Thinking outside the spectrum: Efficacy of a UV-A lighting system for passive disinfection of healthcare associated pathogens

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Introduction
- Mobile UV-C light room decontamination devices are increasingly used as an adjunct to standard cleaning in patient rooms
- However, UV-C cannot be used when patients or personnel are present
- UV-A (315-400 nm) has been proposed as a safe method to provide continuous disinfection of surfaces that can occur while patients and staff are present

Methods
- In the laboratory, we evaluated the efficacy of UV-A for reduction of methicillin-resistant Staphylococcus aureus (MRSA), Escherichia coli, Clostridium difficile spores, Candida auris, and bacteriophages phi X147 and MS2 on steel disk carriers
- Recovery of organisms from carriers exposed to UV-A was compared to controls held under ambient light for the same duration of exposure

Results
- At the intensity proposed for use in patient rooms (3 W/m²), we found that MRSA and E. coli were reduced by ≥1.2 log₁₀ CFU after 8 hours of exposure (figure 1)
- Bacteriophage MS2 and Phi X147 were reduced by 1.1 log₁₀ PFU and .3 log₁₀ PFU respectively after 8 hours of exposure (figure 1)
- At 3 W/m², C. difficile and Candida auris were reduced by <0.5 log₁₀ CFU at 8 hours
- At 24 and 48 hours of exposure at 30 W/m², C. difficile spores were reduced by 2.1 log₁₀ CFU and 2.2 log₁₀ CFU respectively (figure 2)

Conclusions and Acknowledgements
- We found that UV-A light was effective in reducing MRSA, E. coli, and bacteriophage MS2 at an intensity level proposed for use in patient rooms
- At higher intensities (10, 30 W/m²), UV-A was also effective against C. difficile spores
- UV-A may be useful as a supplement to standard cleaning by providing continuous low level disinfection of surfaces
- GE Current a Daintree Company provided the testing apparatus but had no role in the study design or outcome

Figure 1. Reduction of organisms exposed to 3 W/m² of UV-A

Figure 2. Reduction of C. difficile spores exposed to variable intensities of UV-A