

# Norovirus Outbreaks

## Investigative Guidelines

May 2019

### 1. DISEASE REPORTING

#### 1.1 Purpose of Reporting and Surveillance

N.b. Individual cases of noroviral illness are not reportable. Possible common-source outbreaks are reportable.

1. To identify and confirm the etiology of common-source outbreaks
2. To ascertain means of transmission and to control outbreaks
3. To track the burden of outbreaks caused by norovirus.

#### 1.2 Laboratory and Physician Reporting Requirements

Neither viral gastroenteritis in general nor an individual diagnosis of noroviral infection is reportable *per se*. These infections may be confirmed, albeit uncommonly, by clinical laboratories that employ certain multiplex polymerase chain reaction (PCR) panels for testing fecal specimens. In general, you will only hear about noroviral infections in the context of outbreaks of acute gastroenteritis. Physicians are required to report suspect outbreaks immediately after they become aware of them.

#### 1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Individual cases need not be investigated and should not be reported in Orpheus.
2. Investigate immediately all complaints of possible common-source outbreaks of gastroenteritis (i.e., vomiting, diarrhea, and other gastrointestinal symptoms). Outbreaks of gastroenteritis in nursing homes and similar settings (which are most often caused by norovirus) must likewise be investigated.
3. Notify OHS immediately about possible common-source outbreaks.
4. For gastroenteritis outbreaks outside of long-term-care facilities (LTCFs): as warranted by what is known of the incubation period, symptom profile and symptom duration, obtain specimens for noroviral confirmatory testing by the Oregon State Public Health Laboratory (OSPHL). Gastroenteritis outbreaks in LTCFs must be investigated and controlled, but specimens need not be collected for testing unless the clinical and epidemiologic features are inconsistent with noroviral illness.

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5. Submit completed outbreak investigation forms (available at <https://www.oregon.gov/oha/ph/diseasesconditions/communicabledisease/reportingcommunicabledisease/pages/index.aspx#outbreak>) when an investigation is completed. These are often completed by the coordinating Oregon Health Authority (OHA) epidemiologist, however check before you start one of these.

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### 2.1 Etiologic Agent

Noroviruses are nonenveloped RNA viruses of the *Caliciviridae* family that constitute the most common cause of outbreaks of acute gastroenteritis in Oregon and in the United States. Noroviruses are classified into at least 5 genogroups (GI–GV) based on sequencing, and strains within these genogroups are further divided into at least 35 genotypes. “GII.4” strains cause most outbreaks and nearly all outbreaks in LTCFs; “GII.4” variants are named by the city whence they are first identified—e.g., “GII.4 Sydney” or “GII.4 New Orleans.” New GII.4 strains seem to emerge every 2–3 years to cause increased numbers of outbreaks. Other caliciviruses (e.g., “sapovirus”) cause outbreaks with similar clinical and epidemiologic features, though they are less common in the United States. Other caliciviruses infect animals but do not cause human illness.

Because caliciviruses do not have a lipid envelope, they are *not* inactivated by alcohol-based hand sanitizers.

### 2.2 Description of Illness

In contrast to most outbreaks of bacterial gastroenteritis, noroviral outbreaks are characterized by high rates of both vomiting and diarrhea: typically at least a third of patients report vomiting, and a third report diarrhea. Vomiting is sometimes more commonly reported than diarrhea; this may be particularly true for children. In addition to the usual gamut of other GI symptoms (nausea, abdominal cramps, etc.), Norovirus cases typically report headache and myalgias to a degree not seen with other common agents. Be sure to ask about these symptoms.

Although sometimes intense, this is generally a mild, brief, and self-limited illness that rarely lasts more than a day or two, although some people may feel “wrung out” for a few days after acute symptoms have resolved. In most outbreaks, few if any affected persons seek medical attention. Fewer than 1% are hospitalized.

Deaths are very rarely reported—almost all among elderly and debilitated patients in nursing homes for whom the role played by norovirus in their demise is hard to assess.

### 2.3 Reservoirs

Humans are the only known source of the noroviruses that cause human disease.

## Noroviral Infections

### 2.4 Sources and Routes Transmission

Noroviruses are shed in stool and vomitus. Most transmission is from person to person via fecal-oral or “vomit-oral” (yuck) routes. Unlike other common agents of gastroenteritis, however, there is compelling evidence that norovirus can be spread by the airborne route after someone vomits. Less direct sources of transmission include food that's uncooked before serving, shellfish, and environmental surfaces contaminated with feces or vomitus.

### 2.5 Incubation Period

Given enough individuals in a group, the median incubation period is almost always 30–36 hours. Individual incubations are typically 24–48 hours, though volunteers studied had onsets ranging from 10 to 50 hours.

### 2.6 Period of Communicability

Communicability has been inferred from outbreak investigations to last at least 2–3 days post-recovery for some individuals. It is likely that persons are most infectious during the period of acute disease. Viral RNA is detectable in stool for as long as two weeks after symptoms resolve, although this doesn't necessarily imply communicability. Remember that norovirus has a low infectious dose: it is highly contagious.

### 2.7 Treatment

There is no specific therapy. Rehydration may be indicated when vomiting or diarrhea is severe.

### 2.8 Susceptibility and Immunity

Exposure to these agents is very common; >40% of U.S. adults may have antibodies that react with noroviral antigens— close to 100% of children in less developed countries. Paradoxically, antibodies may be markers for susceptibility rather than protective immunity. Following infection, victims may be immune for a few months to infection by the same strain, but long-term immunity does not develop.

To cause illness, noroviruses must bind to intestinal histo-blood-group antigens, the expression of which requires fucosyltransferase 2, which is encoded by the *FUT2* “secretor” gene. Around 20% of Individuals have *FUT2* gene mutations that make them “nonsecretors,” and they appear to be resistant to clinical illness caused by genogroup GI.1 and most GII.4 strains.

## 3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

### 3.1 Case Definitions

There is no fixed case definition, as individual cases are not reportable. During outbreak investigations, a case definition must be developed. For most noroviral outbreaks, “vomiting or diarrhea” is a reasonable case definition, qualified by some time or exposure element (e.g., within 2 days of an implicated meal).

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### 3.2 Services Available at the Oregon State Public Health Laboratory (OSPHL)

Noroviral infections are rarely identified by private labs. Testing in public health and academic labs became feasible on a significant scale only in the mid-1990s, with the development of recombinant antigens and molecular probes.

Since 1999, stool samples can be screened at OSPHL for norovirus. Consult with OHA epidemiologists before specimens are collected. Food and water testing is generally not practicable; if you think such testing is indicated, contact OHA epidemiologists.

Please make every attempt to get 5 stool specimens from every significant cluster, outside of LTCFs, where norovirus is a potential cause. Specimens should be collected as soon as possible, but specimens collected even several days after symptoms resolve are worth testing (see §2.6). Fresh (and ideally loose) stool is best; use a clean container with a tight-fitting screw top (OSPHL staff get *really annoyed* when stool samples leak). It doesn't have to be sterile. Urine specimen cups or 50-mL centrifuge tubes make ideal containers. Distribution of [It-Kits™](#) with their over-the-toilet collection pans (the "hats") may increase the yield. Try to send specimens to OSPHL within 48 hours of collection. Refrigerate (but don't freeze) them prior to transport.

## 4. ROUTINE CASE INVESTIGATION

There are no routine investigations. Almost by definition you will be dealing with a "special situation"—i.e., an outbreak. See §6.

## 5. CONTROLLING FURTHER SPREAD

### 5.1 Education

Advise individuals on measures to avoid further or future exposures.

1. Stress the importance of hand washing to minimize the risk of secondary transmission.
2. Stress the importance of environmental sanitation. Severe vomiting is a hallmark of norovirus infection and, with its low infectious dose, a little aerosolized vomitus goes a long way to infecting innocents unlucky enough to come in contact with contaminated surfaces. See OHA information about [cleaning up vomitus and feces](#).
3. [Oregon Administrative Rule 333-019-0010](#) classifies "any illness accompanied by diarrhea or vomiting" as a "restrictable disease." Persons who have been ill should not work as patient care providers or food handlers—either at work or at home—for (ideally) 48 hours after symptoms resolve. Because such persons may be infectious for even longer periods of time after symptom resolution, admonish them about the need for scrupulous hand washing even after they return to work.

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### 5.2 Infection Control Recommendations

1. Hospitalized patients and residents of nursing homes and similar settings  
The CDC's Hospital Infection Control Practices Advisory Committee recommends contact precautions for incontinent or diapered patients with acute diarrhea when the diarrhea has an infectious cause. Because aerosolized vomitus contains a lot of infectious virus, gowns, gloves, masks, hair and shoe covers should be worn when a patient is vomiting; bed linens should be handled as infectious waste.
2. Work Restrictions
3. See §5.1.3. Case is a Day-Care Worker or Attendee  
Symptomatic children should be excluded while ill; and ask parents to keep them home for a day or two after they get better.

### 5.3 Protection of contacts

None needed, except hand washing after changing diapers of infected children and after any other contact with excreta.

## 6. MANAGING SPECIAL SITUATIONS

### 6.1 Common-source Outbreaks

Notify OHA epidemiologists (971-673-1111) ASAP when you get wind of any possible common-source outbreaks. They can help develop questionnaires as necessary, provide other assistance in data collection and analysis, advise regarding testing, and assign an outbreak number for specimen tracking. In addition, they will notify neighboring counties and states as appropriate. Many outbreaks that seem to have a limited, local focus may be connected to events elsewhere (e.g., multi-state distribution of a contaminated commercial product).

Likely sources of norovirus include raw oysters, salsa, salads and other cold foods, or other food that gets hands-on contact. Contaminated water and ice are other possibilities. Infected food handlers are very often behind the problem. Inquire about recent illness among food handlers, going back at least 5 days before the implicated event; check work or attendance records. Focus on implicating specific food, water, or environmental exposures, using epidemiological comparisons of cases and controls, and evaluating their method of preparation.

### 6.2 Long-Term-Care Facilities (LTCFs) and Similar Settings

Most noroviral outbreaks in LTCFs are spread rapidly from person to person by the fecal-oral or vomit-oral route. Attack rates often exceed 50% and usually at least a few residents need rehydration in an emergency room, even hospitalization. Staff absenteeism is often so high that patient care and safety are compromised. Patient caregivers from temporary staffing agencies are often used, but may become ill themselves after filling in during a norovirus outbreak and carry the agent (unwittingly, of course) to another facility.

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Although some of these outbreaks probably start with a foodborne exposure, a food item is almost never implicated. For this reason, once norovirus can reasonably be presumed (based on epidemiologic profile) as the cause, the focus is not on investigation of exposures but on helping the facility to control a person-to-person outbreak and tracking it to completion.

### 1. Data collection, basic descriptive epidemiology, and reporting to OHA

- Ask LTCF staff to complete the [Gastroenteritis Case Log](#) on the first 10 or more cases for whom demographics, time of onset, and symptom profile can be obtained. Use the symptom profile to determine whether the outbreak is consistent with a noroviral etiology (vomiting and diarrhea with minimal fever and no blood in stool). Record any new cases in the [Gastroenteritis Case Log](#) with the case's name and date of illness onset. Monitor the log daily until no more cases occur. If the outbreak is not norovirus-like, call the OHA on-call epidemiologist at 971-673-1111.
- Enter case log data into OHA's GI Case Log Database available via Citrix through the "Directory of Useful Databases for Epidemiologists" (DUDE). Case log data from the early days of the outbreak should be entered no later than *five days* after the outbreak is reported to OHA.
- Use the tools included in the database to review basic descriptive epidemiology, including the epidemic curve (i.e., cases by onset time), as soon as new data are entered.
- Monitor the outbreak until the last case has been symptom-free for 2 incubation periods (4 days); at which time the outbreak may be considered "over."
- Complete a [Control Measures Report](#) and enter the report into OHA's Control Measures Report Database available via DUDE.
- Within 30 days of the onset date of the last case, enter summary reports of the outbreak investigation into the OHA Outbreak Database available via DUDE.

### 2. Control Measures

Refer facility staff to OHA's guidance on [Norovirus Outbreak Detection and Management](#).

Advise facility staff regarding steps to take to control the outbreak:

- **Handwashing:** Encourage frequent hand washing among staff, food handlers, and residents in the facility. Staff members should use proper Person Protective Equipment (PPE) to protect themselves from illness and to prevent further person-to-person transmission. The use of gloves, masks, and gowns should be highly encouraged for staff members working with ill patients and cleaning bodily fluids.

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- **Exclusion and Isolation**
  - As with hospitalized patients, diapered or incontinent nursing home residents should be placed on contact precautions, and gowns, gloves and masks should be used when caring for any patients who are vomiting.
  - Inform visitors to the facility of the outbreak and consider limiting visits; post notices at the entrance of the facility warning them of the outbreak and its highly communicable nature. Stop all transfers within and out of the facility; or provide a descriptive symptom profile to the receiving facility prior to any transfer. Do not accept new admissions into the facility until the outbreak is declared over. (We recommend waiting seven days after the last case onset before new admissions are permitted.)
  - Stop group activities until the outbreak has been declared over. Communal meals and social and recreational groups should be stopped to prevent further person-to-person transmission.
  - Sick patients should be cohorted if at all possible.
  - Sick staff members should not be allowed to work until they are asymptomatic for 48 hours. Staff working on affected units should not work on other patient care units (or in other facilities in the case of caregivers who work for outside agencies that provide fill-in staff).
  
- **Environmental Disinfection:** Steam cleaning can be used for carpets and upholstery. For hard surfaces use a product on the [Environmental Protection Agency's list of registered antimicrobial products effective against norovirus](#), or use bleach. CDC recommends the use of a chlorine bleach solution at 3,500 parts per million (1 cup regular-strength [5.25%] or 3/4 cup concentrated [8.25%] bleach per gallon of water). 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 virus. Clean frequently used surfaces as well:
  - chair handles and backs,
  - door handles,
  - counters,
  - hand railings,
  - bed linens,
  - frequently used items (toothbrushes, combs, remote controls, etc.)

For more information, see CDC's [Norovirus Outbreak Management and Disease Prevention Guidelines](#) (2011).

**UPDATE LOG**

May 2019. Testing no longer encouraged for outbreaks in LTCFs; instructions for managing outbreaks in LTCFs incorporated; language updated from “Norwalk-like viruses” to “noroviruses”; information about noroviral subtypes and susceptibility added (Paul Cieslak).

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