Efficacy of UV-C Disinfection with or without Sodium Hypochlorite Compared to Usual Disinfection of Hospital Environmental Surfaces: Pilot study

**Abstract**

**Background:** The hospital environment is known to harbor pathogens that cause healthcare-associated infections (HAI)s. Sodium hypochlorite (NaClO) is a common method for disinfection. Nonetheless, ultraviolet C light (UV-C) seems to be less time-consuming and less prone to human errors.

**Methods:** This pilot study tested 3 different methods for terminal room disinfection: 1) NaClO, 2) UV-C; and 3) NaClO followed by UV-C. After patient discharge, cleaning was conducted by the cleaning staff of each hospital. Environmental samples were taken before and after cleaning and after every disinfection procedure from 3 high-touch areas: beds, railings, and tables. Our main objective was to calculate reductions in bacterial colony forming units (CFUs). We hypothesized that similar bacterial count reductions would be observed for the 3 methods.

**Results:** Eight rooms were tested in 4 hospitals in Mexico City (115 cultures). Median bacterial count reductions with their respective IQRs, adjusted to CFUs after cleaning, were: 1) NaClO only, 0.0 (0.0-0.0) after NaClO only; 2) UV-C only, 0.0 (0.0-1.0) after UV-C only; and 3) NaClO + UV-C, 0.4 (0.0-0.7) after NaClO + UV-C. The one-way repeated measures ANOVA test revealed no differences in the absolute reduction of CFUs (p=0.450)

**Conclusions:** All 3 disinfection methods seemed to be equally effective for the reduction of bacterial counts on hospital surfaces.

**Introduction**

Hospital environmental surfaces are known to harbor pathogens that cause HAI's. The environmental contamination of clinical rooms has been linked to the transmission of pathogens, including S. aureus, enterococci, C. difficile, Acinetobacter spp and norovirus. An increased risk of HAI with the same microorganism from the previous room occupant or roommate has further been demonstrated.

UV-C disinfection after usual cleaning and disinfection procedures has been shown to be efficacious and safe in hospitals from high-income countries, but it has not been compared to disinfection with sodium hypochlorite (NaClO) in our country (the standard disinfection procedure at the present time in our hospitals).

Therefore, the purpose of this study was to compare UV-C against NaClO for terminal room disinfection after the usual cleaning procedure.

**Methods and Materials**

**Design:** experimental pilot study. **Location:** 4 hospitals in Mexico City. **Interventions:** Protocol A: cleaning followed by disinfection with NaClO. Protocol B: cleaning followed by disinfection with UV-C. Protocol C: cleaning followed by disinfection with NaClO plus UV-C. **Outcome:** relative reduction of CFUs for each of the disinfection protocols (i.e., CFU reduction adjusted for contamination after cleaning and before each disinfection procedure). Two vacant rooms were selected immediately after patient discharge in each hospital (1 room was tested with protocol A and 1 room with protocol B). The cleaning staff was blinded to the experimental intervention and was asked to clean and disinfect the room with NaClO as usually done. The UV-C emitter (UVDI V-360º) was operated by the sponsor (two 5-minute cycles at a distance not greater than 2.4 meters from the surfaces of interest).

Cultures were taken from 3 high-touch surfaces: mattresses, beds rails and patient tables. Environmental contamination was assessed before cleaning and after every disinfection procedure (once after NaClO and once after every 5-minute cycle of UV-C).

**Results**

A total of 115 samples were gathered. Median (range) bacterial contamination (CFUs) before cleaning was as follows: mattresses, 22 (2-1000); patient tables, 45 (1-92); left bed rails, 25 (0-1200); right bed rails, 20 (10-1000). The relative CFU reductions for each protocol, broken down by type of object, are shown in chart 1. The formula used was: [CFUs before the procedure minus CFUs after the procedure] divided by the absolute reduction of CFUs (p=0.450).

**Conclusions**

Similar CFU reductions were noted for the three disinfection procedures. However, it is unknown if any one of these protocols is superior to the others for disinfection of high touch surfaces and reduction of HAI’s in constrained budget settings. We therefore consider that a cost-effectiveness study is warranted.

**References**

1. Anderson DR, Chen C, Whalen SL, et al. Disinfection of terminal room disinfection and epidemiology of infection caused by multidrug-resistant organisms and distribution diffe-


**Contact information**

Dr. Eric Ochoa Hein

dr.eric.ochoa@yahoo.com.mx

+5255-5487-1000 ext. 7096

---

**Chart 1. Relative CFU reductions broken down by type of object.**

---

For instance, a 1600 x 900 mm poster is suitable for this template. The default color theme for this template is "Office", so you can always return to that after trying some of the other versions of PowerPoint. **Change Color Theme:**

**Printing Your Poster:**

To change the color theme, select the drop-down list.

To change the color theme, select the drop-down list.

For best results, insert, picture in your poster file by selecting the placeholders.

To preview the print quality of images, all graphic elements should be at least standard copy & paste. For best results, be sure to preview your graphics at poster and using half-scale dimensions.

To preview the print quality of images, all graphic elements should be at least standard copy & paste. For best results, be sure to preview your graphics at poster and using half-scale dimensions.