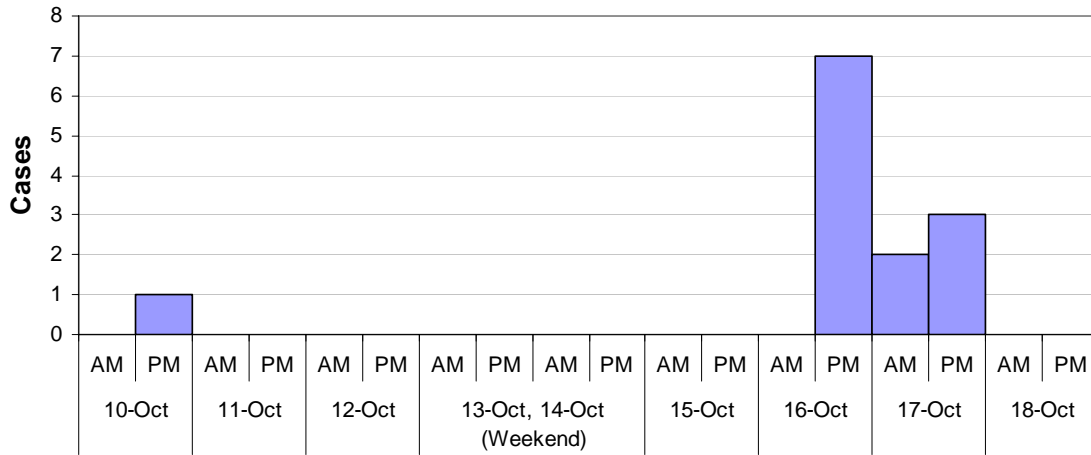
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A total of four stool specimens were collected from ill individuals and submitted for laboratory testing. Testing was performed at the Kansas Department of Health and Environmental Laboratories (KDHEL).

Results

All 13 enrollees reported gastrointestinal illness that met the case definition. No daycare staff reported symptoms. Cases ranged from four months to five years of age (median = 2 years). The first onset was October 10; no other enrollee became ill until October 16 (Figure 1), and no additional illnesses were reported after October 17. All cases reported vomiting and stomach ache. Non-bloody diarrhea was reported by nine cases (69%); six cases (46%) reported fever. Precise recovery times were not obtained; however, several cases reported an illness duration of approximately 24 hours.

Figure 1. Cases by date of symptom onset (n=13)

Four (31%) of the enrollees were tested for enteric pathogens. All four (100%) tested positive for norovirus—*Salmonella* Braenderup was also found in one norovirus-positive specimen.

Discussion

The gastrointestinal illness outbreak among daycare attendees was caused by norovirus. Although one enrollee tested positive for *Salmonella* in addition to norovirus, *Salmonella* was not found in the other three stool specimens. Salmonellosis typically causes symptoms for several days. The short duration of the *Salmonella*-positive case's illness (less than 24 hours) indicates the case was likely an asymptomatic carrier of *Salmonella*, and was sickened by norovirus.

The laboratory-confirmed index case became ill on October 10, after returning home from daycare. Despite symptoms of diarrhea and vomiting, the case continued to attend daycare. Seven other attendees became ill between 5:00 and 9:30 p.m. October 16;

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because norovirus' incubation period usually ranges from 24 to 48 hours, the most likely period of exposure was Monday, October 15. It is unclear if the outbreak was the result of person-to-person transmission within the daycare facility on October 15, or if norovirus was spread through a single source, such as food, on that date.

Humans are the only known reservoir of norovirus; person-to-person transmission is common. Norovirus is the leading cause of foodborne illness in the United States. An estimated 23 million people are infected with norovirus every year—40% of these infections may be foodborne.[#] Onset of diarrhea and vomiting may occur 10-50 hours after infection, and may last from 12 to 60 hours. Vomiting is more prevalent in children than adults. The disease is transmitted through fecal-oral routes; historically, norovirus outbreaks have been associated with fecally contaminated foods, especially ready-to-eat foods such as salads, sandwiches, ice, cookies, and fruit.[¶] Lettuce salad, grapes, bananas, and cookies were all served at the daycare on Monday, October 15.

Limitations

This outbreak investigation did not include a formal study of the relationship between exposures and illness. A cohort study may have been helpful in clarifying the specific exposure, or exposures, associated with infection.

Recommendations

Several prevention measures should be followed to prevent future outbreaks in daycare settings:

- Daycare enrollees should be educated on proper hand washing technique.
- Younger children enrolled in daycare should be supervised after they use the toilet, to ensure proper hand washing.
- Daycare staff and enrollees practice should always practice proper hand washing technique, including hand washing after using the toilet, after changing diapers, and before preparing, serving or eating food.
- Surfaces and hard-surface toys should be cleaned regularly; during an outbreak, they should be cleaned daily.
- The importance of restricting ill daycare enrollees and staff should be stressed, especially when the illness is gastrointestinal.

Acknowledgements

[#] Mead PS. Food related illness and death in the United States. Emerging Infectious Diseases, 1999. 5(6):607-625.
[¶] Centers for Disease Control and Prevention. "Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and other Health Care Professionals." MMWR 2004:53(No. RR-4).