SALT LAKE COUNTY
HEALTH DEPARTMENT

Viral Gastroenteritis

NOROVIRUS

Guidelines for Environmental Cleaning and Disinfection of Norovirus

Noroviruses are a group of viruses that cause acute gastroenteritis in humans. The symptoms of norovirus infection include nausea, vomiting, diarrhea, cramping and low-grade fever. Noroviruses are transmitted through the fecal-oral route, either by consumption of fecally-contaminated food or water, direct person-to-person spread or environmental and fomite (inanimate object or substance that is capable of transmitting infectious organisms) contamination.

Materials needed:
Disposable gloves, masks, eye protection or face shields, and gown or protective clothing. *Please don all materials before beginning cleaning procedure.* For questions about personal protective equipment, refer to: http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf, Part II.E.

General warning:
Chlorine bleach may damage fabrics and other surfaces. Please spot test area before applying to visible surface.

This document contains information for:

- Disinfection
- Health concerns with using chlorine bleach
- Specific clean-up procedures
- Food service establishments
- Healthcare/Hospital/Nursing home facilities
- References

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Disinfection

(For non-visibly soiled areas, please refer to Specific clean-up 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, keyboards, mattress covers, aprons, uniforms, linens, bedding and ice machines.

1. **What works best: chlorine bleach (AKA sodium hypochlorite, NaOCl)**

   Chlorine bleach concentrations and mixing instructions:

   200ppm (parts per million) - 1:250 dilution
   - **Use for stainless steel, food/mouth contact items, toys**
   - **1 tablespoon bleach in 1 gallon water**

   1000ppm (parts per million) - 1:50 dilution
   - **Use for non-porous surfaces, tile floors, counter-tops, sinks, toilets**
   - **1/3 cup bleach in 1 gallon water**

   5000ppm (parts per million) - 1:10 dilution
   - **Use for porous surfaces, wooden floors**
   - **1½ cup bleach in 1 gallon water**

   Stability of chlorine bleach:
   Open bottles of concentrated chlorine bleach will lose effectiveness after 30 days. Change bottles of bleach every 30 days for accurate concentrations. For disinfecting, use an unopened bottle of chlorine bleach. Prepare a dilution of fresh bleach every day of use and discard unused portions.

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Bleach dilutions clarified with household measurement terms

Bleach Solution	Exact Dilution	Chlorine (ppm)	Approximate Dilution	Approximate Chlorine (ppm)	Application*
5.25-6.15%	None	52,500-61,500	None	52,500 - 61,500	Patient Care
	1:10	5,250-6,150	1.5 cups / 1 gallon	~6000	Patient Care
	1:100	525-615	0.25 cup / 1 gallon	~600	Patient Care
	1:200	263	1 tablespoon / 1 gallon	<200	Dietary
	1:1000	53-62	1 teaspoon / 1 gallon	~50	Dietary

*see References 14 & 15; the glossary in the CDC guidelines provides bleach dilutions using household measurement terms and equivalent parts per million (ppm) that can be used to translate recommendations for use in the patient care setting for environmental decontamination after cleaning, e.g., for *Clostridium difficile*. The Safety Institute has expanded the information to include the use of chlorine bleach as a sanitizing agent in dietary settings consistent with EPA U.S Govt regulations (21 CFR Part 178).

2. **Other effective disinfectants**

- A phenolic environmental disinfectant (Lysol® or Pinesol®) may be effective, but may require a concentration of **2-4X** the manufacturer's recommendation. The use of this product at the higher concentration may pose a significant health risk to children, workers, pets or yourself. Use extreme caution when using these products. Please read the manufacturer's warning.

- Environmental Protection Agency (EPA)-registered disinfectants

  Note: Some of these products now include quaternary ammonia-based disinfectants but in combination with alcohols. These claims of effectiveness are based on in-vitro studies usually using feline calicivirus; field effectiveness in the context of outbreaks has not been evaluated.

  List of EPA's registered antimicrobial products effective against norovirus:
  http://www.epa.gov/oppad001/list_g_norovirus.pdf

****NOT ALL DISINFECTANTS ON EPA LIST ARE APPROVED FOR USE IN FOOD FACILITIES****
Please see Food Service Establishments Section

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Health concerns with using chlorine bleach

Mixing hazards

- USE ONLY IN WELL-VENTILATED AREAS. Adverse effects of inappropriate mixtures of household cleaners usually are caused by prolonged exposure to an irritant gas in a poorly ventilated area. The most common inappropriate mixtures of cleaning agents are bleach with acids (like vinegar) or ammonia (Windex®). Potential irritants released from such mixtures are chlorine gas, chloramines, and ammonia gas.

Health hazards

- Chlorine bleach is corrosive and irritating to all mucosal tissue, skin, eyes and upper and lower respiratory tract. Avoid spray bottle application with any disinfectant. However, "pour" or "pump" bottles that do not produce aerosols are highly recommended.

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.

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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/pdf/isolation/Isolation2007.pdf

1. Pre-cleaning of visible/organic debris with absorbent material (double layer and placed in a plastic bag to minimize exposure to aerosols) should precede the disinfection process.

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

   *Ensure appropriate dilution and contact times 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; instead, 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 or damageable by bleach

- EPA-registered phenolic solutions (concentrated Lysol® or concentrated Pinesol®) mixed at **2-4X** the manufacturer's recommended concentration.

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Food Service Establishments

Ill employees

All documents refer to Salt Lake County Health Department Health Regulation #5:
http://www.slcohealth.org/envRegs/pdf/05food_20120731.pdf

1. Exclusion:

   Food handlers who are ill with gastrointestinal symptoms MUST NOT prepare or serve food for others under any circumstances. Any employee with vomiting or diarrhea or diagnosed with norovirus must be sent home immediately, unless their symptoms are the result of a non-infectious condition (e.g. pregnancy or Crohn's Disease) **(4.2.6.i.a and 4.2.6.i.b)**.

2. Removal of exclusion

   - Suspected norovirus:

     Employees ill with *suspected* norovirus MUST not return to work until 24 hours after symptoms have ended or MUST provide medical documentation that the symptom is from a non-infectious condition **(4.2.7.i.a)**; however, it is **highly recommended** that employees ill with suspected norovirus do not return to work until 48-72 hours after symptoms have ended.

   - Confirmed norovirus in a food handler **serving a non-highly susceptible population**:

     Employees who have been *diagnosed* with norovirus may return on a *restricted* basis (i.e. restricted from working with exposed food, clean equipment, utensils, and linens, unwrapped single-service and single use articles) in the food establishment no sooner than 24 hours after symptoms resolve **(4.2.7.i.b.i)**. They remain restricted until they meet the following conditions:

     - Approval is obtained from the Regulatory Authority **(4.2.7.iv)**, AND
     - They have been medically cleared **(4.2.7.iv.a)**, OR
     - More than 48 hours have passed since the employee's symptoms have resolved **(4.2.7.iv.b)**, OR
     - They did not develop symptoms and more than 48 hours have passed since diagnosis **(4.2.7.iv.c)**.

   - Confirmed norovirus in a food handler **serving a highly susceptible population**:

     Employees who have been *diagnosed* with norovirus are excluded from work until they meet the following requirements:

     - Approval is obtained from the Regulatory Authority**(4.2.7.iv)**, AND
     - They have been medically cleared **(4.2.7.iv.a)**, OR
     - More than 48 hours have passed since the employee's symptoms have resolved **(4.2.7.iv.b)**, OR
     - They did not develop symptoms and more than 48 hours have passed since diagnosis **(4.2.7.iv.c)**.

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.
- It is recommended that persons involved in busing tables and/or handling of used utensils, cups or dishes exercise regular thorough hand washing, particularly before eating or handling food or clean utensils.

Disinfection precautions

- NOT ALL DISINFECTANTS ON EPA LIST ARE APPROVED FOR USE IN FOOD FACILITIES: http://www.epa.gov/oppad001/list_g_norovirus.pdf
- **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.**
- Any pesticide product intended for sanitizing inanimate food contact surfaces must be approved by FDA under 21CFR178.1010. See link below for approved chemicals: http://www.access.gpo.gov/nara/cfr/waisidx_99/21cfr178_99.html

Healthcare/Hospital/Nursing home facilities

Occupational Health policies

- Refer to Occupational Health for employee health policies for work restrictions and return to work policies: http://www.cdc.gov/hicpac/pdf/InfectControl98.pdf.

EPA-registered hospital-use disinfectant

- Ensure appropriate use EPA-registered hospital-use disinfectant (see Disinfection section).

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. Please consult terminal cleaning recommendations for your facility. Selection of appropriate cleaning agent should be consistent with the equipment manufacturer's recommendation for compatibility.

Cleaning procedures

- Routine environmental cleaning measures, at proper time intervals, and proper disinfection order, with the recommended concentration and contact time should be used.
- 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/hicpac/pdf/guidelines/eic_in_HCF_03.pdf, 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.
- For additional laundry information, refer to: http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf, pgs 98-104.

Ice machines

- Contaminated ice machines must be disinfected.
- For protocols, refer to: http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf, pgs 65-67.

This information was prepared by Michigan Department of Community Health, Communicable Disease Division and modified for use by Salt Lake County Health Department, Epidemiology Bureau.

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