

Evaluation of a Patient Activated Ultraviolet-C Radiation Device for Decontamination of Restrooms

Jennifer L. Cadnum, BS¹; Annette L. Jencson, BSMT, CIC²; Thriveen Sankar Chittoor Mana, MBA³; & Curtis J. Donskey, MD^{1,2,3}

¹ Research Service, Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH,

² The Cleveland VA Medical Research and Education Foundation, Cleveland, OH

³ Department of Medicine, Division of Infectious Diseases, Case Western Reserve University, Cleveland, OH

Contact: Jennifer.Cadnum@VA.gov

Follow The CLean Team @CLE_Cleans

Poster #221

Background

- Ultraviolet-C (UV-C) radiation is effective in killing a wide range of viral and bacterial pathogens, including *Clostridium difficile* spores
- However, operation of mobile UV-C decontamination devices can be cumbersome and time consuming to deploy
- We tested the efficacy of an automated, wall-mounted UV-C device designed for decontamination of patient restrooms after each use

Objective

- To evaluate the efficacy of a patient activated, low-pressure mercury UV-C room decontamination device against common hospital pathogens

Methods

- The ASEPT.1X system is a UV-C device mounted above the door frame in restrooms that utilizes a door safety monitor as well as motion and infrared sensors to assess if the bathroom is currently or has previously been occupied (Figure 1)
- A 5-minute UV-C decontamination cycle is triggered after each use of the restroom; the cycle is aborted if the door is opened or motion is detected (Figure 1)
- We tested the efficacy of the device against methicillin-resistant *Staphylococcus aureus* (MRSA), *C. difficile* spores, and bacteriophages MS2 and Phi X174
- Pathogens were inoculated onto steel discs and exposed to 1, 3, or 6 UV-C cycles (Figure 2)

Figure 1. (A) ASEPT.1X system (B) Placement (C) Safety / activation mechanism

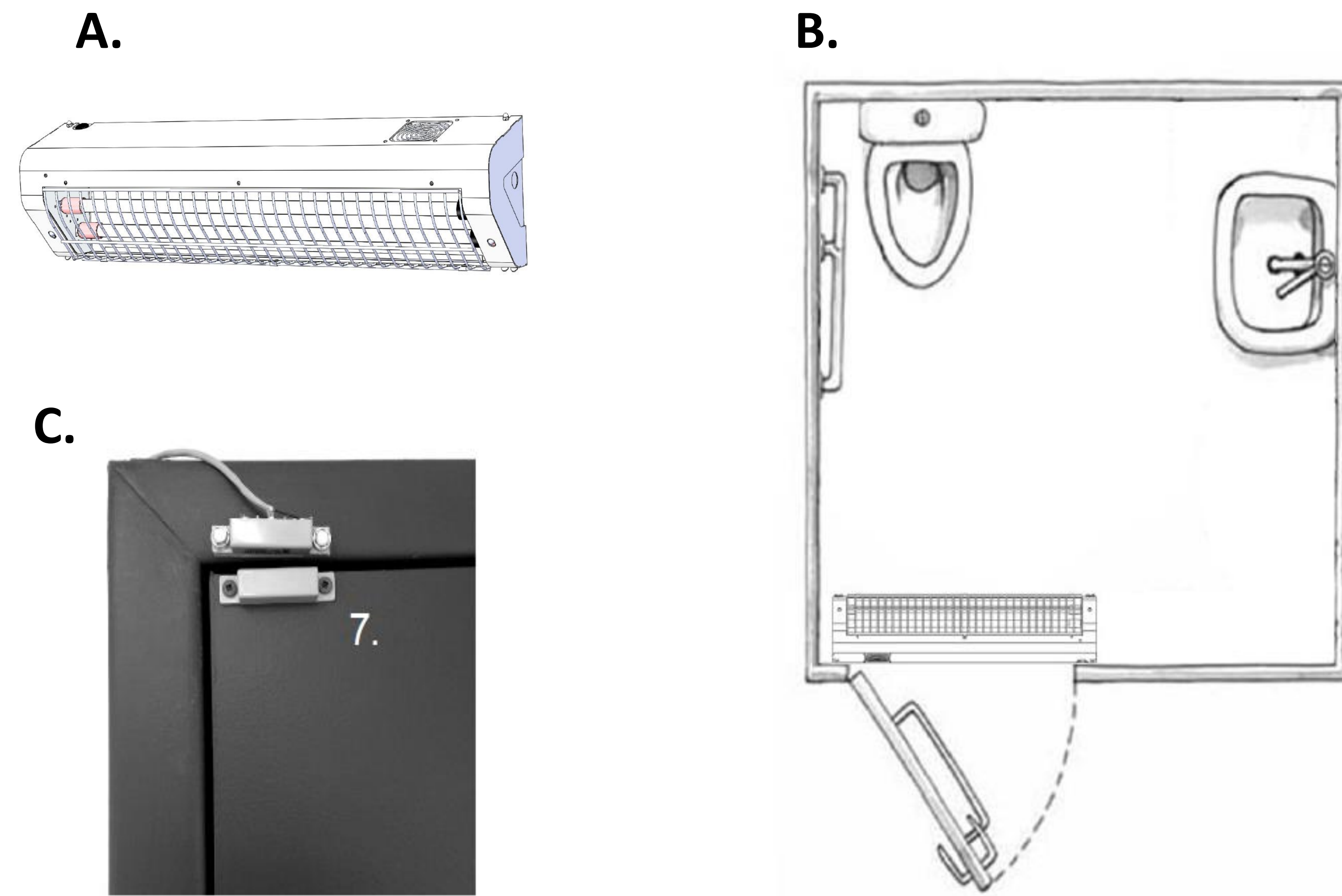
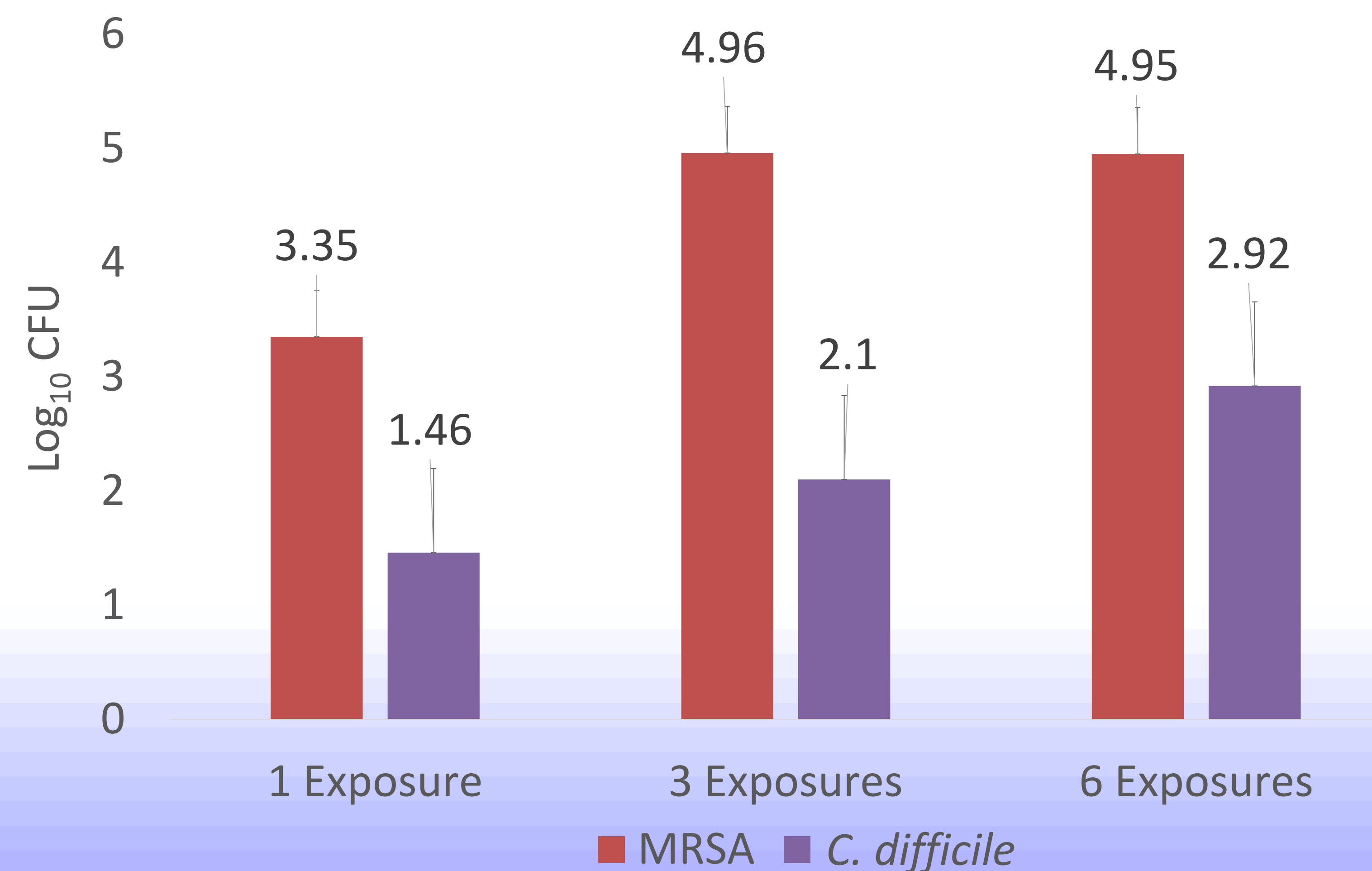


Figure 2. Reduction of organisms after 1, 3, and 6 exposures to ASEPT.1X



Results

- A single 5-minute cycle reduced recovery of MRSA by greater than 3.4 log₁₀ CFU
- Viruses were reduced by ≥1 log₁₀ PFU in single 5-minute cycle
- Three cycles of exposure (15 minutes total) were required to achieve a >2 log reduction in *C. difficile* spores (Figure 2)
- The safety features of the device were effective in preventing UV-C exposure upon room entry (Figure 1)

Conclusions

- Our results suggest that an automated, wall-mounted UV-C device could provide a useful adjunct to manual cleaning of patient bathrooms with minimal added workload for environmental services personnel

Acknowledgement

- Class 1 Inc. provided the ASEPT.1X system for testing but did not fund or have any role in planning or design of the study