

Norovirus Infections

Summary

Noroviruses are the leading cause of acute gastroenteritis which is sometimes referred to as “stomach flu” or “winter vomiting disease”. Individual norovirus infections are not reportable to the New Mexico Department of Health. However, outbreaks of norovirus should be reported to the Epidemiology and Response Division (ERD at 505-827-0006). Noroviruses are highly contagious, with as few as 18 viral particles sufficient to cause infection. These viruses can remain viable and infective on surfaces for up to two weeks. Although illness is generally short-lived and self-limiting, hospitalizations and deaths have occurred, especially among nursing home residents. Outbreaks of norovirus illness can be due to contaminated food or water, but more commonly the virus is transmitted person to person.

Agent

Noroviruses (genus *Norovirus*, family *Caliciviridae*) are a group of related, single-stranded RNA, non-enveloped viruses that cause acute gastroenteritis in humans and were previously described as “Norwalk-like viruses” (NLV).

Transmission

Reservoir:

Humans are the only known reservoir.

Mode of transmission:

Noroviruses are found in the stool or vomitus of infected people or on contaminated surfaces not properly cleaned and disinfected. People can become infected with the virus through:

- Eating food, drinking liquids or using utensils contaminated with norovirus.
- Touching surfaces or objects contaminated with norovirus, and then touching their face, mouth, or mucous membranes.
- Direct contact with the feces or vomitus of a person who is infected and showing signs or symptoms (e.g., while caring for someone who is sick.)
- Inadvertent ingestion of airborne aerosolized virus particles that may occur with patient vomiting.
- Ingesting recreational water that is contaminated and lacks sufficient chlorination.

Persons at increased risk of spreading disease include:

- Food handlers.
- Persons providing direct patient care in hospitals or long-term care facility (LTCF).
- Residents and visitors of LTCFs.
- Residents of homeless shelters.
- Children and staff in daycare centers and schools.
- Other closed populations (e.g., cruise ship staff and passengers).

Period of communicability:

- Although pre-symptomatic viral shedding may occur, shedding in either stool or vomitus usually begins with onset of symptoms and may continue for two weeks after recovery. Ill persons are most contagious with the greatest amount of viral shedding during the illness and for 48 hours after symptoms end. However, shedding may persist for 2-3 weeks.

Clinical Manifestations

Incubation period:

Generally, 24 to 48 hours after ingestion of the virus; however, symptoms can appear as early as 10 hours after exposure.

Illness:

Illness is characterized by abrupt onset of vomiting, watery, non-bloody diarrhea with abdominal cramps, and nausea. Some persons may experience only vomiting or diarrhea. In addition, myalgia, malaise, and headache are commonly reported. Low-grade fever is present in about half of cases. Symptoms usually last 1 to 3 days. Dehydration is the most common complication of illness and may require intravenous replacement fluids. Studies suggest that up to 30% of infections may be asymptomatic. Mechanisms of immunity to norovirus are unclear. Immunity may be strain-specific and persist for only a few months, but with the genetic variability of noroviruses, individuals may be repeatedly infected throughout their lifetimes.

Laboratory Diagnosis

Diagnosis of norovirus infection relies on the detection of viral RNA in the stools or vomitus of affected persons, by use of reverse transcription-polymerase chain reaction (RT-PCR) assays. In New Mexico, testing is available at the Scientific Laboratory Division (SLD) for outbreak investigation and must be approved by the Epidemiology and Response Division (ERD). Identification of the virus can best be made from stool or vomitus specimens taken within 48 to 72 hours after onset of signs and symptoms, although good results can be obtained by using RT-PCR on samples taken as long as seven days after symptom onset. See Appendix A for more information regarding collection of samples.

SLD does not perform norovirus testing for environmental samples.

Treatment

There are no antiviral medications or vaccines to treat or protect against noroviruses, respectively. Most people recover completely within 1 to 3 days, with no long-term complications of norovirus illness. However, persons who are unable to drink enough liquids to replace those lost with vomiting and/or diarrhea may become dehydrated and require replacement of fluid and correction of electrolyte disturbances through oral and intravenous fluid administration.

Surveillance

The Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists (CSTE) have not developed case definitions for a norovirus infection and they are not reportable at the national or New Mexico state level. However, New Mexico

Administrative Code requires that suspicion or confirmation of any outbreak, including norovirus, must be reported to ERD at 505-827-0006.

What Constitutes an Outbreak?

Since diarrhea may be fairly common among residents of a long-term care facility (LTCF), determining when there is an outbreak may be subjective. In general, an outbreak of gastroenteritis in a LTCF is defined as the presence of more diarrhea or vomiting than would be normally anticipated in the facility, or in a particular ward/unit, for that time frame of concern.

Clinical Case Definition:

The following definition is recommended for a norovirus outbreak in a LTCF:

Vomiting and/or diarrhea (three or more loose stools per individual in a 24-hour period) in a resident or staff member with sudden onset of symptoms since (specified date) and whose symptoms have no other apparent cause.

An outbreak of norovirus may be categorized as either “suspected” or “confirmed”:

Suspected norovirus outbreak – The signs and symptoms of the illness closely resemble those of norovirus but no laboratory confirmation is available

Confirmed norovirus outbreak – The signs and symptoms of the illness are consistent with norovirus, and laboratory testing yielded positive results for norovirus in specimens collected from at least two ill persons.

Control Measures

1 Case Management

Individual norovirus cases are not reportable and, therefore, would not be individually investigated. However, each case within a suspected outbreak will require review or an interview.

1.1 Isolation:

In general, persons with suspected norovirus infection should be managed with standard precautions with careful attention to hand hygiene practices (see section below). However, contact precautions (as described in http://www.cdc.gov/ncidod/dhqp/gl_isolation_contact.html) should be implemented when caring for diapered or incontinent persons, during outbreaks in a facility, and when there is the possibility of splashes that might lead to contamination of clothing.

1.2 Prophylaxis: Not applicable.

2. Contact Management

2.1 Isolation:

Exclude ill staff in specific positions (e.g., food handlers, childcare personnel and health care personnel with direct patient care duties) for a minimum of 48 hours after signs/symptoms resolve.

Cohort ill patients and/or residents in institutional settings such as long-term care facilities and hospitals for a minimum of 48 hours after signs and symptoms fully resolve.

2.2 Prophylaxis: Not applicable.

3. Prevention

3.1 Hand Hygiene:

Appropriate hand hygiene has been identified by CDC as the “single most important method to prevent norovirus infection”. Washing hands with running water and plain or antiseptic soap for at least 20 seconds is the most effective and preferred method. Alcohol based hand sanitizers can be used in addition to hand washing but should not be used in place of washing with soap, as they have not been shown to be consistently effective.

3.2 Environmental Cleaning:

Disinfecting potentially contaminated surfaces is recommended to prevent exposure and further spread of norovirus. The most effective disinfectant is a chlorine bleach solution made from diluting household bleach in 1:10 dilution by mixing one cup bleach in nine cups water. Health care settings should use products that are EPA-registered and labeled for use in such settings.

Management of Norovirus in a Nursing Home or Institutional-Associated Outbreak

Facility-Oriented Prevention and Control Measures:

- When a single ward is affected: at a minimum restrict admissions and discharges in the ward for a minimum of 48 hours after the resolution of the last case.
- When multiple wards are affected: restrict admissions and discharges for the entire facility for a minimum of 48 hours after the resolution of the last case.
- Conduct a site visit assessment with appropriate team member(s) to collect further information. Staff should use checklist (Appendix B) to guide their assessment of the facility.
- Conduct surveillance at the facility. Use a line listing to keep track of potential cases. Include:
 - Number of ill residents.
 - Number of ill staff (include job function/location and residents with whom they work.)
 - Onset dates (and times if possible) of signs/symptoms.
 - Signs and symptoms.
 - Duration of illness.
 - Physical distribution of illness in the facility.
 - Hospitalizations/deaths.
- Collect samples for laboratory testing as necessary from people who are/have been ill, if this has not already been done. Try to obtain a minimum of three specimens (or as many possible) from an outbreak in a nursing home or other institution.

- Provide education to facility staff about clinical presentation, disease transmission, and prevention and control measures.
- Coordinate investigation with the New Mexico Environment Department's Food Program to inspect the food facility to determine whether any food handling staff was ill in the days before the residents' illness onset dates. This may indicate that a food source may have started the outbreak in the facility. Contact the City of Albuquerque Environmental Bureau if the facility is in Albuquerque. Assure that food handler interviews are conducted in standardized and complete fashion.
- The facility must contact the Division of Health Improvement (DHI) when the investigation is conducted in a facility licensed by DHI to report the gastrointestinal illness outbreak.
- Provide adequate amounts of gloves, gowns, aprons, masks, goggles and face shields.
- Environmental cleaning (regulatory agencies may request adjustments on a case-by case-basis):
 - Disinfect potentially contaminated surfaces, let sit for 5-10 minutes before rinsing.
 - The most effective disinfectant is a chlorine bleach solution made from diluting household bleach in 1:10 dilution by mixing one cup bleach in nine cups water.
 - Mix new bleach solutions daily, bleach solutions are susceptible to degradation.
 - Disinfect hard non-porous surfaces:
 - Doorknobs, faucets, sinks, toilets, bath rails, phones, counters, chairs, bottles, hand rails, food and drug delivery carts, elevator buttons, light switches, blinds, floors and computer keyboards.
 - Common medical equipment should be adequately disinfected between use.
 - Avoid moving equipment in and out of outbreak areas.
 - Contaminated clothes, linen, and bed curtains should be placed into bags and washed separately in hot water for a complete wash cycle – ideally as a half load for best dilution.
- Disinfect entire kitchen and increase frequency of kitchen cleaning.
- Restrict kitchen service:
 - Use disposable plates, cups, utensils and individual packaged condiments.
 - Remove self-serve areas.
 - Restrict employees that work in areas with ill patients from the kitchen.
 - Disinfect food carts after every use.
- Collect specimen for laboratory testing from symptomatic people.
 - Obtain at least 3 specimens, preferably 5.
- Post signs at appropriate locations throughout the facility (see signs at the end this document).
- Ask nonessential visitors to reschedule their visit.
- Ask any visitors with GI symptoms to avoid visiting.

Resident-Oriented Prevention and Control Measures:

- Increase surveillance for diarrhea and vomiting.

- Ensure that all residents wash their hands after using the bathroom, before meals and after any episode of diarrhea or vomiting.
- Isolate ill residents from others by confining them to their rooms until at least 48 hours after their last symptoms resolve.
- Group ill people together (cohort), if possible.
- Discontinue activities where ill and well residents would be together.
- Group activities should be kept to a minimum or ideally postponed until the outbreak is over.
- Avoid transferring residents to “sister facilities” or other institutions while cases of gastroenteritis are occurring. If a transfer is necessary, the receiving institution must be notified of the outbreak.

Staff-oriented Prevention and Control Measures:

- Maintain strict hand hygiene when entering and leaving every resident room.
 - Wash hands with soap and water for at least 20 seconds when entering or leaving a room.
 - Alcohol-based hand sanitizers may be used when hands are not visibly soiled, though the effectiveness of these products against noroviruses are not consistently effective.
- Ill staff should stay home for a minimum of 48 hours after symptoms resolve.
- Staff should be assigned to work with either well residents or ill residents.
- All staff should wear gloves when caring for residents or handling bedding.
- Staff should wear masks when caring for a resident who is vomiting.
- Housekeeping staff should wear gloves and masks when cleaning contaminated or potentially contaminated surfaces or laundry.
- Ensure food staff are aware of the necessary precautions in designated food areas and educate food staff on the importance of hand washing.

Management of Norovirus in a Daycare Associated Outbreak:

- Exclude symptomatic children from day care until 24 hours after cessation of illness. Upon return, hand washing of children must be strictly monitored.
- Exclude symptomatic staff from work for at least 48 hours after cessation of illness.
- Staff hand washing, especially after changing diapers and before food preparation, must be strictly enforced.
- If possible, implement a cohort system (whereby infected children and staff are placed together in a separate area away from other children and staff.)
- Staff should wear gloves and masks when cleaning contaminated or potentially contaminated surfaces or laundry.

Management of Norovirus in a Restaurant or Hotel Associated Outbreak:

- Food handlers and preparers with gastroenteritis caused by norovirus should not work for at least 48 hours after complete resolution of signs and symptoms, unless the

employee can provide written medical documentation from a health practitioner stating that the food employee is free of a Norovirus infection

- In addition, because the virus continues to be present in the stool for as long as 2-3 weeks after the person recovers, strict hand washing after using the bathroom and before handling food items is important in preventing the spread of this virus.
- Food handlers who were recently sick can be given different duties in the restaurant so that they do not handle food (e.g., working the cash register or hosting).

Appendices

A. Instructions for Collection of Specimens

B. Checklist for Gastrointestinal Disease Outbreak – Healthcare Facility

References

Centers for Disease Control and Prevention. Updated Norovirus Outbreak Management and Disease Prevention Guidelines. MMWR March 4, 2011/ Vol. 60 (No. RR#3)

<https://www.cdc.gov/hai/organisms/norovirus.html>

Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. October 25, 2002 / Vol. 51 / No. RR-16

Centers for Disease Control and Prevention. "Norwalk-Like Viruses" Public Health Consequences and Outbreak Management Recommendations and Reports June 01, 2001 / 50(RR09); 1-18

The U. S. Food and Drug Administration (FDA) 2017 Food Code

American Academy of Pediatrics. In: Kimberlin, DW, et al eds. Red Book: 2021-2022 Report of the Committee on Infectious Diseases. 32nd ed. Itasca, IL: American Academy of Pediatrics; 2021.

Heymann, DL, ed. Control of Communicable Diseases Manual. 21st edition. Washington, DC: American Public Health Association; 2022.

Appendix A

Instructions for Collecting Norovirus Specimens

NMDOH epidemiologists will approve and coordinate testing for norovirus with Scientific Laboratory Division (SLD) by calling 505-827-0006.

1. Collect a fresh stool specimen (do not use a preservative or any enteric transport media) in a clean, dry container (e.g., urine cup). A minimum volume of one cc is recommended. Collection is best during the first 48 - 72 hours of illness while stools are still liquid or semi-solid (virus is excreted in the greatest amount during this time); however, norovirus can be found by PCR in formed stool up to seven days after symptoms resolve. While norovirus can be detected from vomitus specimens, this specimen type is NOT preferred. If vomitus is the only specimen available for testing, it may be submitted if testing is approved by ERD and coordinated with SLD. Collection of multiple specimens is advised to properly investigate the outbreak. A minimum of two positives is required for entry as an outbreak into CaliciNet.
2. Label each specimen container with the patient's first name, last name, patient ID, date of birth, date and time of collection, and name of the facility. Complete all of the information requested on the submission form clearly and carefully. Check the "Virus Isolation" box and write "Norovirus" in the "Other (specify)" section of the "Agent(s) suspected". Testing may not be performed if the specimen container is improperly labeled or if the submission form is incomplete.
3. Please indicate the facility name on the submission form and obtain a NORS ID from the foodborne epi program. Numerous norovirus outbreaks may be under investigation within a single geographic area and the facility name/NORS ID is used to track the specimen and to direct appropriate reporting of all testing to CDC via CaliciNet.
4. Specimens for norovirus testing should be refrigerated (not frozen), submitted as soon as possible after collection and placed on ice during transport to SLD. They can be stored in a refrigerator for up to 14 days and be acceptable for testing.
5. If requested, SLD can rule out *Salmonella*, *Shigella*, and Shiga-toxin positive *E. coli* (STEC). A portion of the stool specimen should be placed in Cary Blair enteric transport medium (pink liquid). Specimens collected in Cary Blair transport medium should be maintained at room temperature and received at SLD as soon as possible but no later than 48 hours after collection. Do not ship specimens in Cary Blair on ice.
6. Indicate "Norovirus Testing, PCR" on the outside of the shipping container. Many specimens are received by SLD each day and this will help to rapidly direct the specimens to the appropriate laboratories for testing. If specimens for norovirus testing are collected over a weekend, the specimens should be refrigerated at 35-45 degrees Fahrenheit and processed for shipment to SLD on Monday unless specific arrangements have been pre-coordinated with SLD.

Appendix B

Checklist for Gastrointestinal Disease Outbreak in Health Care Facility

Meet with director and/or infection preventionist:

- ✓ Explain the role of the department of health in helping to control/prevent the outbreak.
- ✓ Explain the disease.
- ✓ Encourage them to educate residents and visitors about how to prevent the spread of infection.
- ✓ Ensure that the facility understands proper sample submission protocol for specimen testing.
- ✓ Distribute educational materials (e.g. CDC setting specific fact sheets and hand washing poster).

Evaluate the facility’s policy for residents who are sick:

Do they isolate ill residents from others by confining them to their rooms?	Yes	No
If ill individuals are not housed in private rooms, does the facility group ill residents together when possible (i.e., cohorting)?	Yes	No

Evaluate the facility’s policy for staff members who are sick:

Are there clear criteria for excluding staff from work?	Yes	No
Are there criteria for returning to work after exclusion?	Yes	No
Are criteria being effectively implemented?	Yes	No

Evaluate visitor policies:

Are visitors restricted during outbreaks?	Yes	No
If visitation is allowed, are visitors directed to go to the person they are visiting and not spend time with anyone else?	Yes	No
Do visitors wash their hands upon entering and leaving the room?	Yes	No
Are visitors reminded not to visit if they are sick?	Yes	No

Evaluate residents’ hand washing:

Are, soap, running water, and paper towels available?	Yes	No
Is hand washing done properly (lather with soap for at least 20 seconds, rinse, turn off water with paper towel after drying hands)?	Yes	No

Are the sinks adequate and appropriate for varying levels of activities of daily living?	Yes	No
Do staff assist impaired residents wash their hands?	Yes	No
Do residents wash their hands:		
· After using the toilet?	Yes	No
· Before and after eating snacks and meals?	Yes	No

Evaluate staff hygiene: (Discretely observe hand washing several times during your visit.)

Are, soap, running water, and paper towels available?	Yes	No
Is hand washing done properly (lather with soap for at least 20 seconds), rinse, turn off water with paper towel after drying hands) or use of alcohol-based products if hands not visibly soiled?	Yes	No
Do staff wash their hands:		
· Upon entering and leaving every resident's room?	Yes	No
· After each diaper change or after assisting a resident with using the bathroom?	Yes	No
· Before preparing food or assisting residents with meals?	Yes	No
· Before administering medicine/treatments?	Yes	No
· Before eating?	Yes	No
· After toileting?	Yes	No
Do staff wear gloves when caring for ill residents or when touching potentially contaminated surfaces?	Yes	No
Are gloves discarded and hands washed immediately after completing patient care?	Yes	No

Evaluate environmental controls:

Has administration adjusted staffing to minimizing the flow of staff between sick and well residents?	Yes	No
Have activities where ill and well residents are together been discontinued?	Yes	No
Are group activities kept to a minimum or postponed until the outbreak is over?	Yes	No
Is there a policy for denying new admissions until the incubation period expires after the resolution of the last case?	Yes	No
Is an <u>appropriate</u> disinfectant used? (For example, 1/4 cup bleach per		

gallon of water prepared daily)?

Are areas contaminated with vomitus and/or diarrhea cleaned immediately with appropriate disinfectant?	Yes	No
Is a disinfectant used <i>at least</i> daily to clean surfaces such as handrails, doorknobs, physical/occupational therapy equipment?	Yes	No
Are contaminated linen and bed curtains placed into laundry bags immediately upon removal or use?	Yes	No
Are contaminated linen, laundry bags, and bed curtains washed separately in hot water for a complete wash cycle – ideally as a half load for best dilution?	Yes	No
Do housekeeping staff wear gloves when cleaning contaminated or potentially contaminated surfaces or laundry?	Yes	No
Do housekeeping staff wear masks when cleaning contaminated or potentially contaminated surfaces or laundry? (If norovirus suspected)	Yes	No

Are written hand washing instructions/reminders posted?

Yes No

Evaluate the cleanliness of the food preparation area.

Is there a hand washing sink in the kitchen with soap, running water, and paper towels?	Yes	No
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See Norovirus Infections Fact Sheets ([English](#)) ([Spanish](#)).