

Norovirus Outbreaks

rev March 2021

Norovirus is the most common cause of viral gastrointestinal illness and is sometimes referred to as the 'stomach flu'. Outbreaks of norovirus are common as viral particles are readily transmitted person-to-person due to a low infectious dose required to cause illness. Outbreaks can happen anytime, but they occur most often from November to April. While sporadic cases are not reportable, norovirus outbreaks are reported to DSHS and to the CDC.

BASIC EPIDEMIOLOGY

Infectious Agent

Noroviruses are small, structured RNA viruses that belong to the Caliciviridae family. There are six genogroups (G) of norovirus, of which GI, GII, and GIV infect humans. Due to its genetic diversity, infection with one genogroup does not provide immunity against any other norovirus genogroup. GII norovirus strains account for the majority of norovirus outbreaks in long-term care facilities, and the GII.4 Sydney strain has been predominant in recent years.

Transmission

Transmission occurs primarily through the fecal-oral route, either through direct person-to-person contact or indirectly via contaminated food or water. Norovirus is also spread through aerosols or vomitus and contaminated surfaces and objects.

Incubation Period

Norovirus symptoms typically present 12–48 hours after exposure to the virus.

Communicability

Norovirus is most communicable during the acute stage of disease, but the virus may be shed in stool for 2-3 weeks after symptom resolution.

Clinical Illness

Infected people usually have an acute onset of vomiting with non-bloody diarrhea. Other symptoms include abdominal cramps, nausea, and sometimes a low-grade fever. Norovirus illness is generally self-limited and full recovery can be expected in 1-3 days for most patients, and 4-6 days in the very young, elderly, and hospitalized. Additional symptoms include: nausea, low-grade fever, abdominal cramps, and malaise. Deaths can occur, especially in the elderly in long-term care facilities.

DEFINITIONS

Outbreak Definition

An outbreak is defined as two or more cases with symptoms clustered in time and space.

Laboratory Criteria for Diagnosis

- Polymerase chain reaction (PCR) can be used to test stool and emesis samples, as well as environmental swabs in special studies. (Identification of norovirus can best be made from stool specimens taken within 48 to 72 hours after onset of symptoms. Virus can sometimes be found in stool samples taken as late as 2 weeks after recovery.), **OR**
- Detection of norovirus by direct and immune electron microscopy of fecal specimens, **OR**
- Fourfold increase of norovirus antibodies in acute- and convalescent-phase blood samples

Note: The etiology of GI outbreaks should be confirmed by submitting specimens to the DSHS Laboratory. Sequencing of norovirus strains found in clinical and environmental samples has greatly helped in conducting epidemiologic investigations.

Case Classification

- **Confirmed:**
 - A clinically compatible case that is laboratory confirmed
- **Probable:** Norovirus can be established as the probable cause of an outbreak if:
 - The mean (or median) illness duration is 12 to 60 hours, **AND**
 - The mean (or median) incubation period is 24 to 48 hours, **AND**
 - More than 50% of people have vomiting, **AND**
 - No bacterial or parasitic agent is found.

OUTBREAK INVESTIGATION

Outbreak Investigation

Suspect norovirus outbreaks should be investigated in order to determine the agent, characterize the scope, and prevent additional cases.

Outbreak Investigation Checklist

- Prepare a linelist of all cases. Minimal information needed for the line list might include patient name or other identifier; age and sex; category or group (e.g., patient, preschooler, resident, staff, or student), room number, if applicable; onset of symptoms (date & time), signs & symptoms, duration of illness; lab specimen collected, lab results; treatments and outcome of case; and foods eaten or other risky exposures leading up to illness reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Category	Room #	Onset	Symptoms	Hospitalized	Lab specimen
1	NT	34	F	resident	4c	2/4/16	Bl. D, F	Yes	stool
2	PR	2	M	staff	Wing A	1/30/16	V, D, F	None	none

- Systematically collect information from cases to characterize the outbreak.
 - Interview ill persons (as many as possible).
 - Use a questionnaire based on the Hypothesis Generating Questionnaire <https://www.dshs.texas.gov/idcu/investigation.aspx> that includes information specific to the outbreak, such as a calendar and building floor plans.
- Characterize the outbreak: Compile all of the available information on all cases in the outbreak. See Characterize the Outbreak below.
- Arrange for appropriate laboratory testing.
 - Attempt to collect stool specimens from at least 3, but not more than 12, ill persons. Coordinate specimen submission and testing with EAIDU and DSHS or local laboratory. See Laboratory Procedures.
 - Ensure that specimens negative for norovirus are tested for bacterial pathogens.
- Conduct environmental field investigation, if indicated.
 - Facility assessment:
 - Collect information on facility operations.
 - Identify and correct items that may have contributed to the outbreak.
 - Obtain names and contact information of those present at facility during outbreak timeframe, e.g., employees, food workers, customers, residents, students, etc.
- Implement facility control measures. See Control Measures Section.
- Communicate regularly with all parties involved in outbreak investigation
 - Provide Situation Reports through email.
 - Hold conference calls to discuss the outbreak investigation.
- Monitor the outbreak until the last case has been symptom free for 48 hours
- Report findings at conclusion of investigation:
 - Create Outbreak Summary Report.
 - Enter outbreak into **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Characterize the outbreak

- Provide descriptive information, in narrative, tabular, and graphic form, for the outbreak:
 - Calculate or estimate the number of persons at risk.
 - Calculate or estimate the number of ill persons.
 - Calculate or estimate the attack rate.
 - Calculate or estimate the mean, median, and range for the illness incubation period.
 - Calculate the number and frequency of symptoms expressed by ill persons.
 - Calculate the number and percentage of ill persons who sought medical care.
 - Calculate the number and percentage of ill persons hospitalized overnight.
 - Calculate the number and percentage of ill persons who died.
 - Calculate the percentage of total cases in the age groups <1y, 1-4y, 5-19y, 20-24y, ≥50y.
 - Calculate the gender distribution of illness (% female, % male).
 - Document the number of persons who provided stool specimens and the number of these that tested positive for norovirus.
 - Document the strain of norovirus, if determined.
- Characterize the outbreak setting:
 - Document any ill health care, food, or other workers at the facility or other setting.
 - Document the percentage of ill staff who had illness onset >24 hours before residents/others.

- Document any suspected source of the outbreak (*Note:* More than one suspect source can be entered into the National Outbreak Reporting System or NORS).
- Document characteristics of the setting that might have contributed to the outbreak (crowding, construction, water issues, recent movement of people into setting, etc.).
- Document any food or environmental specimens that tested positive for noroviruses and the viral strain identified, if known.
- Characterize the time frame of the outbreak.
- Document the illness onset dates for the first and last ill persons in the outbreak, and the peak date of illness.
- Prepare an epi-curve for the outbreak.

Exclusions

School/child-care: No exclusion specified for norovirus but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications

Food Employees: Symptomatic food employees infected with Norovirus are to be excluded from work. Asymptomatic food employees diagnosed with an infection from Norovirus are to be excluded from working in a food establishment serving a highly susceptible population or restricted if they do not serve a highly susceptible population.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from Norovirus, OR
- More than 48 hours have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications), OR
- The food employee did not develop symptoms and more 48 hours have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

CONTROL MEASURES

Control measures should be implemented as soon as a potential outbreak is recognized. Specific recommendations for the prevention of additional cases should be based on the findings of the epidemiologic investigation.

General Control Measures include:

- **Hand hygiene**
 - Hands should be washed with warm water and soap for 15-20 seconds, especially:
 - Before preparing, handling or eating any food.
 - After going to the bathroom.
 - After changing a diaper.
 - After caring for someone with diarrhea.
 - No bare-hand contact with ready-to-eat foods is also helpful.
 - Alcohol-based and other sanitizers are of questionable efficacy and should not be a substitute for hand washing when soap and water are available.
- **Environmental Disinfection**
 - If the facility does not have an Environmental Protection Agency-registered commercial virucide, use bleach. The CDC recommends the use of a chlorine bleach solution with a concentration of 1000–5000 ppm (5–25 tablespoons of household bleach (5.25%) per gallon of water) on all surfaces. Leave the surface wet for ≥5 minutes or follow the directions on the commercial cleaner to allow sufficient time for the bleach to kill the pathogen.
 - Bathrooms and “high-touch” surfaces (door knobs, hand rails, etc.) should be targeted.
 - Refer to bleach cleaning recommendations: <https://waterandhealth.org/disinfect-for-health/> and <https://waterandhealth.org/disinfect/flu-and-health/tools-reduce-spread-norovirus/>
- **Exclusion and Isolation**
 - Recommend segregation of ill persons, perhaps also with exposed persons, if appropriate.
 - Recommend restriction of movement and visitors, if a group setting and if appropriate.
 - Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care until they are free from symptoms for at least 24-48 hours without the use of symptom suppressing medications.

For more information on norovirus prevention, please see:

<http://www.cdc.gov/norovirus/preventing-infection.html>

Recommended Control Measures for Schools and Child-Care Centers:

- **Hand Washing**
 - Encourage children and adults to wash their hands frequently, especially before handling or preparing foods and after wiping noses, diapering, using toilets, or handling animals.
 - Wash hands with soap and water long enough to sing the “Happy Birthday” song twice.
 - Sinks, soap, and disposable towels should be easy for children to use.
 - If soap and water are not available, clean hands with gels or wipes with alcohol in them.

Diapering

- Keep diapering areas near hand washing areas.
- Keep diapering and food preparation areas physically separate. Keep both areas clean, uncluttered, and dry.
- The same staff member should not change diapers and prepare food.
- Cover diapering surfaces with intact (not cracked or torn) plastic pads.
- If the diapering surface cannot be easily cleaned after each use, use a disposable material such as paper on the changing area and discard the paper after each diaper change.
- Sanitize the diapering surface after each use and at the end of the day.
- Wash hands with soap and water or clean with alcohol-based hand cleaner after diapering.
- **Environmental Surfaces and Personal Items**
 - Regularly clean and sanitize all food service utensils, toys, and other items used by children.
 - Discourage the use of stuffed toys or other toys that cannot be easily sanitized.
 - Discourage children and adults from sharing items such as combs, brushes, jackets, and hats.
 - Maintain a separate container to store clothing and other personal items.
 - Keep changes of clothing on hand and store soiled items in a nonabsorbent container that can be sanitized or discarded after use.
 - Provide a separate sleeping area and bedding for each child, and wash bedding frequently.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Cases or suspected cases of illness considered being **public health emergencies, outbreaks, exotic diseases**, and unusual group expressions of disease must be reported to the local health department or DSHS **immediately**. Other diseases for which there must be a quick public health response must be reported **within one working day**.

Local and Regional Reporting and Follow-up Responsibilities

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
 - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
 - The following should be reported to NORS:
 - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
 - Enter outbreaks into NORS online reporting system at <https://wwwn.cdc.gov/nors/login.aspx>
 - Forms, training materials, and other resources are available at <http://www.cdc.gov/nors/>
- To request a NORS account, please email **FoodborneTexas@dshs.texas.gov**
 - Please put in Subject Line: NORS User Account Request.
 - Information needed from requestor: name, email address, and agency name.
 - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Real time RT-PCR for norovirus is available at the DSHS laboratory for clinical specimen testing. Coordinate shipping, specimen submission, and testing of specimens with EAIDU and the DSHS laboratory staff. Specimens should not be submitted to the DSHS laboratory unless approved by EAIDU. Contact an EAIDU foodborne epidemiologist to discuss further.

CLINICAL SPECIMENS

Specimen Collection

- Only raw stool is accepted for norovirus testing.
- Transport temperature: 2-8°C (ice pack).
- Transport time: as soon as possible.

Submission Form

- Use the DSHS Laboratory G-2B form for specimen submission.
 - Select appropriate test:
 - Molecular Studies
 - Check “PCR” and “Norovirus”.
 - Check “Outbreak association” and write in name of outbreak, (bottom of Section 2).
 - Payor source
 - Check “IDEAS” to avoid bill for submitter.

Specimen Shipping

- Transport temperature: 2-8°C (ice pack)
- Transport time: as soon as possible.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday, state or federal holiday unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
 Texas Department of State Health Services
 Attn. Walter Douglass (512) 776-7569
 1100 West 49th Street
 Austin, TX 78756-3199

ENVIRONMENTAL AND FOOD SAMPLES

- Testing of food or other environmental specimens is generally NOT done for norovirus outbreaks, because appropriate laboratory protocols are not available.
 - Food testing is not routine, except for shellfish (by FDA).
 - Detection in water and other food items requires special protocols; if indicated, EAIDU will call CDC or FDA to discuss further.

UPDATES

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- Entire section updated