# NOROVIRUS
# (Norwalk-like virus)

## ✓DISEASE AND EPIDEMIOLOGY

### Clinical Description:

Norovirus infection typically presents with an acute onset, and the symptoms generally include some combination of nausea, vomiting, abdominal cramps, discomfort, and watery, non-bloody diarrhea. Low-grade fever occasionally occurs, and vomiting is more common in children. Other symptoms can include headache, malaise, chills, and muscle aches. Dehydration is the most common complication, especially among the young and elderly. Symptoms generally last 24–48 hours, followed by complete recovery. There is no evidence of long-term sequelae following infection, although post-gastroenteritis arthritis has been described following norovirus infection, as with gastroenteritis due to other agents.

### 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.

### Differential Diagnosis:

The differential diagnosis includes other causes of viral gastroenteritis and bacterial food poisoning.

### Laboratory identification:

Norovirus is diagnosed using RT-PCR run on stool specimens. Positive results are best obtained within the first 3 days of illness. Sequencing of noroviruses found in clinical samples has helped in conducting epidemiologic investigations by linking cases to each other and differentiating outbreaks that were mistakenly connected.

> **USL:PH:** The Unified State Laboratories: Public Health performs norovirus RT-PCR.

### Treatment:

There is no specific treatment for norovirus infection.

### Case fatality:

Norovirus typically causes a self-limiting 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 of norovirus.

## Transmission:
Primary transmission of noroviruses is by person-to-person spread via the fecal-oral route or through contaminated food or water. Contaminated fomites can also potentially transmit norovirus and can cause infection. Evidence also exists for transmission of norovirus through aerosolization of vomitus that may then contaminate fomites or inadvertently enter the oral mucosa and be ingested.

## Susceptibility:
Immunity appears to be strain-specific and lasts only a few months. Therefore, given the genetic variability of noroviruses, individuals are likely to be repeatedly infected throughout their lifetimes. Recent evidence suggests that susceptibility to infection may be genetically determined, with people of O blood group being at greatest risk for severe disease.

## Incubation period:
The incubation period for norovirus infection is usually between 24–48 hours, but the range is from 10–72 hours.

## Period of communicability:
While some viral shedding may occur prior to the onset of symptoms, shedding typically begins with the onset of symptoms and can occur for several days after recovery. Noroviruses are highly contagious, and it is believed that a dose of as few as ten viral particles may be sufficient to cause infection.

## Epidemiology:
Norovirus has a worldwide distribution. In the U.S., noroviruses are believed to be one of the most common causes of foodborne illness. The Centers for Disease Control and Prevention (CDC) estimates that at least 50% of all foodborne outbreaks of acute gastroenteritis are attributable to noroviruses. 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 suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention
- Identify clusters or outbreaks of this disease and determine the source.
- Identify cases and sources to prevent further transmission.

## Prevention:

### Personal Preventive Measures/Education

To avoid exposure, persons 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 the 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 test positive for norovirus should be excluded from food handling duties for either 72 hours past the resolution of symptoms or 72 hours past the date the positive specimen was provided, whichever occurs last. In outbreak circumstances consistent with norovirus and affecting patrons or food handlers, food handling facility employees 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:** Enteric precautions.

**Quarantine:** No restrictions.

# ✓CASE INVESTIGATION

## Reporting:

All cases of norovirus should be reported to public health.

## Case definition:

**Clinical Description:**

A disease primarily consisting of vomiting, abdominal cramps, nausea and non-bloody diarrhea (defined as 3 or more loose stools in a 24-hour period) with an

onset of symptoms 12-48 hours after exposure. This disease is self-limiting 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.

## Case Investigation Process:

- Food handlers should be excluded from food handling duties for either 72 hours past the resolution of symptoms or 72 hours past the date the positive specimen was provided, whichever occurs last.

## Outbreaks:

CDC defines a food-borne outbreak as, "an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food". In order to confirm an outbreak of norovirus, most serum pairs must demonstrate more than fourfold rise in antibody titer to Norwalk virus or Norwalk-like virus in acute and convalescent sera or visualization of small, round-structured viruses that react with patient's convalescent sera but not acute sera by immune-electron microscopy must be demonstrated.
In the U.S., noroviruses are believed to be one of the most common causes of foodborne illness. The Centers for Disease Control and Prevention (CDC) estimates that at least 50% of all foodborne outbreaks of acute gastroenteritis are attributable to noroviruses.

## Identification of case contacts and management:

### Daycare

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 72 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.

### School

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

- Students or staff with norovirus who have diarrhea should be excluded until 72 hours past the resolution of symptoms.
- 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 72 hours past the resolution of symptoms or 72 hours past 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 72 hours past the resolution of symptoms. Staff members who give 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 either 72 hours past the resolution of symptoms or 72 hours past 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.

## ✓ REFERENCES

Centers for Disease Control, Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR 46 (RR-10), 1997.l

Control of Communicable Diseases Manual (19th Edition), Heymann, D.L., Ed; 2008.

Red Book: 2003 Report of the Committee on Infectious Diseases (26th Edition), Larry K. Pickering MD, Ed; 2003.

Principles and Practice of Infectious Disease (6th Edition), Gerald L. Mandell, John E. Bennett, and Raphael Dolin Eds; 2005.

Massachusetts Department of Public Health, Guide to Surveillance, Reporting and Control, 2006.