



Norovirus (Norwalk-like virus)

Disease Plan

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Last updated: February 16, 2016, by Laine McCullough

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ WHY IS NOROVIRUS IMPORTANT TO PUBLIC HEALTH?

Norovirus infection occurs worldwide and affects people of all ages. It is the most common cause of gastroenteritis in adults and children. About 1/5 cases of acute gastroenteritis is caused by Norovirus. Each year in the United States (U.S.), norovirus causes an estimated 19 to 21 million illnesses, 56,000 to 71,000 hospitalizations, and 570 to 800 deaths. Patients over the age of 65 years are at greatest risk for norovirus-associated death, and children younger than 5 years of age have the highest rates of norovirus-associated medical care visits. The virus is easily transmitted from person-to-person and outbreaks are common. Outbreaks often occur in group settings such as long term care facilities and daycare centers. In Utah, norovirus is only reportable in outbreak situations. Early detection and investigation of cases is crucial in identifying sources of outbreaks and preventing additional spread of illness.

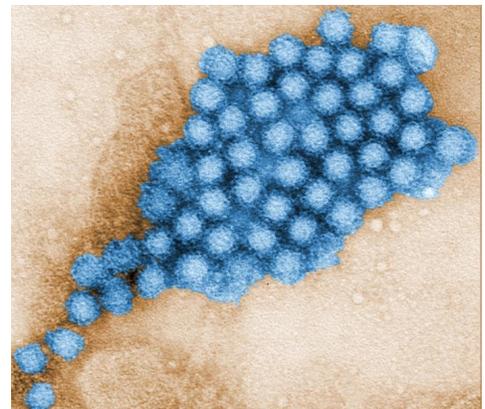
✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Norovirus infection typically presents with acute onset of nausea, vomiting, abdominal cramps, low-grade fever, and watery, non-bloody diarrhea. Acute diarrhea without vomiting may also occur, most notably in children. Other symptoms may include headache, malaise, chills, and muscle aches. Dehydration is the most common complication, especially among the young and elderly. Symptoms generally last 24–72 hours; usually followed by complete recovery. There is no evidence of long-term sequelae following infection in immunocompetent individuals, although post-gastroenteritis arthritis has been described following norovirus infection, as with gastroenteritis due to other agents. Serious infection has been observed in immunocompromised groups. Norovirus has been described as a cause of persistent diarrhea and weight loss among adult allogeneic hematopoietic stem cell transplant recipients.

Causative Agent

Norovirus is a non-enveloped, single-stranded RNA virus of the family *Caliciviridae*. It was originally termed “Norwalk-like virus” after the original strain, “Norwalk virus,” that caused an outbreak of gastroenteritis in Norwalk, Ohio in 1968. This virus is highly contagious and recognized as the most common cause of sporadic gastroenteritis across all age groups.



Transmission electron micrograph (TEM) of Norovirus (CDC Photo, 2015)

Differential Diagnosis

The differential diagnosis for norovirus includes other viral agents of gastroenteritis such as sapovirus, rotavirus, astrovirus, and enteric adenovirus.

Laboratory Identification

Most clinical virology laboratories use real-time reverse transcriptase-polymerase chain reaction (RT-PCR) for detection of viral RNA in stool. Other tests, including multiplex nucleic acid-based assay and enzyme immunoassay (EIA) tests, such as the BioFire FilmArray, have been cleared by the U.S. Food and Drug Administration (FDA) and are beginning to be more widely used.

Genotyping of noroviruses can be performed by Centers for Disease Control and Prevention (CDC) or the California Department of Public Health (CDPH) for Utah samples. While genotyping is not always useful in outbreak settings due to the delay in obtaining test results, it is important in identifying currently circulating strains and comparing strains occurring in Utah with strains in other states.

Utah Public Health Laboratory (UPHL): The Utah Public Health Laboratory (UPHL) can test stool samples for norovirus using the BioFire FilmArray. This test is available for outbreak cases only. Turn-around time is generally 1–2 business days, but in some cases results may be available the same day. Because norovirus is commonly found in stool, at least two (but preferably 5–10) specimens should be collected for norovirus testing in an outbreak investigation. Two positive samples are required to confirm a norovirus outbreak. When stools are submitted from suspected norovirus outbreaks, UPHL will start by testing two samples using the BioFire FilmArray. Additional samples will be tested, if necessary, to attempt to obtain two positive samples and confirm the outbreak. The samples will also be sent to the CDPH for genotyping. CDPH prefers at least four samples for valid results. Turn-around time for genotyping results is typically 1–2 weeks. All testing performed by UPHL and CDPH is free of charge to local health departments (LHDs) and patients, funding permitting. Please contact the Bureau of Epidemiology or UPHL *before* submitting specimens for norovirus testing to ensure that the proper forms are completed.

Treatment

Treatment is primarily supportive, including fluid and electrolyte replacement as needed for dehydration.

Case Fatality

Norovirus typically causes a self-limited disease and fatal illness is rare. However, illness among the elderly and immunocompromised patients may be severe enough to cause death.

Reservoir

Humans are the only known reservoir for norovirus.

Transmission

Primary transmission of norovirus is by person-to-person spread via the fecal-oral route, or through contaminated food, water, or environmental surfaces. Vomitus-oral transmission can also occur through aerosolization, followed by direct ingestion, or environmental contamination. Food is contaminated most often by infected food handlers, but also by using contaminated water during production. Secondary household transmission is also common.

Norovirus is highly contagious. The infectious dose is estimated to be as low as 18 viral particles, suggesting that approximately 5 billion infectious doses might be contained in each gram of feces during peak shedding.

Susceptibility

Persons of all ages are at risk for infection; however, adults over 65 years, young children less than five years, and immunocompromised patients are at elevated risk for severe disease and death. Immunity is complex and not fully understood, though it appears to be strain-specific and lasting only a few months. Therefore, given the genetic variability of noroviruses, individuals are likely to be repeatedly infected throughout their lifetimes.

Incubation Period

The incubation period for norovirus infection is usually between 24–48 hours, with a range of 10–72 hours.

Period of Communicability

Shedding typically begins with the onset of symptoms and can occur for up to four weeks following infection.

Epidemiology

Norovirus is the leading cause of acute gastroenteritis worldwide. It is estimated that norovirus causes 1/15 U.S. residents to become ill each year. Due to the success of the rotavirus vaccine, norovirus has surpassed rotavirus as the most common cause of acute gastroenteritis for pediatric patients.

Most foodborne outbreaks of norovirus illness are likely caused by contamination of food by a food handler immediately before consumption. Food items frequently associated with outbreaks include cold foods such as salads, sandwiches, and bakery products, as well as salad dressings

and cake icing. Some food items, like oysters and berries, may be contaminated prior to arriving at a store or restaurant due to prior contact with contaminated water.

✓ **PUBLIC HEALTH CONTROL MEASURES**

Public Health Responsibility

- Investigate all disease outbreaks.
- Complete the GI Cluster form for person-to-person outbreaks associated with institutional settings such as nursing homes or schools.
- Complete the National Outbreak Reporting System (NORS) form for suspected foodborne or other point-source outbreaks.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Provide cleaning guidelines to institutions experiencing outbreaks.
- Identify cases and sources to prevent further transmission.
- Identify clusters or outbreaks of this disease and determine the source.

Prevention

Personal Preventive Measures/Education

To avoid exposure and transmission, individuals should:

- Always wash their hands thoroughly with soap and warm water before eating or preparing food, after using the toilet, and after changing diapers.
- Wash their own hands, as well as the child's hands, after changing a child's diaper.
- Dispose of diapers in a closed-lid garbage can.
- Always wash their hands with plenty of soap and warm water if they are caring for someone who has vomited or has diarrhea, particularly after cleaning the bathroom, helping their person use the toilet, or changing diapers, soiled clothes, or soiled sheets. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom, after using the toilet or helping someone use the toilet, after changing diapers, before handling food, and before eating.

Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g. dental dam) may prevent the spread of norovirus to a case's sexual partners, and may prevent exposure to and transmission of other fecal-oral pathogens.

Chemoprophylaxis

None.

Vaccine

None.

Isolation and Quarantine Requirements

Isolation: Food handlers who are symptomatic or who test positive for norovirus should be excluded from food handling duties for at least 48 hours after the resolution of symptoms, or 48 hours after the date the positive specimen was provided, whichever occurs last. In suspected or confirmed norovirus outbreaks, food handlers may be required to provide stool specimens for testing.

NOTE: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider.

Hospital: Standard and contact precautions.

Quarantine: No restrictions.

NOTE: In certain circumstances, cases, ill contacts, and/or asymptomatic contacts who are food handlers may be required to have negative stool samples before returning to work. The LHD will decide which cases and/or contacts will need negative stool samples prior to returning to work.

✓ CASE INVESTIGATION

Reporting

All outbreaks of norovirus should be reported to public health. Individual cases are no longer reportable.

Case Definition

Norovirus

Clinical Description

A disease primarily consisting of vomiting, abdominal cramps, nausea and non-bloody diarrhea with an onset of symptoms 12–48 hours after exposure. This disease is self-limited and usually resolves completely within 48 hours.

Laboratory Criteria

Isolation of norovirus nucleic acid (via probe or amplification test) or antigen by EIA.

Case Classification

Confirmed: A case that meets the laboratory criteria.

Probable: A case that meets the clinical case definition and is a contact to a known case or cluster, but does not have laboratory confirmation.

NOTE: Case classification may vary in outbreak settings and should be determined by investigators based on outbreak findings.

Case Investigation Process

Food handlers should be excluded from food handling duties for at least 48 hours after the resolution of symptoms or 48 hours after the date the positive specimen was provided, whichever occurs last.

Outbreaks

CDC defines a foodborne outbreak as, "an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food." In the U.S., noroviruses are the most common cause of foodborne illnesses and outbreaks. The CDC estimates that at least 50% of all foodborne outbreaks of acute gastroenteritis are attributable to noroviruses.

Identify Case Contacts

Contacts of norovirus cases may include household contacts, daycare and school attendees and workers, and food handlers. These contacts may be identified through interview of the case-patient or physician notes. More information about management of case contacts are listed in the "Case Contact Management" section below.

Case Contact Management

Daycare Centers

Since norovirus may be transmitted from person-to-person through fecal-oral transmission, it is important to follow up on cases in a daycare setting carefully. General recommendations include:

- Children with norovirus who have diarrhea should be excluded until at least 48 hours after the resolution of symptoms.
- Children with norovirus who have no diarrhea and are not otherwise ill may be excluded or may remain in the program if special precautions are taken.
- Since most staff in childcare programs are considered food handlers, those infected with norovirus should be subject to the same exclusions as food handlers.

Schools

Since norovirus may be transmitted easily from person-to-person through fecal-oral transmission, it is important to follow up on cases in school settings carefully. General recommendations include:

- Students or staff with norovirus who have diarrhea should be excluded until symptoms resolve.

- Students or staff with norovirus who do not handle food, have no diarrhea or have mild diarrhea, and are not otherwise sick, may remain in school if special precautions are taken.
- Students or staff who handle food and have norovirus must not prepare food until at least 48 hours after the resolution of symptoms or 72 hours after the date a positive specimen was provided, whichever occurs last.

Community Residential Programs

Actions taken in response to a case of norovirus in a community residential program will depend on the type of program and the level of functioning of the residents. In long-term care facilities, residents with norovirus should be placed on standard (including enteric) precautions until at least 48 hours after the resolution of symptoms. Staff members who provide direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions. In addition, staff members with norovirus infection who are not food handlers should not work until their diarrhea is resolved.

In residential facilities for the developmentally disabled, staff and clients with norovirus must refrain from handling or preparing food for at least 48 hours after the resolution of symptoms, or 48 hours after the date the positive specimen was provided, whichever occurs last. In addition, staff members with norovirus infection who are not food handlers should consider not working until their diarrhea is resolved.

ACKNOWLEDGEMENTS

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✓ REFERENCES

Aron, H. J., Vinje, J., Lopman, B., Park, G. W., Yen, C., Gregoricus, N., & Parashar, U. (2011). Updated Norovirus Outbreak Management and Disease Prevention Guidelines. *Morbidity and Mortality Weekly Report*, 60(RR03), 1-15. Retrieved February 16, 2016.

Blacklow, N. (2016, February 4). Epidemiology and pathogenesis of viral gastroenteritis in adults. Retrieved February 16, 2016, from http://www.uptodate.com/contents/epidemiology-and-pathogenesis-of-viral-gastroenteritis-in-adults?source=search_result&search=norovirus&selectedTitle=2~41.

Centers for Disease Control and Prevention. (2015, March 18). Transmission electron micrograph (TEM) image of some of the ultrastructural morphology displayed by norovirus virions, or virus particles [Photograph]. Retrieved from <http://blogs.cdc.gov/publichealthmatters/2015/03/making-a-norovirus-vaccine-a-reality/>.

Norovirus and Other Human Calicivirus Infections. (2015). In L. Pickering (Ed.), *Red Book: 2015 Report of the Committee on Infectious Diseases* (30th ed.). Elk Grove Village, IL: American Academy of Pediatrics.

Massachusetts Department of Public Health, Bureau of Communicable Disease Control. (2006, June). Norovirus & Other Caliciviruses. Retrieved February 16, 2016.

Norovirus Infection. (2015). In D. Heymann (Ed.), *Control of communicable diseases manual* (20th ed.). Washington, DC: American Public Health Association.

Norovirus Worldwide. (2015, September 30). Retrieved February 16, 2016, from <http://www.cdc.gov/norovirus/worldwide.html>.

Overview. (2013, July 26). Retrieved February 16, 2016, from <http://www.cdc.gov/norovirus/about/overview.html>.

✓ VERSION CONTROL

Updated February 2016 – "Why is Norovirus Important to Public Health" section added. "Clinical Description" section reworded. "Laboratory Identification" section updated to include new test type and testing methods. "Treatment", "Transmission", and "Susceptibility" sections updated. "Public Health Responsibility" section updated. Exclusion recommendations for persons in sensitive occupations or daycare changed from 72 hours after resolution of symptoms to 48 hours. "Identify Case Contacts" section updated and separated from "Case Contact Management." "Acknowledgements," "Version Control," and "Minimum Data Set" sections added.

✓ UT-NEDSS Minimum/Required Fields by Tab

Demographic

- Last Name
- First Name
- State
- County
- Date of Birth
- Area Code
- Phone Number
- Birth Gender
- Ethnicity
- Race

Clinical

- Disease
- Onset Date
- Date Diagnosed
- Does case live or work in a long-term care facility, assisted living center, or other type of group home setting?
 - (if yes) Name of facility:
- Died
- Date of Death
- Diagnostic Facility

Laboratory

- Test Type
- Test Result
- Accession Number

Contacts

- Does case's infection appear secondary to another person's infection?
 - (if yes) Contact name:
- Any contacts ill with similar symptoms?

Epidemiological

- Food Handler
 - (if yes) What is the name of the facility where the patient handled food?
 - (if yes) Location:
- Healthcare worker
 - (if yes) What is the name of the healthcare facility?
 - (if yes) Location:
- Group Living
- Childcare Association
 - (if yes) What is the name of the childcare?
 - (if yes) Location:
- Occupation
- Attends school
 - (if yes) What is the name of the school?
 - (if yes) Location:
- Imported From
- Risk Factors
- Risk Factor Notes

Reporting

- Date first reported to public health

Investigation

- Date 72 hours before disease onset:
- Date 10 hours before disease onset:

Administrative

- State Case Status (completed by UDOH)
- Outbreak Associated
- Outbreak Name

*Individual cases of Norovirus are not reportable. However, for cases entered in to UT-NEDSS, these are the recommended minimum fields.