

The Fellowship of the Wellspring: A District's Epic Tale of Multiple Norovirus Outbreaks

Presenter: Jonathan Falk, MPH, District Epidemiologist, Central Shenandoah Health District

Background: On October 14, 2016, the Central Shenandoah Health District (CSHD) received a call regarding cases of nausea, vomiting, and diarrhea associated with an event held at a local venue that previous weekend. By December 7, 2016, five outbreaks were reported from this local venue with the last outbreak occurring on December 3, 2016. The venue is a rustic site that has become a popular destination for celebrating special events.

Methods: CSHD conducted an epidemiologic, environmental health, and laboratory investigation to assess hypotheses of potential foodborne, waterborne, environmental, and person-to-person transmission. A proportion of attendees from only three of the five events could be interviewed. A case-control study was performed for each of these three outbreaks and data were analyzed using Epi Info 7™. RT-PCR testing was performed on raw stool specimen submissions by the Division of Consolidated Laboratory Services (DCLS) in Richmond, Virginia. Environmental health staff performed a site visit, and reviewed each caterer's menu and temperature logs to identify potential food safety risks. Water samples were collected at the well head and inside the venue to determine water quality of the private well serving the venue.

Results: The case-control study revealed water as a common risk factor between all three outbreaks in which a study was conducted. For the October 8 event, water had an odds ratio of 2.7 (confidence interval (CI)=1.02-30.33, $p=.08$). For the November 12 event, water had an odds ratio of 21.8 (CI=4.4-108.6, $p<.001$). For the December 3 event, water had an odds ratio of 35.6 (CI=8.2-119.9, $p<.001$). One specimen from each of the events held November 5, November 12, and December 3 was positive by RT-PCR for norovirus G1. Whole genome sequencing was performed on the specimens collected November 12 and December 3. Both specimens were identified to be norovirus G1.3B and were genetically indistinguishable. Initial results shared with the health department on December 5 indicated the presence of total coliform and *E. coli* in the well water. Additional testing through the DCLS confirmed the presence of total coliform and *E. coli* in the well water samples collected December 8 from the well head.

Conclusions: The venue installed ultraviolet light and chlorine disinfection systems on December 7 and December 9, respectively. The venue was also brought under the regulation of the VDH Office of Drinking Water and routine testing of their water supply will be performed annually. No further outbreaks have been reported following the installation of the disinfection system. In recent years, there has been a growing trend of repurposing rustic buildings into sites for wedding receptions and other events. These venues may not directly fall under regulatory authority depending on the size and frequency of the events they host. The outbreaks described above highlight the important role of adequate septic systems, safe water, and safe food preparation at venues that may serve hundreds or thousands of people a year. A critical review should be given to policies to determine if these types of venues should be included under state or local regulations.