

## **NOROVIRUS:**

### **Prevention and Disinfection in Food Processing and Food Service Facilities**



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Norovirus is the leading cause of illness and outbreaks from contaminated food in the United States. Most of these outbreaks occur in the food service settings like restaurants. Infected food workers are frequently the source of the outbreaks, often by touching ready-to-eat foods such as raw fruits and vegetables with their bare hands before serving them. Any food served raw that is handled after being cooked or placed on contaminated surfaces can become contaminated with Norovirus<sup>1, 2</sup>.

- People with norovirus illness shed billions of virus particles in their stool and vomit and can easily infect others.
- Norovirus is highly contagious and can spread quickly in enclosed places like daycare centers, nursing homes, schools, and food service establishments.
- Norovirus can spread to surrounding surfaces through aerosols, increasing the risk of spreading the illness to others.
- Norovirus can stay on objects and surfaces and still infect people for days or weeks.

### **PREVENTION IS THE KEY**

In the food industry, preventing Norovirus outbreaks is critical. Through proper, ongoing training, and following these practices, food workers can help prevent the spread of Norovirus in the workplace<sup>3</sup>.

- Any food worker that is ill should stay home to prevent spreading the virus.
- Practice proper hand washing and drying.
- Avoid touching ready-to-eat food such as raw vegetables and fruits with bare hands.
- Regular cleaning and disinfection of food preparation and food services areas in addition to restrooms and public high touch points.
- Immediately quarantine any contaminated area and perform a thorough cleaning and disinfecting of the area.

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<sup>1</sup> CDC 2014 MMWR 63(22);491-495

[https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6322a3.htm?s\\_cid=mm6322a3\\_w](https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6322a3.htm?s_cid=mm6322a3_w)

<sup>2</sup> CDC 2011 MMWR 60(RR03); 1-15

[https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm?s\\_cid=rr6003a1\\_w](https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm?s_cid=rr6003a1_w)

<sup>3</sup> CDC 2014 Vital Signs <https://www.cdc.gov/vitalsigns/norovirus/index.html>



### **PROPER HAND WASHING**

Proper hand washing remains the front line of defense against transmission of Norovirus and other germs. Food workers should wash their hand before, during and after food preparation. In addition, hand washing is critical after using the restroom, after blowing your nose, sneezing or coughing and after touching garbage.

The CDC recommends the following steps to proper hand washing<sup>4</sup>:

- Wet hands with clean, warm water.
- Apply soap and scrub hands for at least 20 seconds, making sure to lather the backs of hands, between fingers, and under nails.
- Rinse hands well under clean, running water.
- Dry hands using a clean towel.

### **ENVIRONMENTAL DISINFECTION**

Isolate the contaminated area after an incident of vomiting or diarrhea and minimize the number of people allowed in the area. Clean up and disinfection should follow the established protocols for such an event and should include the following key steps<sup>5</sup>:

1. **Dispose of exposed food:** Any food potentially exposed to Norovirus should be immediately discarded.
2. **Wear Personal Protective Equipment (PPE):** Before cleaning a contaminated area, an employee should have a disposable mask, disposable gloves and eye protection. A disposable smock or apron is also recommended.
3. **Clean and Disinfect:** The contaminated area and surrounding surfaces must be cleaned and then disinfected, including high touch or frequently touched surfaces (i.e. doorknobs). Any organic matter (vomit or diarrhea) should be covered to reduce airborne exposure. If a biohazard spill kit is not available, the organic matter should be wiped up with a paper towel that has been saturated with a disinfecting agent. Absorb liquid from carpets or upholstery with baking soda or kitty litter if a biohazard kit is unavailable.

Wash surfaces with soapy water then rinse with plain water and dry with paper towels. Cleaned surfaces should be disinfected using an EPA approved product registered with claims against norovirus as directed on the label or with a chlorine bleach solution with a concentration of 1000 – 5000 ppm (5-25 tablespoons household bleach (5.25%) per gallon of water) for 5 minutes<sup>6</sup>. Carpet and upholstered areas may be steam cleaned, if preferable.

If using bleach as described above or an EPA registered disinfectant at concentrations greater than allowed for use on food contact surfaces without a rinse, all food contact surfaces must be rinsed with potable water after disinfection and then sanitized with an approved food contact surface sanitizer prior to food contacting the surface. See “THE DISINFECTANT CHALLENGE” section below.

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<sup>4</sup>. CDC Hand Washing <https://www.cdc.gov/handwashing/index.html>

<sup>5</sup> National Restaurant Association Educational Foundation, 2016 ServSafe Norovirus Clean-Up [https://www.servsafe.com/ServSafe/media/ServSafe/Documents/NoroVirus\\_Clean-Up.pdf](https://www.servsafe.com/ServSafe/media/ServSafe/Documents/NoroVirus_Clean-Up.pdf)

<sup>6</sup> CDC Stop Norovirus! <https://www.cdc.gov/norovirus/images/stop-norovirus-lg.jpg>



All soiled clothing that has touched organic matter should be removed and washed with hot water and detergent. If possible, these items should be bleached. Any employees whose clothing has been contaminated should be sent home to shower and change clothing.

All paper towels, solid matter and disposable cleaning equipment used in clean-up should be carefully placed into plastic trash bags and double bagged before discarding in the trash. Other non-disposable items used in clean-up should be properly disinfected. Any individual involved in clean-up should then wash and dry their hands, faces and any other exposed areas that may have come in contact with organic matter during clean-up.

### **THE DISINFECTANT CHALLENGE**

Regular sanitization of contact surfaces both directly and indirectly in contact with food is a critical component of any food safety system. Most establishments utilize registered food contact surface sanitizers throughout their facility for this purpose, however, most of these sanitizers are ineffective in inactivating and removing foodborne viruses at concentrations permitted by the Environmental Protection Agency and Food and Drug Administration. This leaves these contact surfaces particularly vulnerable to spreading pathogens, including foodborne viruses.

When food contact surfaces are treated with biocides at concentrations effective against Norovirus and other foodborne viruses, those surfaces must be rinsed and then sanitized again using a concentration allowed on food contact surfaces without a rinse. This is an impractical series of additional steps to manage to achieve the level of protection necessary to help ensure food safety.

The CDC recommends disinfecting contaminated surfaces using a chlorine bleach solution with a concentration of 1000 – 5000 ppm or a disinfectant registered as effective against norovirus by U. S. Environmental Protection Agency (US EPA). A list of antimicrobial products registered as effective against Norovirus is available on the US EPA website<sup>7</sup>. These EPA registered disinfectants rely on test data against the surrogate Feline Calicivirus (FCV) to support registration. There is a significant amount of research suggesting that FCV is more sensitive to common biocides than the Human Norovirus (HuNov) and is, therefore, an unreliable surrogate. Murine Norovirus (MNV) is more genetically similar to HuNov and some researchers believe MNV to be a better surrogate to establish efficacy of a biocide against HuNov.

When choosing a biocide for use in response to a Norovirus incident, it is highly recommended that a product with registered claims against both Norovirus as Feline Calicivirus and Murine Norovirus is used. It is beneficial if that product is allowed to be left on food contact surfaces without requiring a rinse.

### **THE DISINFECTANT SOLUTION**

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<sup>7</sup> U. S. EPA List G: EPA's Registered Antimicrobial Products Effective Against Norovirus, <https://www.epa.gov/pesticide-registration/list-g-epas-registered-antimicrobial-products-effective-against-norovirus>



PURE Hard Surface is an EPA registered disinfectant and food contact surface sanitizer that has registered claims against both Norovirus (as Feline Calicivirus) and Murine Norovirus with a 60 second contact time. This formulation is allowed for use on food contact surfaces without a rinse, ensuring that food contact surfaces are sanitized and disinfected with one treatment.

Laboratory studies supporting PURE Hard Surface’s disinfection claims against Norovirus were performed following the EPA approved protocols for testing a disinfectant. The US EPA accepts carrier based virucidal test methods to support virucidal activity of a disinfectant which are modifications of the AOAC Use Dilution Test or the AOAC Germicidal Spray Products Test. Each virus claimed must be tested in an appropriate test system using a cell line which supports the growth of the virus. The method as outlined in the EPA Disinfectant Technical Science section (DIS-TSS 07) states:

To simulate in-use conditions, the specific virus to be treated must be inoculated onto hard surfaces, allowed to dry, and then treated with the product according to the directions for use on the product label. One surface for each of two different batches of disinfectant must be tested against a recoverable virus titer of at least  $10^4$  from the test surface (petri dish, glass slide, steel cylinder, etc.) for a specified exposure period at room temperature. The virus is then assayed by an appropriate virological technique.

In order for the data to be considered valid, the following criteria must be met:

1. Virus concentration after drying must be at least  $10^4$ .
2. Complete inactivation of the viruses at all dilutions is required. If cytotoxicity is evident, at least a 3 log reduction of virus concentration must be demonstrated beyond the cytopathic effect.
3. Cell controls must be negative for infectivity.

PURE Hard Surface was successful in demonstrating complete inactivation of the test virus according to the test criteria.

<b>Organism</b>	<b>Dried Virus Control</b>	<b>Log Reduction</b>	<b>Contact Time</b>
Murine Norovirus (MNV-1.CW1)	$10^{6.5}$	$\geq 6.0$	60 seconds
Norovirus –as Feline Calicivirus, ATCC VR-782	$10^{6.0}$	$\geq 5.88$	60 seconds

PURE Hard Surface is a Silver Dihydrogen Citrate (SDC) antimicrobial formulation of silver ions stabilized in citric acid.



#### *Mechanism of Action*

SDC utilizes a multiple prong attack against microorganisms. Silver ions are highly attracted to sulfur-containing thiol groups found in metabolic and structural proteins bound to the membrane surface. SDC targets these critical proteins and destroys their structure. This disruption of the organism's membrane function and integrity lyses the membrane and the organism dies. Unlike traditional antimicrobials, bacteria are actually attracted to SDC because they recognize citric acid as a food source. This "Trojan Horse" attack allows SDC to easily enter the microorganism through membrane transport proteins. Once inside the organism, SDC binds to DNA and intracellular proteins causing irreversible damage to the DNA and protein structure. Metabolic and reproductive functions halt, and the organism dies.

Viruses are much smaller than bacterial and fungal cells and do not have metabolic activity. Viruses present fewer target sites on which a biocide can act. Silver targets the viral envelope or capsid and the viral nucleic acid. Silver not only destroys the viral envelope or capsid, preventing the virus from attaching to a host cell, it also destroys the infectious component of the virus, the nucleic acid.

You can learn more about PURE Hard Surface at [www.purebio.com](http://www.purebio.com).

**PURE® HARD SURFACE SANITIZER/DISINFECTANT:**

EPA Registration Number 72977-5-73912 • NSF Non Food Compounds listed, D2 (144518)