Norovirus

Transmission, Exclusion

Transmission
- Fecal-oral
- Ingestion of aerosolized vomitus
- Indirect:

-exposure to fomites

--contaminated water or food

Infectious dose: low, 10 particles

Incubation 12-48 hrs.

Sporadic cases
Outbreaks:
- Cruise ships, hotels
- Nursing homes, long-term care facilities
- Restaurants, catered events
- Contaminated water supply

Very common:

-5-17% of all diarrheal

-50% of food-borne cases

GastroEnteritis 12-60 hrs.
Diarrhea, Nausea, Abdominal pain, Vomiting,
Myalgia, Fatigue, Headache
Low fever, Chills

Complications: Severe dehydration is possible and may be fatal to the very young/old.

Communicability
15-72 hrs. (as long as 3 wks.)

Exclude:
- Isolate infected members of long-term care or living facilities
- Food-handlers (symptomatic)
- Health care workers (symptomatic)

Hardy, ubiquitous, extremely persistent (can withstand extreme conditions)

Diagnosis

Calicivirus
-5 genogroups (GI, II, and IV affect humans) and 30+ genotypes
-Sequencing of strains allows linking cases to common source

Kaplan Criteria for Diagnosis during outbreaks
- Median illness duration of 12-60 hrs.
- Incubation period of 24-48 hrs.
- More than 50% of people vomiting.
- No bacterial agent

Lab Diagnosis

- **RT-PCR:** Test stool, emesis, environmental samples.
Most effective with specimens obtained within 48-72 hrs. of infection.
- **Direct & immune electron microscopy of fecal specimens-** early stage of illness
- **Seroconversion:** >4-fold rise in IgG antibody titer during acute/convalescent phase sera (acute phase serum drawn within first 5 days, convalescent phase 3-6 weeks later)
- **Enzyme linked immunosorbent assays** – single assays of IgA antibody for quick diagnosis. Not as sensitive.

Treatment

No specific treatment currently available.
Make sure to **rehydrate** and restore electrolyte balance.

Contact precautions Control

1. Prevention of initial contamination of food/water sources
2. Prevent person-to-person spread

Food:
- Shellfish (oysters, clams) should be cooked completely. Steaming may not be sufficient.
- Fruits, vegetables should be washed thoroughly.

Able to survive **freezing**, **heat** (60ºC), **10 ppm chlorine**

- Disinfect soiled surfaces using 5000 ppm sodium hypochlorite (bleach)
- Wash soiled linens/clothes with detergent in hot water
- Avoid preparing food while infected
- Wash hands (with soap and water) frequently

Food-handlers should be excluded from work for 3 days after cessation of symptoms, and should be vigilant about washing hands and wearing gloves for 3 weeks.

-Exclusion of health care workers, food workers until symptoms subside + 48 hrs

-Isolation of residents in long-term care centers

Disinfection (For non-visibly soiled areas - please refer to specific procedures for large spills)

Examples of items to disinfect: Doorknobs, faucets, sinks, toilets, commodes, bath rails, phones, counters, chairs (including backs), tables, hand rails, elevator buttons, light switches, mattress covers, aprons, uniforms, linens, bedding and ice machines.

Best: Chlorine bleach (sodium hypochlorite - NaOCl)

Chlorine bleach concentrations and mixing instructions:

- For stainless steel, food/mouth contact items, toys: 200ppm (parts per million ➔ 1 Tablespoon of bleach in 1-gallon water (1:250 dilution)
- For non-porous surfaces, tile floors, counter-tops, sinks, toilets: 1000ppm (parts per million) ➔ 1/3-cup bleach in 1-gallon water (1:50 dilution)
- For porous surfaces, wooden floors: 5000ppm (parts per million) ➔ 1 cup bleach plus 2/3-cup bleach in 1-gallon water (1:10 dilution)

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

Stability of chlorine bleach: Open bottles of concentrated chlorine bleach <30 days. Diluted chlorine: Replace every day, discard day old

Use in well ventilated areas to avoid respiratory irritation. Do not mix bleach with ammonia or acid (release of chlorine gas or chloramines

Other effective disinfectants:

- Glutaraldehyde (0.5%) or Iodine (0.8%) mixed at the manufacturer's recommendations.
- A phenolic environmental disinfectant (Lysol® or Pinesol®) effective, but requires a concentration of 2-4 x manufacturer's recommendation. High concentration ➔significant health risk to children, workers, pets. Use extreme caution when using these products.
- Other EPA approved disinfectants: Quaternary ammonia-based disinfectants but in combination with alcohols.

EPA's Registered Antimicrobial Products Effective Against Norovirus: http://www.epa.gov/oppad001/list_g_norovirus.pdf

For food establishments see list below.

Clean Up Procedures

Personal Protective Equipment

- Disposable gloves, masks, eye protection or face shields, and gown or protective clothing
- Environmental cleaning using a more concentrated disinfectant will require a heavier duty glove than a simple non-sterile latex/vinyl glove.

Specific Clean-up Procedures : For cleaning large spills of vomitus or stool, a two-step process should be used. Put on personal protective equipment before cleanup as specified in the CDC document: http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html

1-First pre-cleaning of visible/organic debris with absorbent material (double layer and placed in a plastic bag to minimize exposure to aerosols)

2-Then liberally disinfect area and objects surrounding the contamination with an appropriate disinfectant (multiple applications may be required).

*Ensure appropriate dilution and contact time for the appropriate environmental disinfectant.

Hard surfaces: Disinfect with bleach, rinse with water if food preparation area.

Carpet / Upholstered Furniture: Visible debris should be cleaned with absorbent material (double layer) and placed in a plastic bag to minimize exposure to aerosols - disinfecting with bleach may discolor carpet – steam clean (heat inactivation) 158°F for 5 minutes or 212°F for 1 minute for complete inactivation.

Linens / clothing / textiles: If soiled, vomit or stool should be carefully removed to minimize aerosols. Keep contaminated and uncontaminated clothes separated. Minimize disruption of soiled linens and laundry. Aerosols created may pose a risk for transmission. Wash items in a pre-wash cycle, then use a regular wash cycle using detergent and dried separately from uncontaminated clothing at high temperature greater than 170°F. Ensure segregation of clean and soiled linens/clothing/textiles.

Surfaces Corrodible/damageable by bleach: EPA registered phenolic solutions (concentrated Lysol® or concentrated Pinesol®) mixed at 2-4X the manufacturer's recommended concentration.

Food Service Establishments

Sick employees: exclude from food preparation and handling clean equipment; preferably send home and stay away for 48 hrs after symptoms subside

Hand washing: After using the restroom, sneezing, coughing, before and after food preparation, all employees should wash hands with warm running water and soap, using friction for 20 seconds. Hands should be dried with a single-service paper towel or air dryer. Persons involved in busing tables, handling of used utensils; cups or any dishes exercise regular thorough hand washing, particularly before eating or handling food or clean utensils.

Disinfection Precautions not all disinfectants shown on EPA list

- Product label must contain language stating approval for use in (FDA or USDA) food facilities AND provide appropriate directions for use/application rates in these settings. Consult the manufacturer for further information on approval for use on food contact surfaces and/or in food service facilities.

http://www.access.gpo.gov/nara/cfr/waisidx_99/21cfr178_99.html

Healthcare/Hospital/Nursing Home Facilities

Occupational Health Policies: http://www.cdc.gov/ncidod/dhqp/gl_hcpersonnel.html

Medical Equipment Cleaning Precautions: Medical equipment used for care of norovirus infected patients, should be either dedicated to that room for the duration of isolation or be thoroughly disinfected upon removal from the room.

Cleaning Procedures: Routine environmental cleaning measures, at proper time intervals, and proper disinfection order, with the recommended concentration and contact time

- For cleaning procedures (i.e. changing water / wash cloths, sequence of cleaning) refer to HICPAC Environmental Infection Control for Healthcare Facilities, 2003 http://www.cdc.gov/ncidod/dhqp/gl_environinfection.html pgs.71-88.

Laundry Concerns: Do not shake soiled linens and laundry. Aerosols created may pose a risk for transmission. Soiled linens should be placed directly into a bag at the point of removal. Ensure proper separation of clean and soiled laundry.

Ice Machines

- Contaminated ice machines must be disinfected. For protocols see http://www.cdc.gov/hicpac/pubs.html.