

HUMAN NOROVIRUS REDUCTION ON STAINLESS STEEL AND PLASTIC SURFACES WITH COMMERCIAL DISINFECTANTS

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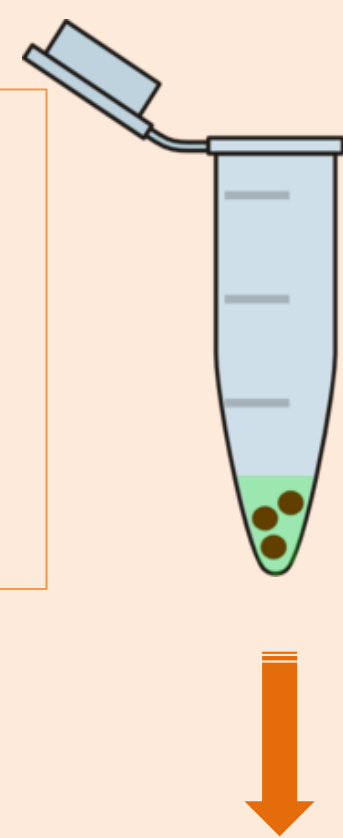


INTRODUCTION

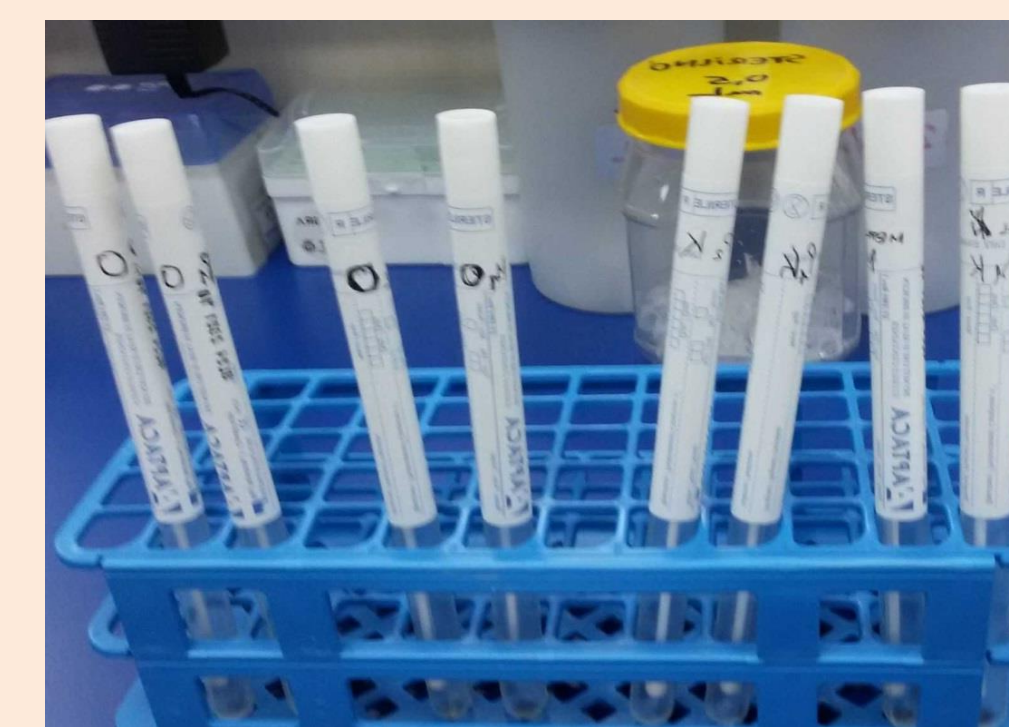
Human norovirus (HuNoV) is considered the most common cause of acute nonbacterial gastroenteritis in the world. They are spread primarily by fecal-oral route, either by consumption of contaminated food or water, direct person-to-person contact, or environmental and fomite contamination. Contamination of environmental surfaces plays an important role in the spread of noroviral infections, especially in indoor facilities, such as convention centers, restaurants, hospitals, schools, daycare centers, and institutions for the elderly. Their persistence in the environment and resistance to disinfectants considerably contribute to their transmission. Since norovirus can survive on surfaces for weeks, cleaning and decontaminating surfaces is critical. One of the effectiveness test for validation of a compound to be registered as a virucide, indicates that it is acceptable if a minimum 4 log reduction of virus particles is demonstrated compared to control.

The aim of this study was to test the efficacy of some commercially available disinfectants for norovirus inactivation on stainless steel and plastic surfaces.

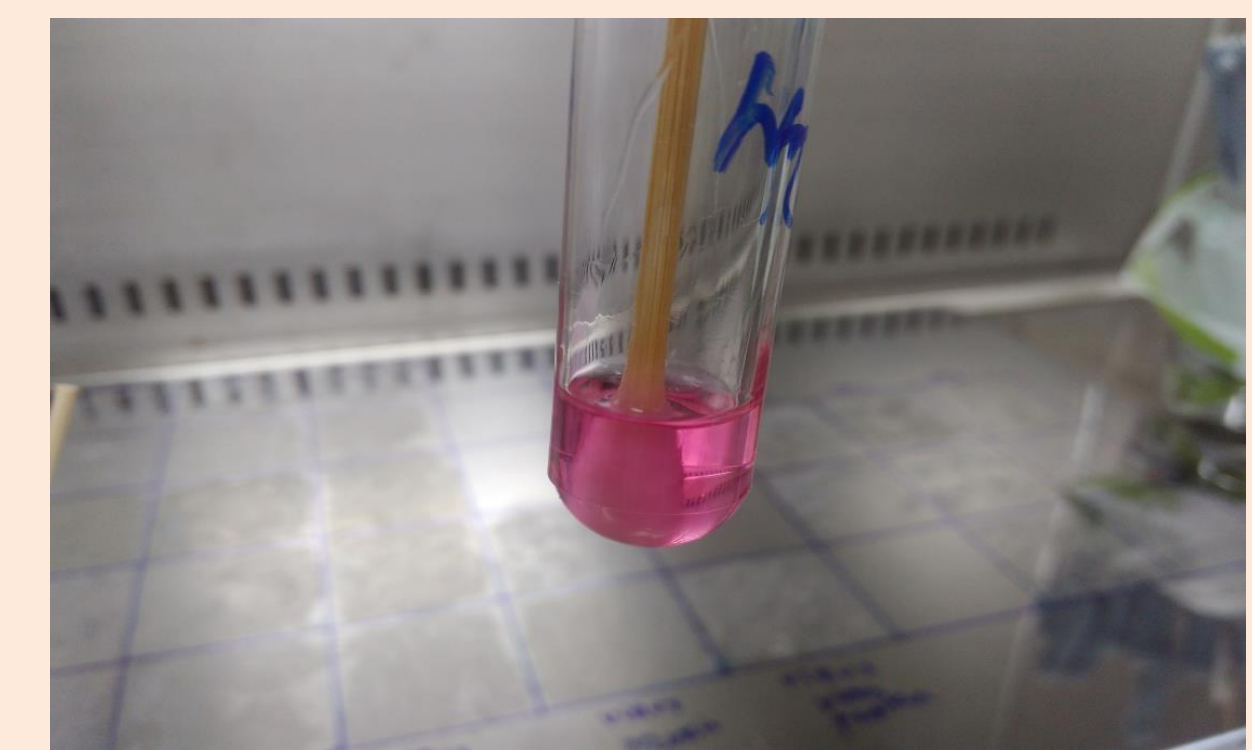
HuNoV suspension was obtained from the previously identified positive human fecal sample with high load of the virus particles



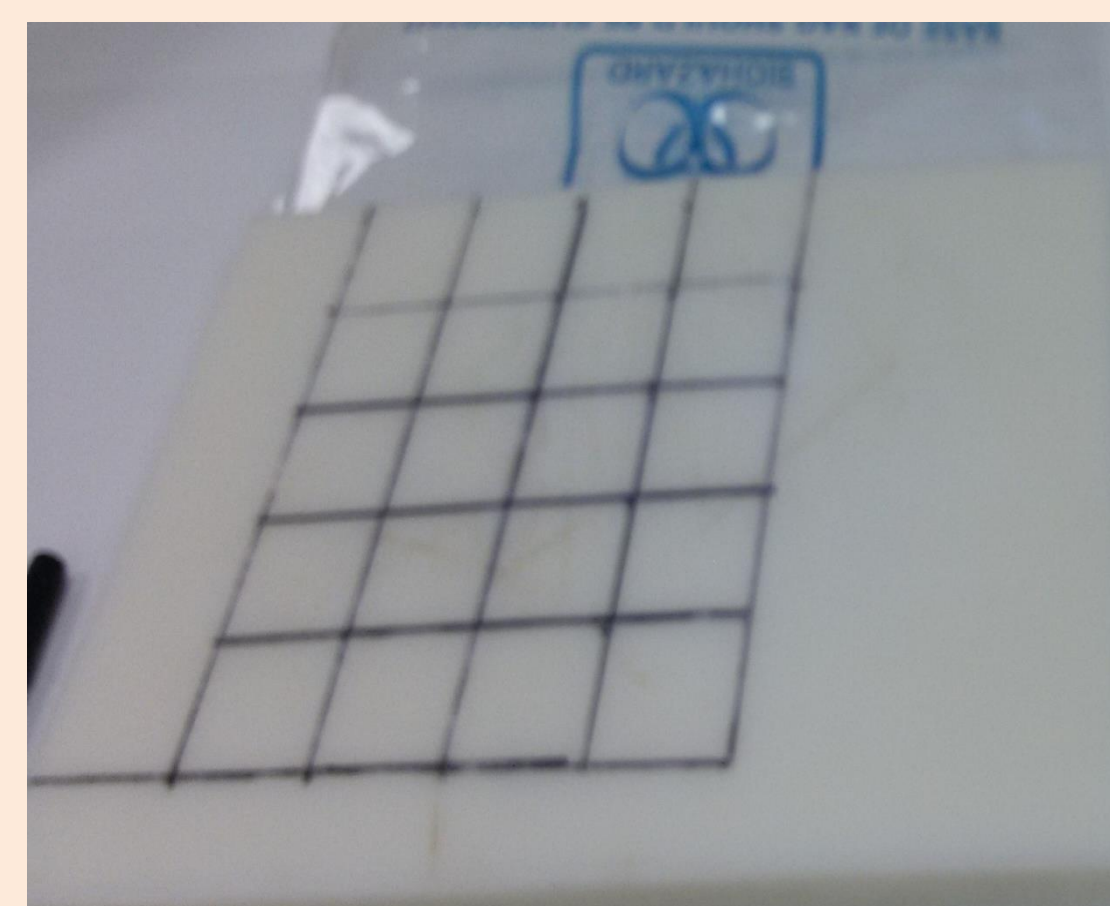
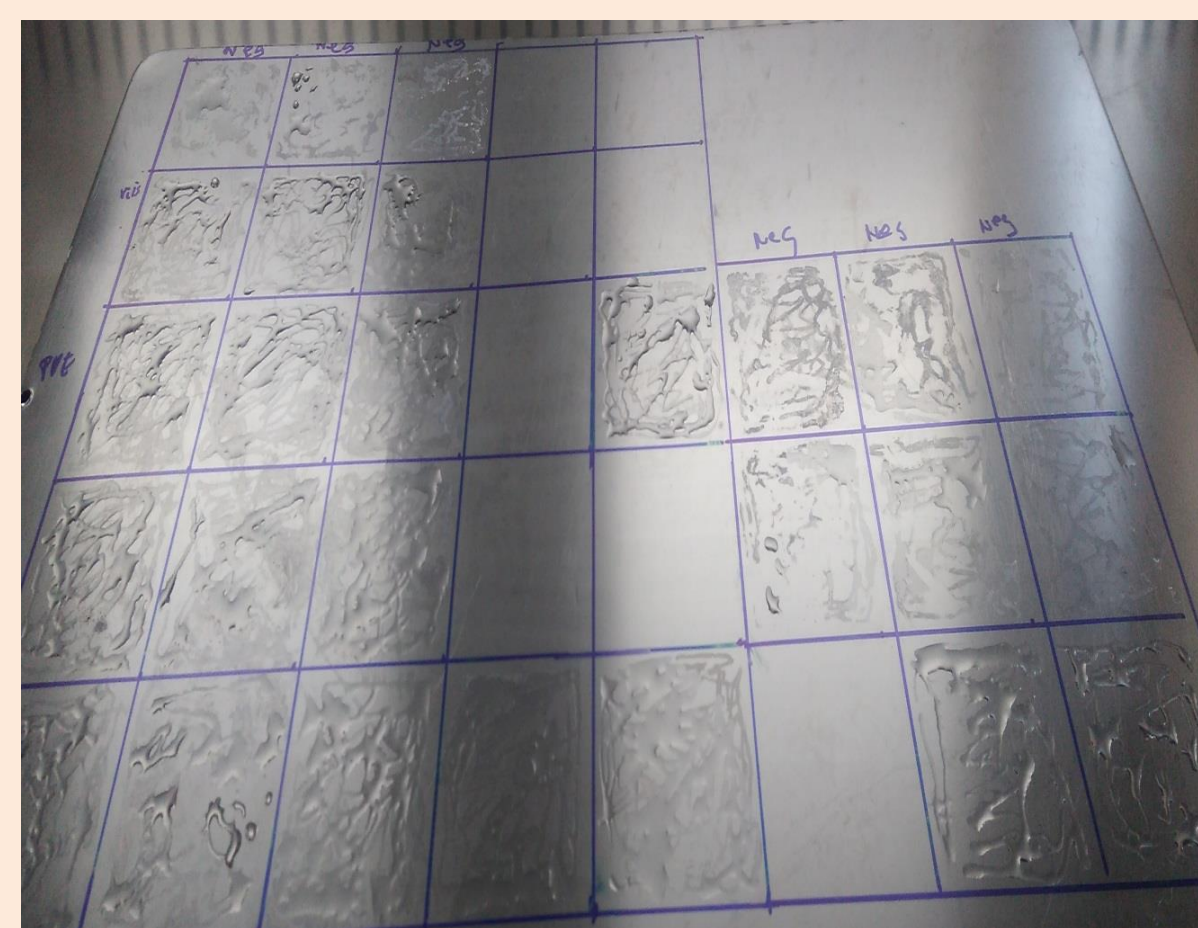
Swab method was used for sampling representative surfaces.



MATERIAL AND METHOD



HuNoV suspension (conc. 5 log GE/ μ L) was applied on representative surfaces and treated with hypochlorite based or chlorine-free disinfectants, with 5 and 15-minute contact time, with/without post rinsing the surfaces



RT-qPCR was completed by Norovirus Real-TM, Sacace Biotechnologies, Italy

Norovirus RNA Extraction-Trizol Method

- Collected swabs were placed in 1 mL of Trizol reagent.
- Added 200 μ L of chloroform
- Centrifuge until a clear boundary is formed between the aqueous and organic phase
- 500 μ L of isopropanol was added to the aqueous phase
- Formed white precipitate was washed with 1 mL of cold 70% EtOH.
- Resuspension of the precipitate in purified DNA / RNA free water, stored at -78 $^{\circ}$ C until use.

RESULTS

On stainless steel reduction of norovirus particles was higher with hypochlorite based disinfectant after 15 min contact time and post rinsing and amounted to 2.23 ± 0.03 log GE while chlorine-free disinfectant had no effect on norovirus reduction without post rinsing.

Similar effect for tested disinfectants was obtained on the plastic board regardless of the contact time.

Higher reduction was obtained by rinsing surfaces after treatments with hypochlorite based and chlorine-free disinfectants.

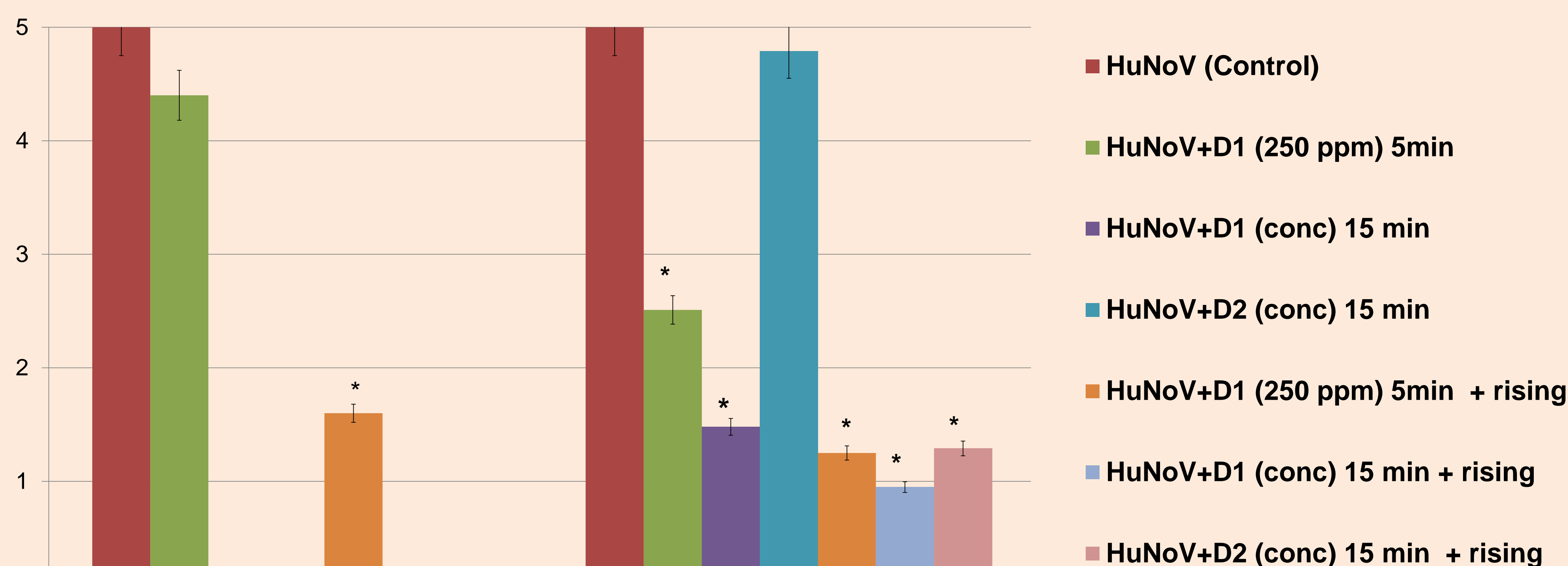


Fig 1. Reduction of human norovirus on stainless steel surfaces with commercial disinfection. Results are expressed as mean \pm standard deviation. Treatments were compared to the untreated controls (HuNoV on surfaces). All experiments were performed in 3 replicates and 3 independent experiments. Statistical significance: $p < 0.05$.

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CONCLUSION

Reduction of norovirus particles was higher with hypochlorite based disinfectant while chlorine-free disinfectant had no effect. The obtained results indicate that the additional measure of rinsing with water of the target surfaces is significant. Various factors, such as the type of disinfectant, method of application, type of material, should be taken into account when choosing measures to prevent and control environmental transmission of noroviruses.