

Investigation of a Norovirus Outbreak at a Connecticut University, 2018

On April 20, 2018, the Connecticut Department of Public Health (DPH) was notified by university officials of a possible gastrointestinal (GI) outbreak at one or both of their campus locations - Campus A and B. Illnesses were first reported among members of sports teams practicing on Campus A. To determine the cause and extent of illness, staff of the DPH conducted a case-control study among the university community, environmental assessments of food-service venues, and testing of stool from students and food workers. This report summarizes the findings of the investigation.

Epidemiology Investigation

To collect preliminary information about the outbreak, staff of the DPH Epidemiology and Emerging Infections Program (EEIP) conducted telephone interviews with 20 ill students on April 23-24, using a standardized survey that included questions about symptoms, onset of illness, and places of food consumption on campus. Answers supplied during these interviews indicated that symptoms and onsets of illness were consistent with a norovirus infection, illness onset was tightly clustered on April 19-20, and ill students primarily consumed foods from Campus A. By April 24, over 100 students had reported GI illness to the university health service. To further characterize the outbreak, a second standardized online questionnaire that included questions about illness, specific meals and foods consumed, and campus dining locations was developed. University officials were requested to distribute the survey link to university students, faculty, and staff (5,490 students and 1,026 faculty and staff).

A case was defined as illness consisting of vomiting and/or diarrhea (> 3 stools in 24 hour period) in a university student, faculty or staff member during April 4 – May 2, 2018. A total of

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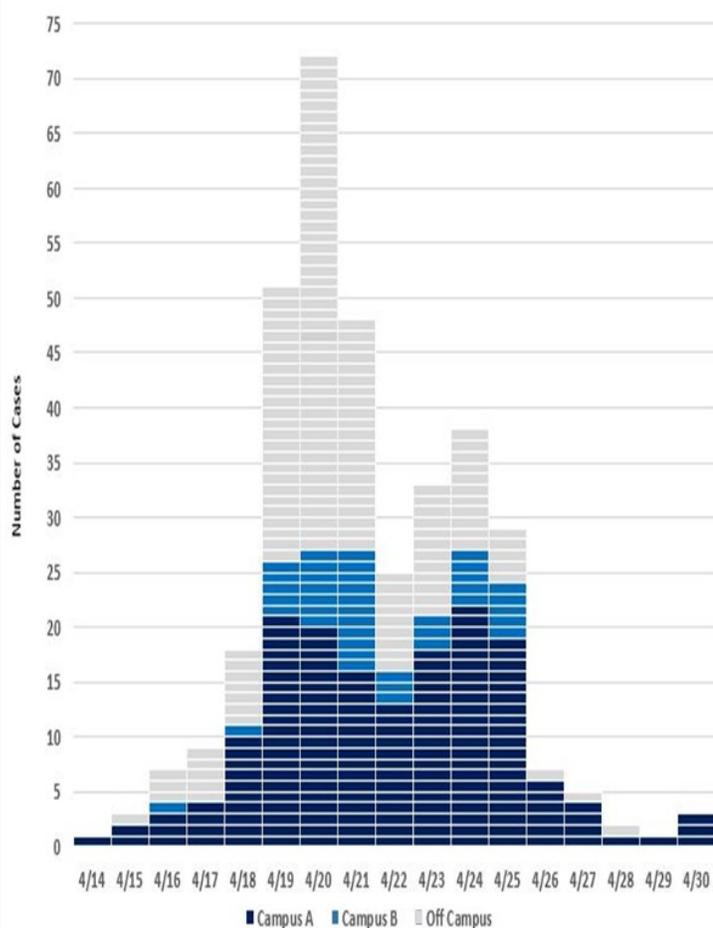
1,743 (27%) students, faculty and staff responded to the online survey. Of those, 377 (22%) reported illness consistent with the case definition, of which 51% of case-patients lived on campus; 77% on Campus A. Of those meeting the case definition, the median age was 20 years (range 18-63 years); 68% were female, 279 (74%) ate at a university dining hall. Onset of illness ranged from April 14 – April 30, 2018 (Figure, page 18). The median duration of illness was 3 days (range 1-14 days). Of the 377 case-patients, 326 (86%) reported nausea and diarrhea, 282 (75%) cramps, 267 (71%) vomiting, 262 (69%) muscle aches, 240 (64%) chills, and 133 (35%) fever. Twenty-three (6%) reported being hospitalized and no deaths were reported; 127 (34%) sought medical attention.

For the purpose of analyzing food exposures, and to exclude cases likely due to secondary transmission, analysis of survey responses was limited to 174 cases with onset of illness during April 19-21, 2018. Univariate analysis indicated that illness was statistically associated with eating food on Campus A and eating food from the sandwich or Mexican station in the main cafeteria. More specifically, illness was statistically associated with consumption of either a chicken or turkey sandwich or wrap from the sandwich station or any burrito from the Mexican station. Analysis of specific food item ingredients further indicated that eating lettuce and/or tomatoes from either the sandwich or Mexican station was statistically associated with illness (Table, page 18).

Laboratory Investigation

Seven stool samples from university students visiting the local hospital ED during April 20-22, 2018 tested positive for norovirus using a PCR

Figure. Number of Cases of GI Illness by Onset date and Place of Residence, Connecticut 2018



multiplex assay for enteric pathogens at the hospital laboratory. These stool samples were referred to the DPH State Public Health Laboratory (SPHL) for confirmation. Twenty additional food worker stool samples were tested at the DPH SPHL. All 7 student and 8 (40%) food worker samples tested positive for norovirus Genotype II (NoV GII). Eight (4 students, 4 food workers) NoV GII positive samples were forwarded to the New York State Wadsworth Laboratory for sequencing; 7 yielded sequence strain GII.P22-GII.5.

Environmental Investigation

The local health department (LHD) and the DPH Food Protection Program (FPP) conducted the environmental investigation. On April 20, the LHD instituted immediate control measures for dining service management including: assessing and excluding food workers with GI symptoms, discarding food prepared by ill food workers, eliminating self-service/salad bar areas, re-enforcing hand washing practices, and ensuring proper use of gloves. Dining service management was advised to use an EPA-registered product effective against norovirus in both dining service cafeterias.

Due to a large municipal water main break on April 23-24, and the subsequent public health

Table. Case control study results for statistically significant exposures at a Connecticut University, April 16-19, 2018.

Exposures	Odds Ratio	95% Confidence Interval	P-value
Campus A Main Cafeteria Specific Food Venues			
Sandwich Station	12.39	7.95-19.30	<0.0001
Mexican Station	5.90	3.67-9.51	<0.0001
Specific Foods			
Turkey wrap/ sandwich from Sandwich Station	14.75	6.16-35.35	<0.0001
Chicken wrap/ sandwich from Sandwich Station	10.68	6.33-18.01	<0.0001
Lettuce from Sandwich Station	20.85	12.98-33.50	<0.0001
Tomatoes from Sandwich Station	12.63	6.45-24.74	<0.0001
Burrito from Mexican Station	10.95	5.89-20.36	<0.0001
Lettuce from Mexican Station	13.32	8.42-21.09	<0.0001
Tomatoes from Mexican Station	7.86	4.57-13.52	<0.0001

response, the DPH FPP assumed responsibility for the remainder of the environmental investigation. Of the 43 (48%) food workers interviewed (most from Campus A), 14 (33%) reported vomiting and/or diarrhea at time of interview and were excluded from working at their respective food service establishment (10 worked on Campus A); all reported onsets consistent with student illnesses (4/19-4/23); and none reported GI illness in the 4 weeks before the outbreak. Duties included: cashier/food prep; grill cook; baker; prep/cook

(burritos, sub sandwiches, salad/veggies); and supervisors. Dining service management had a sick worker policy and paid time-off but was not aware that they should be asking about diarrheal illness and excluding ill food worker(s) for 72 hrs. after diarrhea symptoms resolved. In addition, dining service staff were observed using a quaternary ammonium sanitizer for cleaning both food contact and high-touch surfaces in Cafeteria A. This type of cleaning agent, although routinely used for day-to-day sanitizing in food service settings, is not effective against norovirus. The environmental investigation identified several factors that may have contributed to the outbreak including improper glove use, lack of hand washing, an inadequate ill food worker reporting policy, and lack of, or delay in proper sanitization with cleaning products effective against norovirus.

Control Measures

University-wide control measures were implemented to help limit further spread of infection including: increasing cleaning of high touch surfaces in common areas, dorms, and food service facilities with products effective against norovirus; providing housing/residential life staff with assistance for cleaning after vomiting incidents; and communicating prevention measures to the university community.

Reported By

T. Rabatsky-Ehr MS MPH, P. Gacek MPH, Q. Phan, MPH, Epidemiology and Emerging Infections Program; E. Milardo, RS, BS, Food Protection Program; C. Nishimura MPH, Diane Noel, BS, MT, State Public Health Laboratory, Connecticut Department of Public Health and Local Health Department staff.

Editorial

Norovirus causes an estimated 19-21 million illnesses of gastroenteritis and 400,000 emergency department visits in the United States annually (1,2). Norovirus can spread via multiple modes of transmission during a single outbreak including through contaminated food, environments, and by person-to-person contact (1, 2, 3). Given the low infectious dose, and high concentration of norovirus in the stool and vomit of an acutely ill individual, even a limited contamination event can result in substantial outbreaks. Ready-to-eat foods that require

handling but no subsequent cooking, such as sandwiches, wraps, burritos and raw produce or salads, pose greater risk.

Epidemiologic, environmental, and laboratory evidence suggest that a large NoV GII outbreak occurred among students, faculty, and staff at a university in Connecticut during April 2018. The majority of initial cases likely occurred through foodborne transmission as eating foods including sandwiches or burritos from the Campus A cafeteria on April 19-20 was significantly associated with illnesses. It is unclear how food initially became contaminated, although it is possible ill food workers or contaminated kitchen and cafeteria environments continued to be a source. Person-to-person contact and exposure to contaminated university environments also likely played a role in further propagating the outbreak.

This outbreak reinforces the importance of cleaning food service establishments, classrooms, and dorms with an EPA Registered Product effective for norovirus (4) in a timely manner. Having written procedures and designated personnel for cleaning up vomit (i.e. a Vomit Response Team) where people congregate, such as food service establishments, dining halls, restrooms, and classrooms, may be beneficial in reducing person-to-person transmission. Consistent messaging of control measures to students, faculty, and staff will also help reduce person-to-person transmission. Environmental contamination and ill food workers contributed to this outbreak, highlighting the importance of appropriate environmental cleaning and ill food worker policies for prevention of norovirus outbreaks at universities.

References

1. Hall AJ, Lopman BA, Payne DC, et al. [Norovirus disease in the United States](#). *Emerging Infect Dis*. 2013;19(8):1198–205.
2. Wikswa ME, et al. [Outbreaks of acute gastroenteritis transmitted by person-to-person contact, environmental contamination, and unknown modes of transmission — United States, 2009–2013](#). *MMWR Surveillance Summaries* 2015; 64 (SS12): 1-16.
3. Centers for Disease Control and Prevention (CDC). *Norovirus U.S. Trends and Outbreaks*. <http://www.cdc.gov/norovirus/trends-outbreaks.html>. Accessed July 30, 2018
4. List G: EPA's Registered Antimicrobial Products Effective Against Norovirus. <https://www.epa.gov/pesticide-registration/list-g-epas-registered-antimicrobial-products-effective-against-norovirus>

Influenza Surveillance, 2018 - 2019 Season

Influenza Testing Procedures

The Connecticut Department of Public Health (DPH) provides influenza testing at the Katherine A. Kelley State Public Health Laboratory (SPHL). Health care providers are encouraged to submit respiratory specimens obtained from patients who present with influenza-like illness (ILI) (fever $\geq 100^{\circ}\text{F}$ [37.8°C] AND cough and/or sore throat), regardless of rapid flu testing status. Influenza testing is provided at no cost for patients with ILI in one of the following categories: hospitalized patients; selected outpatients including selected patients of ILI network (ILINet) providers, patients associated with facility outbreaks, or children with severe respiratory illness with or without fever; patients with recent close exposure to swine, sick poultry, or migratory birds; patients with pneumonia or Acute Respiratory Distress Syndrome and recent travel to Southeast Asia or Arabian Peninsula.

Contact the Epidemiology and Emerging Infections Program at 860-509-7994 to discuss testing for influenza and other testing such as a respiratory viral panel or Middle East Respiratory Syndrome Coronavirus. For questions or assistance regarding collection and handling of specimens, please call the SPHL Virology Laboratory at 860-920-6662. Influenza PCR specimen collection kits can be ordered by calling Support Services at 860-920-6674 or 860-920-6675.

More detailed information about criteria for testing and submission of specimens can be found on the [DPH website](#).

Summary of Instructions for Hospitals

Influenza-associated deaths and influenza-associated hospitalizations are reportable to the DPH. This information is shared by DPH with the

relevant local health departments using the Connecticut Electronic Disease Surveillance System (CTEDSS).

All possible influenza-associated deaths must be reported within 12 hours even if influenza was not the primary cause of death. Submit respiratory specimens to the SPHL for post-mortem PCR testing.

All influenza-associated hospitalizations must be reported within 12 hours of the day of recognition or strong suspicion of possible influenza infection. Respiratory specimens from all influenza-associated hospitalizations should be submitted to the SPHL for PCR testing.

Reporting is available through the web-based [CTEDSS](#) and we encourage you to use this option to help speed dissemination of information. Reporting is also done by faxing the completed Hospitalized and Fatal Cases of Influenza case report form, which is available on the [DPH Forms](#) web page, to the DPH Epidemiology and Emerging Infections Program at 860-509-7910. For after hours or holiday reporting, report on the next normal business day

The Emerging Infections Program at the Yale School of Public Health conducts enhanced surveillance activities for residents of Middlesex and New Haven Counties on behalf of the DPH. Staff may request supplemental information on these patients.

More detailed information about reporting of influenza associated hospitalizations or deaths can be found on the [DPH website](#).

**For Public Health Emergencies
After 4:30 P.M, on Weekends
or Holidays, call the
Department of Public Health at
860-509-8000**

<p>Raul Pino, MD, MPH Commissioner of Public Health</p> <p>Matthew L. Cartter, MD, MPH State Epidemiologist</p> <p>Lynn Sosa, MD Deputy State Epidemiologist</p>	<p>Telecommunications Relay Service 7-1-1</p> <p>Epidemiology and Emerging Infections 860-509-7995 Healthcare Associated Infections 860-509-7995 HIV & Viral Hepatitis 860-509-7900 Immunizations 860-509-7929 Sexually Transmitted Diseases (STD) 860-509-7920 Tuberculosis Control 860-509-7722</p>	<p>Connecticut Epidemiologist</p> <p>Editor: Matthew L. Cartter, MD, MPH</p> <p>Assistant Editor & Producer: Starr-Hope Ertel</p>
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