

## Noroviruses

Noroviruses (NoVs) were named after Norwalk, Ohio, where a NoV strain (subsequently called the Norwalk strain) caused the first sudden major diarrhea and vomiting outbreak (referred to as acute gastroenteritis or AGE) in 1968. In addition to causing disease in humans, some NoV strains have caused disease in cows, pigs and mice. There have been no documented cases of animal NoVs being transmissible to humans or vice versa.

The Centers for Disease Control and Prevention (CDC) estimates that each year in the U.S. NoVs are responsible for approximately 23 million infections resulting in 50,000 hospitalizations. In addition, NoVs are the leading cause of AGE in the U.S., NoV episodes have taken place on cruise ships and in healthcare settings (hospitals and nursing homes), hotels, retirement centers, and schools.

Although NoVs are currently more of a concern to the general public than to employees, the increasing incidence of NoV outbreaks exposes many different employee groups, especially healthcare workers (HCWs). For example, in a Maryland hospital in 2004, 265 HCWs developed AGE during a NoV outbreak. The percentage of HCWs affected was three times higher than the percentage of patients affected. Similarly, in an Oregon long-term care facility in April 2006 a relatively large number of employees (25) became ill with AGE.

### Employees at Potential Risk of Exposure

- Hotel employees (especially housecleaning employees);
- Cruise ship employees;
- Food service employees;
- Healthcare (hospital and nursing care) employees treating patients with known or suspected NoV infections;
- Retirement center employees;
- School/daycare employees.

### Symptoms of NoV Infection

According to the CDC, the usual time from exposure to onset of symptoms is 24 to 48

hours but can be as short as 12 hours. This illness is characterized by:

- Sudden-onset vomiting,
- Watery, non-bloody diarrhea with abdominal cramps, and
- Nausea.

### How People Become Infected

According to the CDC, NoVs are highly contagious, with as few as 10-100 virus particles being sufficient to cause infection. NoVs are transmitted primarily through food or water contaminated with fecal material. NoVs can also spread via droplets of vomit. Transmission can also occur indirectly when the virus is transferred to the mouth via the hands after contact with environmental surfaces that have been contaminated with either feces or vomit. NoVs are quite stable in the environment and can survive freezing.

### Treatment Options

There are no antiviral drugs for treatment of NoV infections, and no vaccines are currently available. Illness usually lasts 24 to 60 hours. Dehydration is the most common complication and may require intravenous replacement fluids.

### How to Limit NoV Transmission

- Practice good hand hygiene: After using the restroom, sneezing, coughing, and before and after food preparation, all employees should:
  - wash their hands with warm running water and soap, using friction for 15-20 seconds,
  - dry hands with a single-service paper towel or air dryer, or

- if soap and water are not available, use a waterless, alcohol-based hand rub with a minimum ethanol concentration of 60%.
- After handling contaminated materials avoid:
  - touching the face, especially the mouth; and
  - eating, drinking, smoking, applying lip balm or any facial cosmetics.
- Wear disposable gloves, surgical masks, eye protection or faceshields, and a gown or protective clothing:
  - when caring for diapered or incontinent persons,
  - during outbreaks in a facility,
  - when there is the possibility of splashes that might lead to contamination of clothing, and
  - when cleaning areas heavily contaminated with vomit or feces.
- During an outbreak, it may be best to place patients with suspected NoV in private rooms or to group such patients.

### Disinfecting Environmental Surfaces

Any surface (porous or non-porous) that is likely to have been contaminated by oral or fecal secretions from a NoV-infected person should be disinfected.

#### Most effective disinfectants

The CDC recommends using either chlorine bleach or U.S. Environmental Protection Agency (EPA)-approved disinfectants to control NoV outbreaks. All disinfectants should be used on clean surfaces (i.e., surfaces that are not visibly soiled) for maximum performance.

#### Chlorine bleach

Concentrations and mixing instructions  
**Use for food/mouth contact items, toys:**  
 1 tablespoon of bleach in 1 gallon water (1:250 dilution).

**Use for most non-porous surfaces:**  
 1/3 cup bleach in 1 gallon water (1:50 dilution).

**Use for heavily contaminated non-porous surfaces:**  
 1 and 2/3 cups bleach in 1 gallon water (1:10 dilution).

#### Contact time

Leave bleach on surface for 10-20 minutes and then rinse thoroughly with clean water.

#### Stability of Chlorine Bleach

- Once opened, bottles of household bleach will lose effectiveness after 30 days.
- Use a new unopened bottle of bleach every 30 days for preparing diluted disinfectant solutions.
- Prepare a fresh dilution of bleach (only from bleach bottles that have not been open for more than 30 days) every day of use and discard unused portions.

#### Other disinfectants

Heat disinfection [i.e., pasteurization to 140° F (60°C)] has been used successfully under laboratory conditions for items that cannot be subjected to chemical disinfectants such as chlorine bleach.

#### EPA's Registered Antimicrobial Products Effective Against NoVs

EPA-registered disinfectants should be used according to manufacturers' instructions, including the use of proper PPE recommended by the manufacturer when applying the product. For a list of these disinfectants see: [www.epa.gov/oppad001/list\\_g\\_norovirus.pdf](http://www.epa.gov/oppad001/list_g_norovirus.pdf).

#### Cleaning large spills of vomit or feces

- Visible/organic debris should be removed carefully to minimize airborne particles. Use double-layered absorbent material and discard in a sealed plastic bag.
- Liberally disinfect area and objects surrounding the contamination with an appropriate environmental disinfectant (multiple applications may be required).
- Ensure appropriate dilution and contact time for the environmental disinfectant.

#### Non-porous surfaces; Hard surfaces

- Examples include: bath rails, chairs (all wooden, plastic, and steel parts), counters, doorknobs, elevator buttons, faucets, handrails, light switches, phones, tables, toilets, sinks, etc.)
- Disinfect with chlorine bleach; rinse with water for food preparation areas.

#### Porous surfaces: Carpets/Upholstered Furniture

- Examples include carpets and upholstered chairs and sofas.
- Visible debris should be cleaned with ab-

sorbent material (double layer) and discarded in a plastic bag to minimize airborne particles.

- Steam clean (heat inactivation) 158° F for 5 minutes or 212° F for 1 minute for complete inactivation. Disinfecting with bleach may discolor carpets and/or upholstered furniture.

#### **Other porous surfaces: Clothing/linens/textiles**

- Examples include: aprons, bedding, linens, mattress covers, uniforms, window coverings.
- If soiled, vomit or feces should be carefully removed to minimize airborne particles that may pose a risk for transmission. Do not shake soiled linens and laundry. Soiled linens should be placed directly into a bag at the point of removal.
- Ensure proper separation of clean and soiled laundry.
- Wash items in a pre-wash cycle, then use a regular wash cycle using detergent.
- Dry contaminated material separately at a temperature greater than 170° F.
- It may be best to discard certain soiled materials rather than risk exposure during cleaning.
- For additional laundry information see: [www.cdc.gov/ncidod/dhqp/gl\\_environmental\\_infection.html](http://www.cdc.gov/ncidod/dhqp/gl_environmental_infection.html).

#### **Ice Machines**

- Contaminated ice machines must be disinfected.

For procedures, see: [www.cdc.gov/ncidod/dhqp/pdf/guidelines/Enviro\\_guide\\_03.pdf](http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Enviro_guide_03.pdf).

#### **What Ill Employees Should Do**

- Ill employees should be sent home immediately.
- Employees who have been ill with suspected NoV should not return to work for 48 to 72 hours after symptoms have ended.
- Do not travel while sick; stay home and limit contact with others as much as possible to help prevent the spread of the virus.

### **Additional Procedures that Healthcare Facilities Should Follow**

#### **Occupational Health Policies**

- Refer to Occupational Health unit for employee health policies on work restrictions and return to work policies (See: [www.cdc.gov/ncidod/dhqp/gl\\_hcpersonnel.html](http://www.cdc.gov/ncidod/dhqp/gl_hcpersonnel.html)).

#### **Medical Equipment Cleaning Precautions**

- Medical equipment used for care of NoV-infected patients should be either:
  - dedicated to that room for the duration of isolation, or
  - be thoroughly disinfected upon removal from the room.
- Selection of appropriate cleaning agents should be consistent with the equipment manufacturer's recommendations.
- Some medical equipment may not be able to be immersed in liquid disinfectants. Follow your facility's infection control plan and/or the equipment manufacturer's instructions for appropriate disinfection procedures for medical equipment.

#### **Cleaning Procedures**

- For cleaning procedures (i.e., changing water/washcloths, sequence of cleaning) refer to CDC/HICPAC (Healthcare Infection Control Practices Advisory Committee) Environmental Infection Control in Healthcare Facilities, 2003. (See: [www.cdc.gov/ncidod/dhqp/gl\\_environmental\\_infection.html](http://www.cdc.gov/ncidod/dhqp/gl_environmental_infection.html).)

#### **Training**

Employees with potential for NoV exposure should receive training on hazards associated with exposure to NoVs and on hazards the procedures in place in their facility to isolate and report cases and reduce exposures.

#### **Additional Information**

Centers for Disease Control and Prevention (CDC) Norovirus (last updated June 6, 2006): [www.cdc.gov/norovirus](http://www.cdc.gov/norovirus)

Environmental Protection Agency (EPA): List G: EPA's Registered Antimicrobial Products Effective Against Norovirus (Norwalk-like virus) January 16, 2007. [www.epa.gov/oppad001/list\\_g\\_norovirus.pdf](http://www.epa.gov/oppad001/list_g_norovirus.pdf)

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