advocating and implementing UV-C efficacy standards? "Professional organizations in infection prevention and occupational health are well positioned to take leadership in this effort by establishing joint committees and engaging with funders to set priorities and a time table to move the research and improved practice guidance forward."[10] This isn't a heavy lift for all who work toward the greater good to push for so obvious a solution.

The EPA needs to treat antimicrobial devices the way they treat all their other antimicrobial products, and efficacy standards for UV-C devices need to be established. This may not be impossible for the EPA to achieve alone, but the EPA may require the voice and considered involvement of the broader group. Physicians, researchers, administrators, insurers, and families of patients and victims may choose to be involved in urging the EPA to include antimicrobial devices in the protocol of efficacy standards. Such correspondence may be addressed to Lance Wormell, Chief, Regulatory Management Branch II Antimicrobials Division, Office of Pesticide Programs, U.S. Environmental Protection Agency (Wormell.Lance@epa.gov).

UV-C devices save lives. It is time for the EPA to establish an UV-C device efficacy standard.

ACKNOWLEDGMENTS

Financial support. T.E.C. received fees for consulting support from MIT, Inc.

Potential conflict of interest. T.E.C. consulted on MIT's Statutory and Analytical Assessment of Federal Agency Directives to promulgate regulations relating to antimicrobial products and devices for National Efficacy Standards.

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Infect Control Hosp Epidemiol 2016;37:1000–1001

 0899-823X/2016/3708-0023. DOI: 10.1017/ice.2016.130

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Response to Cowan on Need for UV-C Antimicrobial Device Standards

To the Editor— Novel ultraviolet-C (UV-C) disinfection devices are currently flooding the infection control market due to the well-documented microbicidal efficacy of UV-C irradiation and appealing modern upgrades in mobility, safety, and monitoring of devices. This trend in the market is apparent with a quick glance through the pages of widely circulated infection control magazines, where multiple UV-C device advertisements may be present in a single issue. As noted by Cowan, at least 15 different manufacturers provide UV-C devices to the healthcare industry, but only a few devices are supported by peer-reviewed studies, and there are currently no guidelines to define what constitutes an effective level of pathogen reduction or standardized methodology for evaluating UV-C killing efficacy.

We share the concern Cowan has presented and have made efforts to bring awareness to the need for direct comparison of devices and standardization of methodology. In a recent study, we introduced the need for a platform to directly compare the many UV-C devices on the market.[1] Under uniform testing conditions, we found no difference in the efficacy of the 2 analogous UV-C

devices for killing of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococcus (VRE), or *Clostridium difficile* spores.[1] The caveat of our findings is that the 2 devices utilized an equivalent light source (low-pressure mercury gas bulbs) and power supply, and they delivered an equivalent radiant dose. However, not all UV devices deliver similar wavelengths of light or the same strength of radiant dose.

UV radiation has peak germicidal effectiveness in the wavelength range from 240 to 280 nm.[2–5] Most UV devices use low-pressure mercury gas bulbs that primarily emit UV-C at 254 nm, but recently pulsed xenon flash bulbs have also been incorporated into disinfection systems. Xenon gas bulbs produce a broad spectrum of radiation that encompasses the UV (100–280 nm) and visible (380–700 nm) spectra.[6–8] In a subsequent study, we evaluated the efficacy of a pulsed-xenon device for reducing hospital-acquired pathogens on surfaces in hospital rooms.[9] While the pulsed-xenon device did significantly reduce recovery of *C. difficile*, VRE, and MRSA from frequently touched surfaces, it was significantly less effective than a low-pressure mercury device in reducing pathogen recovery on glass slides with equivalent exposure time, inoculum, organic load, distance from device, etc.[9] These findings suggest that not all UV devices are equally effective.

Clearly, there is a need for direct comparisons of devices, but the cornerstone to comparing UV-C devices is standardized methodology. We recently demonstrated that variation in test methods could significantly impact the performance of UV-C devices.[10] Factors such as increasing the surface area of inoculum spread, orientation of the carriers, and changes in the formulation of organic load greatly impacted the level of killing achieved (in some cases by >2 $\log_{10}$ CFU, or 99%).[10] These findings have significant implications for the consumers of UV technologies. Without uniform testing methods, there is no baseline for the interpretation of percent or log reduction of pathogens. These examples reiterate the need for a universal set of testing guidelines to be developed by the EPA.

The efficacy of UV-C irradiation for killing pathogens is not in question, nor is the importance of testing these types of technology for reducing pathogens on hospital surfaces. However, due to the speed with which new UV-C devices are entering the market, peer-reviewed studies and standardized guidelines have fallen behind. We agree with Cowan that there is a need for uniform standards for testing the efficacy of UV-C devices. This deficiency should be addressed by regulatory agencies and the scientific community. Finally, there is a need for high-quality studies to determine whether use of UV-C devices reduces healthcare-associated infections. Currently, no published randomized trials have demonstrated that UV-C disinfection is beneficial as an adjunct to standard cleaning and disinfection.

ACKNOWLEDGMENTS

Financial support. This work was supported by the Department of Veterans Affairs.

Potential conflicts of interest. Dr. Donskey is a consultant for 3M and Seres Health and has received research grants from Merck, Clorox, EcoLab, GOJO, and AvidBiotics.

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Infect Control Hosp Epidemiol 2016;37:1001–1002

 0899-823X/2016/3708-0024. DOI: 10.1017/ice.2016.131

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A Validation Protocol: Assessing the Accuracy of Hand Hygiene Monitoring Technology

To the Editor—A number of hand hygiene monitoring technology (HHMT) options have become commercially