



# Norovirus (Norwalk-like virus)

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## Disease Plan

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**Last updated: February 8, 2021 by Delaney Moore.**

**Questions about this disease plan?**

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

## ✓ CRITICAL CLINICIAN INFORMATION

Clinical Evidence
Signs/Symptoms <ul style="list-style-type: none"><li>• Most common symptoms include nausea, vomiting, abdominal cramps, low-grade fever, and watery, non-bloody diarrhea.</li></ul>
Period of Communicability <ul style="list-style-type: none"><li>• Norovirus is communicable as long as the infected person sheds norovirus in their stool.</li><li>• Shedding typically begins with onset of symptoms and can occur for up to four weeks following infection.</li></ul>
Incubation Period <ul style="list-style-type: none"><li>• Range 10-72 hours, average 24-48 hours</li></ul>
Mode of Transmission <ul style="list-style-type: none"><li>• Primarily person-to-person via the fecal-oral route</li><li>• Vomitus-oral transmission can also occur through aerosolization and subsequent direct ingestion or environmental contamination.</li></ul>
Laboratory Testing
Type of Lab Test/Timing of Specimen Collection <ul style="list-style-type: none"><li>• RT-PCR and EIA are the most common tests.</li><li>• Genotyping can be performed by the Centers for Disease Control and Prevention (CDC) or the California Department of Public Health (CDPHE). Contact the Bureau of Epidemiology for more information.</li></ul>
Type of Specimens <ul style="list-style-type: none"><li>• Stool is the preferred specimen.</li></ul>
Treatment Recommendations
Type of Treatment <ul style="list-style-type: none"><li>• Supportive care</li></ul>
Prophylaxis <ul style="list-style-type: none"><li>• None</li></ul>
Contact Management
Isolation of Case <ul style="list-style-type: none"><li>• Food handlers with norovirus must be excluded from work until 48 hours after symptoms have resolved.<ul style="list-style-type: none"><li>• A food handler is any person directly preparing or handling food, including those involved in patient care or childcare.</li></ul></li></ul>
Quarantine of Contacts <ul style="list-style-type: none"><li>• None</li></ul>
Infection Control Procedures
<ul style="list-style-type: none"><li>• Standard and contact precautions</li></ul>

## ✓ 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 of 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 five 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 childcare 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.

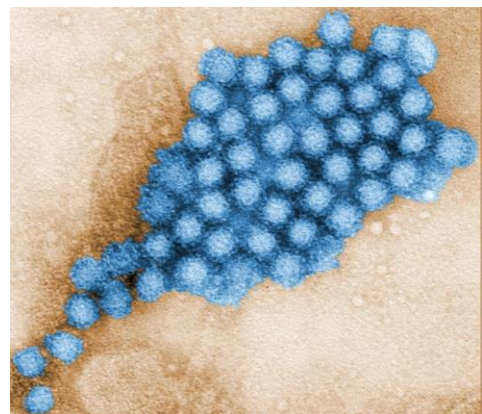
## ✓ DISEASE AND EPIDEMIOLOGY

### 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 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 of age, 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. 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**

Norovirus is communicable as long as the infected person sheds norovirus in their stool. 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 of 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.

Norovirus is transmissible through 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:** Utah Food Code requires that food handlers are restricted from work until one of the following three criteria are met:

1. The excluded or restricted food employee provides to the person in charge written medical documentation from a health practitioner stating that the food employee is free of a norovirus infection; or
2. The food employee was excluded or restricted after symptoms of vomiting or diarrhea resolved, and more than 48 hours have passed since the food employee became asymptomatic; or
3. The food employee was excluded or restricted and did not develop symptoms and more than 48 hours have passed since the food employee was diagnosed.

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

### **Norovirus Case Definition**

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. Control of person-to-person norovirus transmission requires special emphasis on personal cleanliness and sanitary disposal of feces.

## **Identifying Case Contacts**

Contacts of norovirus cases may include household contacts, childcare and school attendees and workers, and food handlers. These contacts may be identified through interview of the case-patient or physician notes.

## **Case Contact Management**

### **Childcare Centers**

Since norovirus may be transmitted from person-to-person through fecal-oral transmission, it is important to follow up on cases in a childcare 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 48 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

This document is a revision of the Utah Department of Health disease plan for norovirus. We would like to acknowledge the Massachusetts Department of Public Health for select content in this document.

## ✓ REFERENCES

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R392-100 Food Service Sanitation Rule, Effective Date: May 15, 2016.

## ✓ **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.

Updated February 2021: Added Critical Clinician Information and Electronic Laboratory Reporting Processing Rules sections. Updated all other sections.

## ✓ UT-NEDSS (EpiTrax) Minimum/Required Fields by Tab

### Demographic

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

### Clinical

- Disease
- Onset Date
- Date diagnosed
- Diagnostic facility
- Visit Type
  - (if inpatient) Did Norovirus cause hospitalization?
- Died
  - (if yes) Date of Death
  - (if yes) Did Norovirus cause death?

### Laboratory

- Lab Name
- Lab Test Date
- Collection Date
- Specimen Source
- Test Type
- Organism
- Test Result
- Accession Number

### Epidemiological

- Food Handler
  - Name of facility where patient handled food

- Location
- Did the patient work while ill?
- Important information including dates

- Healthcare Worker
  - Name of healthcare facility
  - Location
  - Did the patient work while ill?
  - Important information including dates
- Group Living
  - Name of the facility
  - Location
  - Did the patient work/attend while ill?
  - Important information including dates
- Childcare Association
  - Name of the childcare
  - Location
  - Did the patient work/attend while ill?
  - Important information including dates
- Imported From
- Risk Factors
- Risk Factor Notes

### Investigation

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

### Contacts

- Does case's infection appear secondary to another person's infection? (if YES, please fill out info in contact table)
- Any contacts ill with similar symptoms? (if YES, please fill out info in contact table)

### Reporting

- Date first reported to public health

### Administrative

- State Case Status
- Outbreak Associated
- Outbreak Name

\*Individual cases of norovirus are not reportable. However, for cases entered into EpiTrax/UT-NEDSS, these are the recommended minimum fields.



# ✓ ELECTRONIC LABORATORY REPORTING PROCESSING RULES

## Norovirus Rules for Entering Laboratory Test Results

The following rules describe how laboratory results reported to public health should be added to new or existing events in UT-NEDSS (EpiTrax). These rules have been developed for the automated processing of electronic laboratory reports, although they apply to manual data entry, as well.

### Test-Specific Rules

*Test specific rules describe what test type and test result combinations are allowed to create new morbidity events in UT-NEDSS (EpiTrax), and what test type and test result combinations are allowed to update existing events (morbidity or contact) in UT-NEDSS (EpiTrax).*

Test Type	Test Result	Create a New Event	Update an Existing Event
PCR/Amplification	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	No	Yes
	Other	No	Yes
EIA/ELISA	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	No	Yes
	Other	No	Yes

### Whitelist Rules

*Whitelist rules describe how long an existing event can have new laboratory data appended to it. If a laboratory result falls outside the whitelist rules for an existing event, it should not be added to that event, and should be evaluated to determine if a new event (CMR) should be created.*

**Norovirus Morbidity Whitelist Rule:** If the specimen collection date of the laboratory result is 30 days or less after the last positive specimen collection date of the morbidity event, the laboratory result should be added to the morbidity event.

**Norovirus Contact Whitelist Rule:** If the specimen collection date of the laboratory result is seven or less after the event date of the contact event, the laboratory result should be added to the contact event.

### Graylist Rule

*We often receive laboratory results through ELR that cannot create cases, but can be useful if a case is created in the future. These laboratory results go to the graylist. The graylist rule describes how long an existing event can have an old laboratory result appended to it.*

**Norovirus Graylist Rule:** If the specimen collection date of the laboratory result is 30 days before to seven days after the event date of the morbidity event, the laboratory result should be added to the morbidity event.

**Other Electronic Laboratory Processing Rules**

- If an existing event has a state case status of “not a case,” ELR will never add additional test results to that case. New labs will be evaluated to determine if a new CMR should be created.