

- ◆ Increased acute gastroenteritis (AGE) caused by norovirus and sapovirus among young children in Washoe County

INCREASED ACUTE GASTROENTERITIS CAUSED BY NOROVIRUS AND SAPOVIRUS AMONG YOUNG CHILDREN IN WASHOE COUNTY

INTRODUCTION

On September 6, 2012, the Washoe County Health District (WCHD) received the first report of increased illness with predominant vomiting or diarrhea among students of local school A. Since then, WCHD has received reports of increased acute gastroenteritis (AGE) from six local elementary schools and one day care center. There have been over 600 illnesses reported as of October 31, 2012. The purpose of this article is 1) to provide an overview of the current situation; 2) share with the medical community more details of findings from outbreak investigations; 3) provide recommendations to healthcare providers in the community to assist the WCHD in its efforts to control the spread of AGE.

PRIMARY FINDINGS

Reported Morbidity and Clinical Presentation

From September 6 through October 31, a total of 604 persons were ill with AGE from six elementary schools, one childcare, and one cluster detected through WCHD's real-time syndromic surveillance system. Of these, 571 (95%) were children who were students of elementary schools or daycares and 33 (5%) were staff members associated with these schools or daycare. WCHD staff interviewed 81 ill persons. The clinical symptoms are: vomiting (53%), diarrhea (45%), abdominal cramps (44%), nausea (38%), fever (30%), and headache (19%). Eight (10%) of 81 interviewed reported seeking medical care. The median duration of illness was 24 hours among 48 persons who were able to provide illness duration information.

Epidemiological Findings

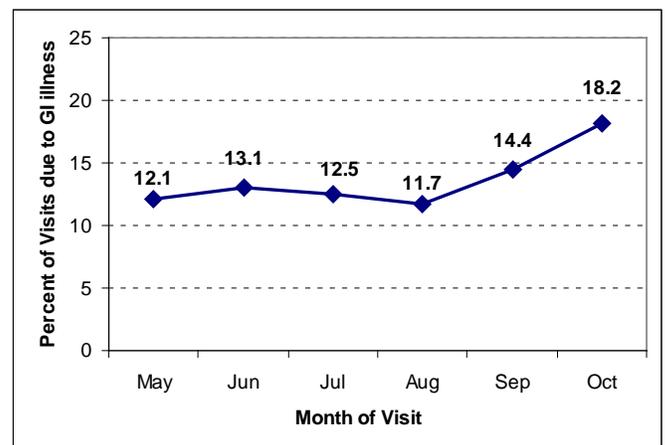
Epidemiologic curves for each individual outbreak suggested an ongoing person-to-person transmission mode. Of 13 ill persons with intensive interviews completed, more than half reported contact with an individual who had similar illnesses either at home, or at school, which also suggested a person-to-person transmission. The WCHD's real-time syndromic surveillance system indicates that the proportion of local emergency department (ED) and urgent care (UC) visits due to AGE complaints increased in September and October (Figure 1) among the population aged 0-12 years. The source of infection has not been determined.

Laboratory Results

A total of 27 stool specimens were collected and tested from ill students, ill staff members, or ill household contacts. The specimens were tested for norovirus (NoV), rotavirus, routine enteric bacterial pathogens (*Salmonella*, *Shigella*, *Shiga-toxin producing E. Coli*, *Campylobacter*, *Aeromonas*, *Plesiomonas*, *Yersinia enterocolitica*, *Staphylococcus aureus*) at the Nevada State Public Health Laboratory. Fifteen (15) of 27 specimens were sent to the Centers for Disease Control and Prevention (CDC) for Sapovirus (SaV) testing. Stool cultures were routinely screened for enteric bacterial pathogens and real-time reverse-transcription polymerase chain reaction (RT-PCR) were used for NoV and SaV testing.

As of November 2, norovirus GI genogroup (NoV GI) was detected in two specimens, norovirus GII genogroup (NoV GII) in three specimens, and SaV in two specimens. Results for the remaining 12 of 27 specimens are still pending at CDC.

Figure 1. Proportion (%) of Emergency Department and Urgent Care Visits due to Acute Gastroenteritis (AGE) Complaints, Washoe County, May-October, 2012



(Source: EpiCenter, WCHD's syndromic surveillance system)

NOROVIRUS & SAPOVIRUS

Noroviruses (NoV) are named after the original strain "Norwalk virus," which caused an outbreak of gastroenteritis in a school in Norwalk, Ohio, in 1968. NoV are highly heterogeneous and can be

genetically divided into 5 different genogroups (GI-GV), with human strains classified in genogroups GI, GII, and GIV, and at least 25 genotypes. Since 2001, the genotype GII.4 viruses have been associated with the majority of viral gastroenteritis outbreaks worldwide¹. Of 12 AGE outbreaks involving 339 ill individuals that were reported in Washoe County in 2010, nine (9) were laboratory confirmed as NoV. Reported outbreak settings include extended care facilities, child care facilities, an acute care hospital, a workplace, and restaurants. One outbreak might have been foodborne; the remaining 11 outbreaks were most likely transmitted person-to-person.

NoV is extremely contagious, with an estimated infectious dose as low as 18 viral particle, suggesting that approximately 5 billion infectious doses might be contained in each gram of feces during peak shedding¹. Given the genetic variability of NoV, individuals are likely to be repeatedly infected throughout their lifetime. Reverse transcriptase polymerase chain reaction (RT-PCR) can be used to identify the organism in the stool. This test is available at commercial laboratories (LabCorp, Quest) and the Nevada State Public Health Laboratory (NSPHL).

This was the first time that the WCHD identified SaV as one of causative agents in an AGE outbreak. One positive SaV specimen was from a student in elementary school A. The other positive SaV specimen was from a household contact of the first case, but who attended a different school. Both students were in the 11-13 year-old age group. The first symptom for these two ill students was vomiting and abdominal cramps, respectively. The symptoms for both students were nausea, abdominal cramping, vomiting, and diarrhea. The duration of illness was nine hours and three days, respectively. Neither of them sought medical care.

SaV is a member of the viral family *Caliciviridae* and is known as one of the major causative agents of viral gastroenteritis affecting both children and adults². SaV can be divided into at least five genogroups, GI-GV, of which the GI, GII, GIV, and GV strains infect humans. Since 1997, the first time SaV was detected as the cause of an outbreak of AGE was in Sapporo, Japan. It has been primarily known as a common cause of viral gastroenteritis in infants and young children. However, in recent years, SaV has increasingly been identified as a cause of outbreaks of nonbacterial gastro-enteritis in various epidemiological settings including a

kindergarten, an elementary school, a junior high school, a college, and a senior residence, etc.² However, because SaV is not included in routine diagnostics testing, it has not been indentified in AGE outbreaks locally. A recent study³ conducted by the State of Minnesota and Oregon found that 21 (23%) of 93 norovirus-negative outbreaks were caused by SaV. Of 21 SaV outbreaks, 10% were in elementary schools. Three of 21 SaV outbreaks were suspected to be foodborne based on settings but no food items were identified. Another recently published study² reported the largest foodborne SaV outbreak was in Japan in 2010. The outbreak was associated with catered box lunches prepared by one catering company.

A recent US study³ concludes that SaV and NoV outbreaks are clinically and epidemiologically similar enough to be indistinguishable without laboratory testing. Transmission mode is primarily from person-to-person or from contaminated environmental surface to person.

RECOMMENDATIONS

Because of this community-wide outbreak caused by newly identified SaV and NoV GI and GII, the high transmissibility of these viruses, and a low immunity in young children, the transmission is still ongoing. WCHD recommends that ill persons stay home for 72 hours after their last symptom (i.e., vomiting or diarrhea) resolves. WCHD is also recommending 24 hour exclusion for students who initially present with stomach ache or nausea, these can return to the classroom after being symptom free for 24 hours unless vomiting or diarrhea developes.

Because of this community-wide outbreak, health care providers (HCP) should encourage their patients who work in sensitive occupations (food handlers, health care workers, child care providers, etc.) to stay home from work for 72 hours after their symptoms resolve. Pediatricians are encouraged to provide education on good hand washing for their patients.

REFERENCES

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