

Norovirus Outbreak Detection and Management

Instruction for Schools & Day Care Centers

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Contents

Norovirus in Schools and Day Care Center	3
Clinical Description	3
Transmission	3
Symptoms	4
Treatment	4
Outbreak Prevention and Detection	5
Outbreak Response and Reporting	6
Ending an Outbreak	6
Cleaning up vomit and other unpleasant tasks	9
Oregon State Public Health Laboratory Testing	10
Specimen Collection Guidelines	10
Gastroenteritis Outbreak Notice	11
Public Health, FERPA and Schools – Frequently Asked Questions (FAQs)	12
Letter for parents and guardians regarding norovirus outbreak	14
CDC Norovirus Fact Sheet	15
Oregon School Gastrointestinal Case Log	16
CDC Recommendations for Norovirus Bleach Cleaning	17
References	188

Norovirus in Schools and Day Care Center

Acute Gastroenteritis (AGE) outbreaks in schools and day care centers (DCC) are common. In Oregon during 2009–2014, confirmed norovirus and norovirus-like outbreaks accounted for 50% of reported gastroenteritis outbreaks in schools and DCCs. Due to the highly infectious nature of norovirus, it is necessary to have an established outbreak response plan to combat a prolonged outbreak among facility students and staff. Norovirus outbreaks can be identified and contained early with understanding of the typical symptoms and with proper infection-control measures.

Clinical Description

Noroviruses, named for the first-recognized outbreak in Norwalk, Ohio in 1968, belong to the *Caliciviridae* family. Noroviruses are non-enveloped viruses, so they are not susceptible to alcohol-based disinfectants. There are six genogroups (G) of norovirus, of which GI, GII, and GIV afflict humans. Due to their genetic diversity, infection with one noroviral strain does not confer immunity against other strains. GII norovirus strains, and in particular, GII.4 strains, account for most norovirus outbreaks in long-term-care facilities (LTCFs).

Transmission

Norovirus is highly contagious due to its extremely low infectious dose (see Table 1). Transmission of norovirus is fecal-oral, primarily through person-to-person contact, but also through:

- contaminated surfaces (i.e., fomites)
- contaminated food
- contaminated water (including ice)
- swallowing of norovirus aerosolized in vomitus

An infected person will begin to shed norovirus particles a few hours before symptoms begin and can continue to shed for more than 2 weeks. Peak viral shedding occurs at 2 to 3 days after symptom onset, with a median amount of norovirus shed of 95×10^9 copies per gram of feces (1).

TABLE 1. Characteristics of “Norwalk-like viruses” that facilitate their spread during epidemics

Characteristic	Observation	Consequences
Low infectious dose	<10 ² viral particles	Permits droplet or person-to-person spread, secondary spread, or spread by foodhandlers
Prolonged asymptomatic shedding	≤2 weeks	Increased risk for secondary spread or problems with control regarding foodhandlers
Environmental stability	Survives ≤10 ppm chlorine, freezing, and heating to 60 C	Difficult to eliminate from contaminated water; virus maintained in ice and steamed oysters
Substantial strain diversity	Multiple genetic and antigenic types	Requires composite diagnostics; repeat infections by multiple antigenic types; easy to underestimate prevalence
Lack of lasting immunity	Disease can occur with reinfection	Childhood infection does not protect from disease in adulthood; difficult to develop vaccine with lifelong protection

Characteristics of “Norwalk-like viruses” that facilitate their spread during epidemics. From MMWR 50 (RR-9):1–18. Available at www.cdc.gov/mmwr/preview/mmwrhtml/rr5009a1.htm.

Symptoms

Norovirus symptoms begin a median of 33 (range, 12–48) hours after exposure to the virus.

Symptoms may include:

- vomiting
- diarrhea, typically watery and without blood
- nausea
- low-grade fever
- abdominal cramps
- malaise
- chills

Treatment

There is no specific treatment for norovirus infection. Because many patients have both vomiting and diarrhea, precautions should be taken to avoid dehydration, especially in the very young and very old.

Outbreak Prevention and Detection

Norovirus infection is not reportable *per se* in Oregon, but Oregon Administrative Rule 333-018-0000 requires that all *outbreaks* of any disease be reported and investigated by the Local Health Department (LHD). An outbreak is defined as more cases than expected for a given population and time period. For example, two children in a 25-person classroom with vomiting or diarrhea within one week would be more than expected and must be reported to the LHD. Similarly, two or more students on the same sports team with similar symptoms within a week would probably represent an outbreak. (If in doubt, consult your local health department.)

Schools and DCCs should encourage staff routinely to record medical reasons for school absences. This would allow the school to quickly identify whether absences are due to a similar illness, such as acute gastroenteritis. Such information should certainly be collected during an outbreak.

For a complete list of reportable diseases, see

<http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/ReportingCommunicableDisease/Pages/index.aspx>.

Outbreak Response and Reporting

When an outbreak of norovirus-like illness is recognized, swift implementation of aggressive infection control measures is necessary to prevent further spread of this highly contagious virus. The affected school or DCC should take the following steps:

- Notify the Local Health Department (LHD) of the outbreak within 24 hours.
- Begin to track the cases' symptom profiles and personal information using the Case Log.
- Consult and coordinate with the LHD on stool collection and laboratory testing. A minimum of 2 positive stool samples is necessary to confirm an outbreak. At least 3 specimens should be collected in case one specimen yields a different result from the other two.
- Educate all staff of the outbreak and the suspected pathogen's symptoms and preventive measures.
- Implement facility-wide control measures:
 - Restrict sick students from school until asymptomatic for 48 hours.
 - Cancel group activities
 - Deep clean bathrooms and frequently touched surfaces.
 - Enforce strict hand washing (supervised hand washing for younger students)
- Limit visitors, and post *Gastroenteritis Outbreak Notice* on all entrances to the facility.
- In consultation with the LHD, declare the outbreak over after the last case is symptom-free for 2 incubation periods (4 days).

Ending an Outbreak

Maintenance and regular review of the Gastroenteritis Case Log will enable public health officials to discern when the outbreak is over — generally when no new cases have surfaced over a period of 2 incubation periods (4 days).

Control Measures

Norovirus is highly contagious, so aggressive control measures should be implemented swiftly as soon as an outbreak is suspected and without waiting for the LHD or to declare an outbreak.

Suggested control measures are:

- **Exclusion:** Students, day care attendees and employees who are sick with either vomiting or diarrhea should be excluded from the school or facility until at least 48 hours after symptoms have resolved. This is because norovirus can still be shed in stool for a time even symptoms have resolved. (Example of exclusion: if John stopped vomiting at noon on Monday, then he may not return to school until Thursday.) Exclusion of sick and recently recovering persons will reduce the likelihood that more students and staff will be exposed.
- **Cohorting:** If possible, keep all staff members who worked with sick children in the same room. For example, if the “Toddlers” room of a DCC is experiencing an outbreak, then staff members working in the “Toddlers” room should work in the “Toddlers” room for the duration of the outbreak and should not work in the “Wobblers” or “Infant” rooms for the duration of the outbreak.
- **Stop group activities:** Stop group activities until the outbreak has been declared “over.” Communal meals and social and recreational groups should be canceled to minimize person-to-person contact and the attendant risk of transmission.
- **Clean:** Remove vomit or diarrhea right away! Wipe up at vomit or diarrhea and then use kitty litter, baking soda or other absorbent materials to absorb liquids. Use soapy water to wash all surfaces that had contact with vomit or diarrhea, as well as nearby high-touch surfaces (e.g., door knobs, toilet handles, hand rails). Rinse with plain water and wipe dry. Because viruses and other germs can remain on surfaces even after cleaning, all surfaces must then be **disinfected**.
- **Disinfect:** To kill remaining germs, an Environmental Protection Agency-registered commercial virucide (www.epa.gov/sites/production/files/2015-10/documents/list_g_norovirus.pdf) should be used. If an EPA-registered virucide is not available, then the facility should use bleach. CDC recommends a chlorine bleach solution with a concentration of ~3500 ppm (this can be achieved by adding 1 cup of household bleach to a gallon of water) on all surfaces; refer to *Clean Up and Disinfection for Norovirus (“Stomach Bug”)* on page 14. Leave the surface wet for ≥5 minutes or follow the directions on the commercial cleaner to allow sufficient time for the disinfectant to work. Disinfect frequently used surfaces such as:
 - chair handles and backs,
 - door handles,
 - hand railings,
 - counters, and
 - frequently used items (toys, keyboards, mouse, changing table, etc.).

- **Personal Hygiene:** Encourage frequent hand washing among staff, food handlers, and students. All students should wash their hands before eating and after using the bathroom. Staff members should supervise the hand washing of young children. Staff members should also wash their hands after changing diapers or helping children in the bathroom. Sick staff members should not be allowed to work until 48 hours after their symptoms have resolved.
- **For more information,** check *Preventing Norovirus Infection* found at www.cdc.gov/norovirus/preventing-infection.html.

Cleaning up vomit and other unpleasant tasks

Staff who clean up vomit or diarrhea should take these precautions to reduce their risk of infection.

General Principles

- Handle with care anything contaminated with vomit or diarrhea:
 - Wear protective gear (gloves, masks & gowns)
 - Soak up vomit & diarrhea with disposable cloths or absorbents like cat litter
- Clean first, then disinfect
 - **Cleaning** is the *removal* of germs and foreign material from surfaces or objects. It is done using water and detergent.
 - **Disinfecting** is the *killing* of germs on surfaces or objects. Chemicals such as bleach are used to kill germs.
 - Disinfecting after cleaning kills germs that remain on surfaces after cleaning, which further decreases the risk of spreading infection.
 - Prepare a 3500 ppm bleach solution by mixing 1 cup of household bleach to a gallon of water. If you are using concentrated bleach, then decrease the amount of bleach to $\frac{3}{4}$ cup of bleach to a gallon of water; **OR**
 - Use an EPA-registered norovirus disinfectant; see www.epa.gov/oppad001/list_g_norovirus.pdf. Be sure to read the label, as there may be separate directions for using the product as a disinfectant or as a cleaner.
 - Prepare fresh bleach solution daily

Cleaning specific things

Carpets and upholstery: carefully remove vomit and diarrhea: clean contaminated carpet or upholstery with detergent and hot water; steam clean at $\geq 158^{\circ}$ F for 5 minutes or 212° F for 1 minute; *do not vacuum* (2).

Furniture, floors and other hard, non-porous surfaces: carefully remove vomit and diarrhea; clean contaminated furniture and other hard surfaces with detergent and hot water; disinfect with 1000–5000 ppm bleach solution (see above).

Fixtures and fitting in toilet areas: carefully remove vomit and diarrhea; clean contaminated fixtures and fitting with detergent and hot water; disinfect with 1000–5000 ppm bleach solution (see above).

Cloth items and plush toys (e.g., stuffed animals, bedding, mattress covers,): carefully remove vomit and diarrhea; wash items in a pre-wash cycle, then use a regular wash cycle with detergent; dry items at a temperature greater than 170° F; *do not mix soiled and clean items in one load*; it is better to discard soiled cloth items than to risk exposure during cleaning (2).

Wash your hands (with soap and water) after any cleaning of vomit or diarrhea.

Oregon State Public Health Laboratory Testing

The Oregon State Public Health Laboratory (OSPHL) will test stool and vomitus from ill persons in suspected norovirus outbreaks. Coordinate with the LHD to receive a Stool Collection Kit to prepare and send specimens to OSPHL. OSPHL analyzes stool samples once a week but twice a week during the October–May norovirus “season.”

Specimen Collection Guidelines

- Detailed stool collection instructions and an instructional video can be found at: <http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/Outbreaks/Gastroenteritis/Pages/Outbreak-Investigation-Tools.aspx#itkit>
- Collect specimens as soon as possible after the onset of illness. Typically, viral shedding is highest during illness and up to 5 days after illness has resolved.
- Collect whole stool (optimal amount is ~15 g, or about the size of a walnut) or 15 mL (1 Tbsp.) of watery stool from each of at least 3 ill persons.
- Refrigerate or store specimens on wet ice until ready to transfer. Do not freeze or leave stool at room temperature. Store stool in a tightly closed container, away from food and medication.
- Label each specimen with the date of collection; and the name and date of birth of the ill person.
- Seal specimens in a bag and transfer them in an insulated, waterproof container with cold packs to ensure appropriate temperature during transfers. (Refer to the OSPHL Guidelines for Packaging and Shipping found at <http://public.health.oregon.gov/LaboratoryServices/SubmittingSamples/Pages/ShippingTransport.aspx>.)
- Contact the LHD to arrange for pick up and transfer of the specimens to OSPHL.

Gastroenteritis Outbreak Notice

NOTICE!

We are currently experiencing many cases of gastroenteritis among our students.

We are working with the _____ County Health Department to contain and control this highly contagious disease.

Please keep your child home if s/he is having vomiting or diarrhea.

Students may return to school **48 hours** after diarrhea and vomiting have stopped.

Public Health, FERPA and Schools – Frequently Asked Questions (FAQs)

Q: As a school in Oregon, what information can I share with or report to public health authorities?

A: Both Oregon state law and federal law (FERPA) allow schools to share information with public health officials. According to [OAR 333-019-0003](#), the local public health administrator or state health authority, in the course of investigating a reportable disease or outbreak, may require a healthcare provider, public or private entity, or an individual to provide copies of information necessary to the investigation including, but not limited to, individually identifiable health information and contact information related to a **case** (ill person), an individual who may be the potential **source** of exposure or infection, or an individual who has been or may have been **exposed** to or affected by the disease. All information obtained by the Oregon Health Authority or local public health administrator in the course of an investigation is confidential. [FERPA](#), the federal Family Educational Rights and Privacy Act, states that schools may disclose, without consent, "directory" information such as a student's name, address, telephone number, date and place of birth, honors and awards, and dates of attendance.

Q: So I may share only directory information with public health officials?

A: Schools may share directory information of students whose parents did not opt out of disclosing directory information at any point, as long as the school has informed parents of [FERPA](#) and given them the opportunity to opt out. [FERPA](#) also allows schools to disclose any information from a student's education records, without consent, to appropriate officials in cases of health or safety emergencies. It is permissible for a school to disclose information to a public health authority in connection with an emergency, if knowledge of that information is necessary to protect the health or safety of the student or other individuals.

Q: What constitutes a 'health or safety emergency'?

A: Schools subject to [FERPA](#) may disclose personally identifiable, non-directory information under the 'health or safety emergency' exception only if the school determines, on a case-by-case basis, that a specific situation presents a significant threat to the health and safety of a student, students or other individuals. If there is a rational basis for the school's determination, the Department of Education will defer to the school's judgment as to the existence of a 'health or safety emergency.'

Q: What is FERPA?

A: The [Family Educational Rights and Privacy Act](#) (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

[FERPA](#) acknowledges certain parental rights with respect to their children's education records. These rights transfer to the student when he or she reaches the age of 18 or attends a school beyond the high school level. Students to whom the rights have transferred are "eligible students."

Letter for parents and guardians regarding norovirus outbreak

Dear Parent or Guardian and Staff,

XXXXXX County Health Department has become aware that, many students at XXXXX School are absent because of vomiting or diarrhea. The Health Department is investigating the situation. From the information we have at this point, it appears that the illness might be caused by Norovirus.

What is Norovirus? This is a common but highly contagious virus that is usually spread by person-to-person contact but can also be spread through food, water, or contact with things that infected persons have touched. Illness usually occurs one or two days after being exposed. Infected persons are contagious while they have symptoms and usually for a couple of days after symptoms have resolved.

Symptoms: Nausea, vomiting, diarrhea, and some stomach cramping. Some people may have a low-grade fever, chills, headache, muscle aches, and a general sense of tiredness. The illness often begins suddenly, and the infected person may feel very sick. The illness is usually brief, with symptoms lasting about 1 or 2 days.

How serious is it? People with norovirus disease may feel very sick and vomit many times a day. Most do not feel sick enough to seek medical attention, and most get better within 1 or 2 days. Few people with norovirus disease are hospitalized; but the vomiting and diarrhea can lead to dehydration requiring medical attention.

If you think you have this infection, the following will help you and help prevent others from getting sick:

- Stay home to rest for at least 48 hours after the vomiting and diarrhea have stopped and you are feeling better.
- Sip fluids frequently as tolerated. Half-strength apple juice, sports fluids, flat lemon-lime soda, or popsicles can help to prevent dehydration.
- **WASH HANDS FREQUENTLY:** Rub all surfaces of hands with soap, rub lathered hands together vigorously for at least 20 seconds, and then thoroughly rinse the hands under a stream of water.
- Wash hands after using the bathroom, cleaning, changing diapers, or before eating or preparing food. Avoid sharing towels, and if possible ask ill persons to use only one bathroom.
- Disinfect household surfaces with a bleach solution (1 cup of household bleach to a gallon of water).
- Call your health provider if symptoms last longer than three days; if you have bloody diarrhea or a fever greater than 100.5°F; or if you think you are becoming dehydrated.

If you have any questions, concerns, or need assistance, please contact the XXXXXXXXX County Health Department Communicable Disease Control Program at XXX-XXX-XXXX.

CDC Norovirus Fact Sheet

Norovirus Illness: Key Facts

Norovirus—the stomach bug

Norovirus is a highly contagious virus. Norovirus infection causes gastroenteritis (inflammation of the stomach and intestines). This leads to diarrhea, vomiting, and stomach pain.

Norovirus illness is often called by other names, such as food poisoning and stomach flu. It is true that noroviruses can cause food poisoning. But, other germs and chemicals can also cause food poisoning. Norovirus illness is not related to the flu (influenza), which is a respiratory illness caused by influenza virus.



Anyone can get norovirus illness

- Norovirus is the most common cause of acute gastroenteritis in the United States.
- Each year, norovirus causes about 21 million cases of acute gastroenteritis in this country.
- Many different types of norovirus exist, so you can get infected and sick many times in your life.

Norovirus illness can be serious

- Norovirus illness can make you feel extremely sick with diarrhea and vomiting many times a day.
- Some people may get severely dehydrated, especially young children, the elderly, and people with other illnesses.
- Each year, norovirus causes about 70,000 hospitalizations and 800 deaths, mostly in young children and the elderly.

Norovirus spreads very easily and quickly

- It only takes a very small amount of norovirus particles (fewer than 100) to make you sick.
- People with norovirus illness shed billions of virus particles in their stool and vomit and can easily infect others.
- You are most contagious when you are sick with norovirus illness and during the first few days after symptoms stop.
- Norovirus can spread quickly in closed places like daycare centers, nursing homes, schools, and cruise ships.
- Norovirus can stay on objects and surfaces and still infect people after days or weeks.
- Norovirus can survive some disinfectants, making it hard to get rid of.

Norovirus can spread in many ways

Norovirus can spread to others by—

- eating food or drinking liquids that are contaminated with norovirus,
- touching surfaces or objects that have norovirus on them then putting your fingers in your mouth, and
- having close personal contact with an infected person, for example, caring for or sharing food, drinks, or eating utensils with an infected person.

There's no vaccine to prevent norovirus infection and no drug to treat it

- Antibiotics will not help with norovirus illness because antibiotics do not work on viruses.
- When you have norovirus illness, drink plenty of liquids to replace fluid loss and prevent dehydration.
- If you or someone you are caring for is dehydrated, call a doctor.

National Center for Immunization and Respiratory Diseases
Division of Viral Diseases



CS234745-A

CDC Recommendations for Norovirus Bleach Cleaning

Clean-up and Disinfection for Norovirus ("Stomach Bug")

THESE DIRECTIONS SHOULD BE USED TO RESPOND TO ANY VOMITING OR DIARRHEA ACCIDENT

Note: Anything that has been in contact with vomit and diarrhea should be discarded or disinfected.

1 Clean up

- a. **Remove vomit or diarrhea right away!**
 - Wearing protective clothing, such as disposable gloves, apron and/or mask, wipe up vomit or diarrhea with paper towels
 - Use kitty litter, baking soda or other absorbent material on carpets and upholstery to absorb liquid; do not vacuum material: pick up using paper towels
 - Dispose of paper towel/waste in a plastic trash bag or biohazard bag
- b. **Use soapy water to wash surfaces that contacted vomit or diarrhea and all nearby high-touch surfaces, such as door knobs and toilet handles**
- c. **Rinse thoroughly with plain water**
- d. **Wipe dry with paper towels**

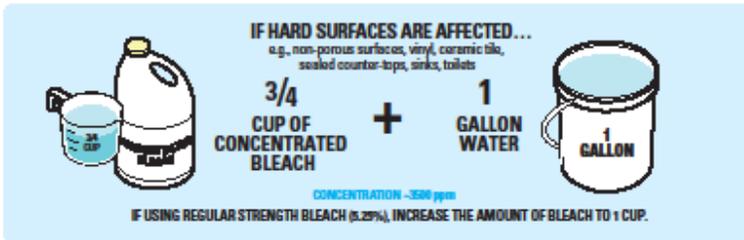
DONT STOP HERE: GERMS CAN REMAIN ON SURFACES EVEN AFTER CLEANING!

2 Disinfect surfaces by applying a chlorine bleach solution

Steam cleaning may be preferable for carpets and upholstery. Chlorine bleach could permanently stain these. Mixing directions are based on EPA-registered bleach product directions to be effective against norovirus. For best results, consult label directions on the bleach product you are using.

a. Prepare a chlorine bleach solution

Make bleach solutions fresh daily; keep out of reach of children; never mix bleach solution with other cleaners.



IF HARD SURFACES ARE AFFECTED...
e.g., non-porous surfaces, vinyl, ceramic tile,
sealed counter-tops, sinks, toilets

3/4 CUP OF CONCENTRATED BLEACH + 1 GALLON WATER

CONCENTRATION ~350 ppm

IF USING REGULAR STRENGTH BLEACH (5.25%), INCREASE THE AMOUNT OF BLEACH TO 1 CUP.

- b. **Leave surface wet for at least 5 minutes**
- c. **Rinse all surfaces intended for food or mouth contact with plain water before use**

3 Wash your hands thoroughly with soap and water

Hand sanitizers may not be effective against norovirus.



Facts about Norovirus

Norovirus is the leading cause of outbreaks of diarrhea and vomiting in the US, and it spreads quickly.

Norovirus spreads by contact with an infected person or by touching a contaminated surface or eating contaminated food or drinking contaminated water. Norovirus particles can even float through the air and then settle on surfaces, spreading contamination.

Norovirus particles are extremely small and billions of them are in the stool and vomit of infected people.

Any vomit or diarrhea may contain norovirus and should be treated as though it does.

People can transfer norovirus to others for at least three days after being sick.

IF CLOTHING OR OTHER FABRICS ARE AFFECTED...

- Remove and wash all clothing or fabric that may have touched vomit or diarrhea
- Machine wash these items with detergent, hot water and **bleach** if recommended, choosing the longest wash cycle
- Machine dry



Scientific experts from the U.S. Centers for Disease Control and Prevention (CDC) helped to develop this poster. For more information on norovirus prevention, please see <http://www.cdc.gov/norovirus/preventing-infection.html>.



disinfect-for-health.org

Updated March, 2015

References

- (1) Atmar RL, Apekun AR, Gilger MA, et al. Norwalk virus shedding after experimental human infection. *Emerg Infect Dis* 2008; 14:1553–7.
- (2) Occupational Safety and Health Administration. OSHA Fact Sheet: Noroviruses. 2008. Available at www.osha.gov/Publications/norovirus-factsheet.pdf.