

Using UV Light to Decrease *Clostridium Difficile* Spores in Pediatric Oncology Rooms

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Background

Healthcare associated infections (HAIs) continue to be prevalent in areas of the hospital where there is high use of broad spectrum antibiotics such as Pediatric Oncology Units. Although many vectors of transmission other than shoe soles carry dangerous pathogens into sensitive areas and cumulatively contribute to the overall microbial load, previous literature has shown shoe sole pathogen contamination to be an unaddressed problem, and a potential cause of HAI's.¹ *Clostridium difficile* has been shown to be prevalent on shoe soles and can spread via aerosolization, direct contact, and indirect contact.

Aim

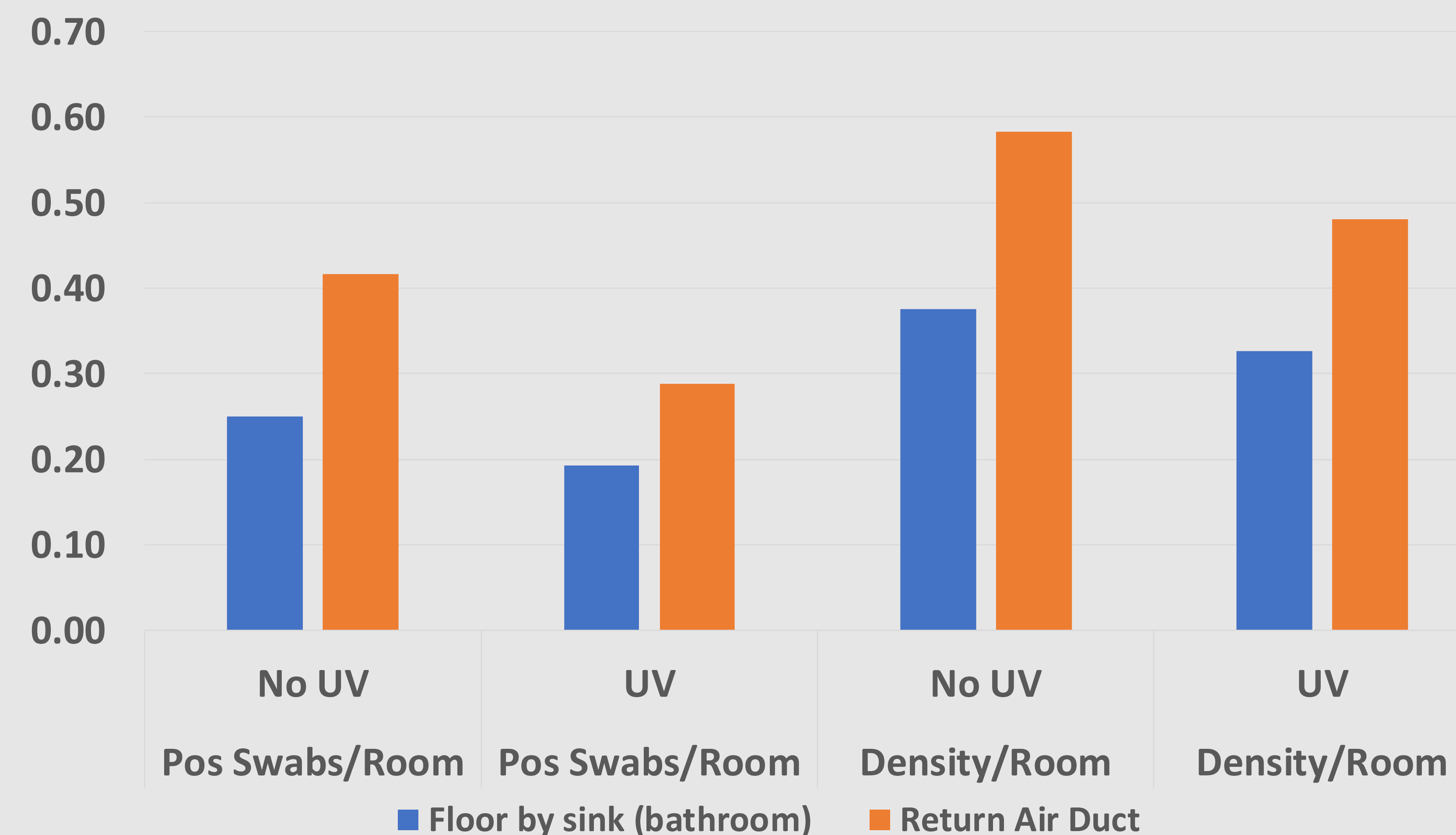
The purpose of this study was to examine the effectiveness of UVC light exposure (HealthySole™Plus, Reno, NV), to the bottoms of shoes for all people entering the pediatric oncology rooms, and to determine if it decreases the number of *C. difficile* spores cultured from the rooms. In a previous study¹ using the HealthySole™Plus, the log₁₀ reduction for *C. difficile* was 0.42±0.54 (P<0.0001).

Methods

- Three UVC devices and 1 placebo device were placed outside of oncology rooms and all visitors and staff were instructed to use the devices prior to entering the room. Compliance of use of the devices was between 70-90% throughout the study.
- The rooms were swabbed weekly at 7 different locations over the course of 6 months.
- C. difficile* was cultured using Hardy Diagnostics Banana Broth™ (Figure 1).
 - Positive results were scored for either presence or density of spores.
 - Density of spores was estimated by the time necessary to produce positive results in the Banana broth.
- A total of 76 swabs at each sample location were collected between Jan 2019- July 2019.
- All other hospital cleaning protocols remained the same.

Results

Presence and Density of *C. difficile* Per Room
Effect of UV Exposure



Rooms with UVC significantly (P < 0.05) reduced *C. difficile* spores for the floors by bathroom sinks and for return air ducts.

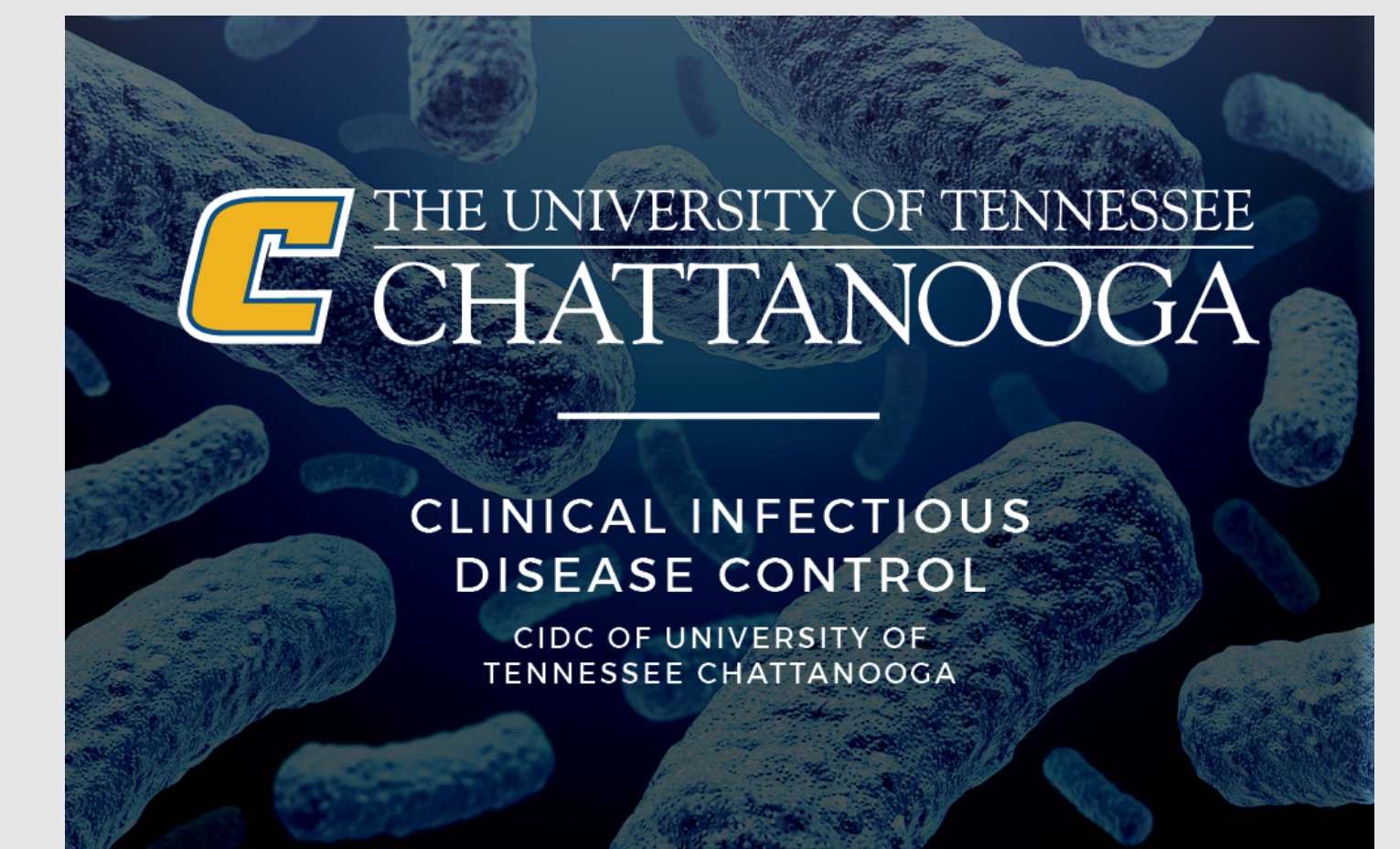
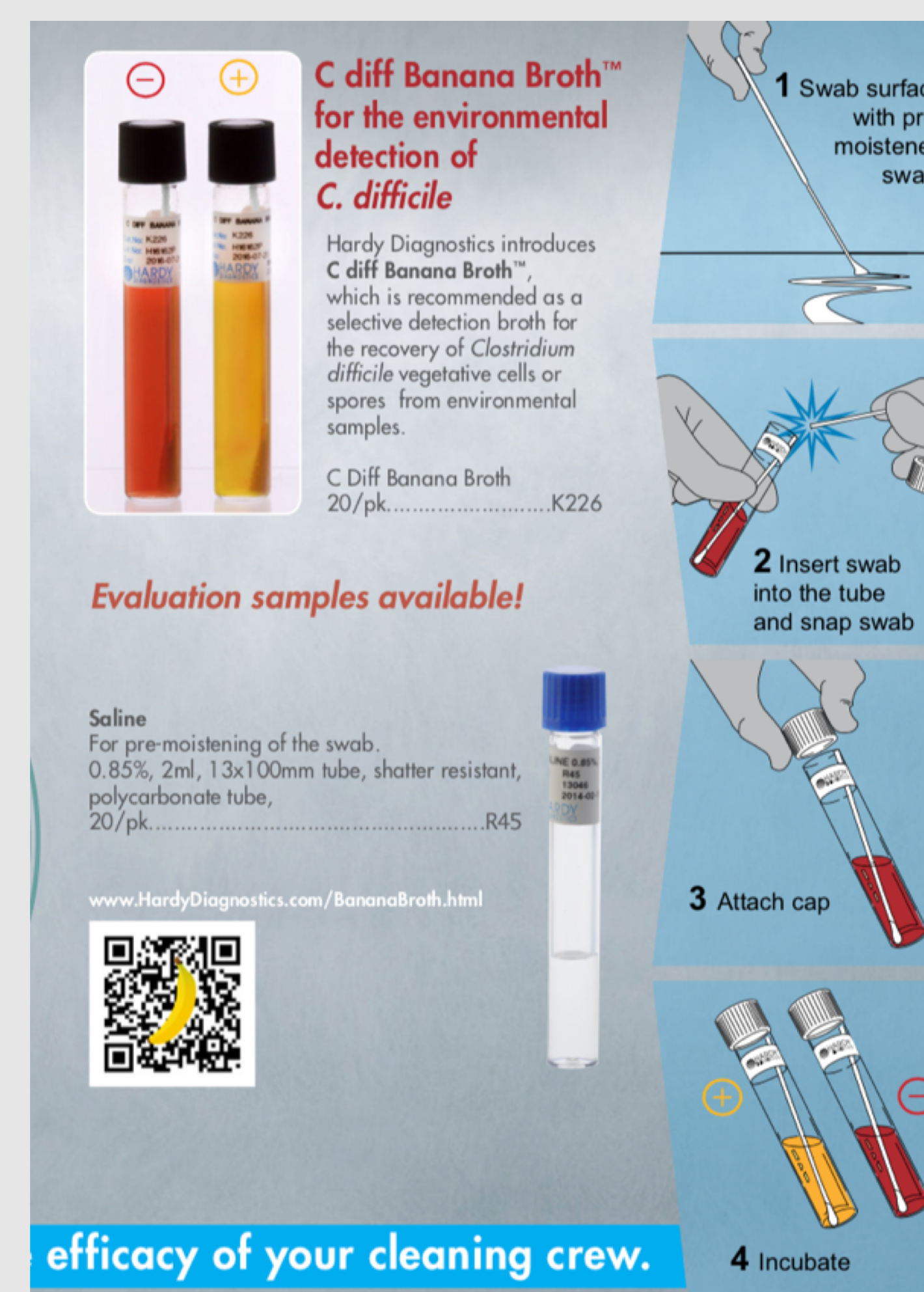


Figure 1: Hardy Diagnostics Banana Broth



Conclusions

- UVC light exposure was shown to be beneficial with an overall average decrease of 28% for the number of positive swabs per room and an absolute decrease in the density of *C. difficile* spores per room of 15%.
- Early *C. difficile* reduction from shoe soles may be a critical step in reducing the overall pathogen load in the critical care setting in these oncology rooms.
- Given that multiple vectors of pathogen transmission cumulatively added to *C. difficile* present for floors by bathroom sinks and return air ducts, we were surprised at the extent of the 28% overall reduction of *C. difficile* from UVC exposure to footwear alone. We were also surprised to see that *C. difficile* spores in return air ducts were significantly reduced when UVC was used. This might indicate reduced aerosolization of these spores in those rooms, which would indicate critical reduction of these spores throughout the rooms.

References

- Rashid T, et. Al, Evaluation of a shoe sole UVC device to reduce pathogen colonization on floors, surfaces and patients. J Hosp Infect. 2018 Jan;98(1):96-101. doi: 10.1016/j.jhin.2017.10.011.