Table 1. Organisms Cultured From Water Collected From All 3 ECMO Units

	ECMO Unit 1		ECMO Unit 2		ECMO Unit 3	
Organism	Culture	qPCR	Culture	qPCR	Culture	qPCR
Water sample (n=1)						
Ralstonia spp	Detected	. . .	Detected	. . .	Detected	. . .
Mycobacterium spp	Not detected	Not detected	Not detected	Detected	Not detected	Detected
Legionella spp	. . .	Detected	. . .	Not detected	. . .	Detected
L. pneumophila		Not detected		Not detected		Not detected
Air sample (n=4)						
Ralstonia spp	Not detected	. . .	Not detected	. . .	Not detected	. . .
Mycobacterium spp	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected
Legionella spp		Not detected		Not detected		Detected
L. pneumophila	. . .	Not detected	. . .	Not detected	. . .	Detected

Note. ECMO, extracorporeal membrane oxygenation; qPCR, quantitative polymerase chain reaction.

decontamination of the HCUs and microbiological surveillance are vital steps in mitigating the risk of infection due to *M. chimera* and other opportunistic pathogens.

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Efficacy of a wearable ultraviolet-C light device for semiautomated decontamination of stethoscopes between each use

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Stethoscope diaphragms are often contaminated with pathogens such as *Clostridioides difficile* and methicillin-resistant *Staphylococcus aureus* (MRSA).[1–5] Moreover, the frequency of acquisition and transfer of *C. difficile* and MRSA during patient examinations has been shown to be similar for stethoscopes and hands.[1,2] Applying hand sanitizer to stethoscopes or wiping with alcohol or disinfectant wipes or swabs can reduce bacterial contamination.[1,6] However, stethoscopes are rarely cleaned in clinical practice.[6]

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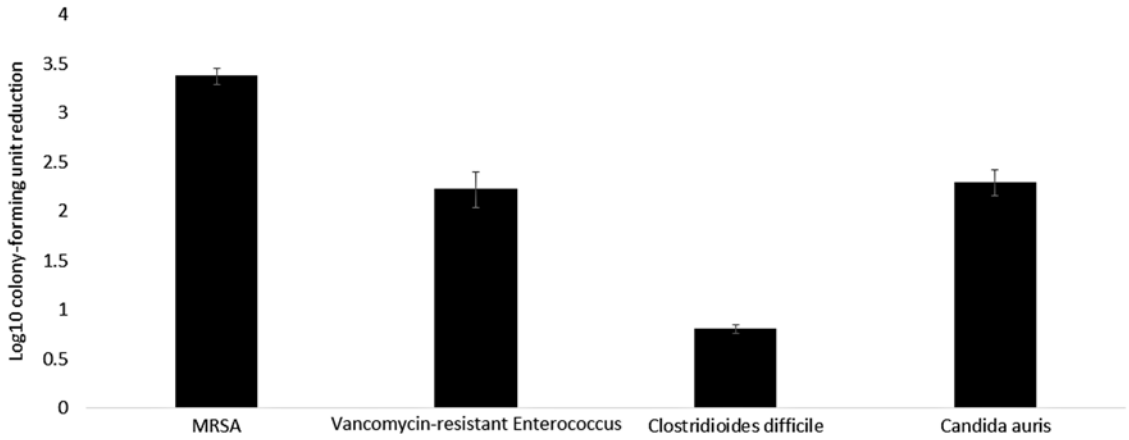

Fig. 1. Efficacy of a 3-minute ultraviolet-C cycle delivered by the StetClean device in reducing pathogens inoculated on stethoscope diaphragms. Note. MRSA, methicillin-resistant *Staphylococcus aureus*. Error bars indicate standard error.

Recently, Messina et al[7] reported the development of a wearable device that provides semiautomated decontamination of stethoscope diaphragms with light-emitting diode (LED)–generated ultraviolet C (UV-C) light between each use. Here, we tested the effectiveness of the device against several healthcare-associated pathogens and evaluated its efficacy in reducing MRSA contamination acquired on stethoscopes during examination of MRSA-colonized patients.

The stethoscope decontamination device (StetClean, egoHEALTH, Siena, Italy) is a pocket-sized rectangular box (6 × 3 × 14 cm) weighing 100 g that is carried in the front or side coat pocket. After each use of a stethoscope, the diaphragm is attached to the device, resulting in automated initiation of a 3- or 5-minute cycle of UV-C light. The UV-C cycle shuts off automatically if the diaphragm is detached. The device is battery-operated and rechargeable with a standard USB cable.

We tested the efficacy of the device against 1 strain each of MRSA (a clinical isolate with pulsed-field gel electrophoresis type USA400), *Clostridioides difficile* spores (American Type Culture Collection no. 43598), *Candida auris* (Centers for Disease Control and Prevention strain 0381), and vancomycin-resistant *Enterococcus faecium* (C68, a clinical VanB isolate) using a modification of the American Society for Testing and Materials standard quantitative carrier disk test method (ASTM E-2197-02).[8] We spread 10-µL aliquots of the organisms to cover the surface area of clean stethoscope diaphragms and then allowed them to air dry. The diaphragms were exposed to UV-C cycles of 3 minutes in the device and were then sampled with premoistened swabs that were vortexed for 1 minute in 200 µL phosphate-buffered saline with 0.02% Tween. Serial dilutions were plated on selective media and $\log_{10}$ colony-forming unit (CFU) reductions were calculated by comparing recovery from carriers after decontamination versus untreated controls. Triplicate samples were tested.

We also tested the ability of the device to eliminate MRSA contamination transferred to stethoscope diaphragms during examination of patients. MRSA-colonized patients underwent standardized examinations of the heart and abdomen (6 skin locations with 5-second contact time for each site) with clean stethoscopes that were or were not exposed to a 3-minute UV-C cycle before culturing by imprinting the diaphragm onto CHROMagar (Becton Dickinson, Franklin Lakes, NJ) containing 10 µg/mL cefoxitin. For comparison with a standard method for cleaning the stethoscope diaphragm, we conducted a similar evaluation with additional MRSA-colonized patients to evaluate the efficacy of wiping the stethoscope diaphragm with a 2.5 × 0.5 cm (1 × 0.2 inches) 70% isopropyl alcohol pad (Medline Industries, Northfield, IL).

For the assessment of transfer from MRSA-colonized patients, the Fisher exact test was used to compare proportions of contamination among groups. The Student *t* test was used to compare the mean numbers of colonies recovered for treated versus untreated stethoscopes. The facility's institutional review board approved the study protocol.

Figure 1 shows the efficacy of the 3-minute UV-C cycle in reducing pathogens on inoculated stethoscope diaphragms. Recovery of VRE, MRSA, and *C. auris* was reduced by >2 $\log_{10}$ CFU, whereas *C. difficile* spores were reduced by only 0.8 $\log_{10}$ CFU.

In total, 45 MRSA-colonized patients participated in the assessment of the efficacy of the 3-minute UV-C cycle. In comparison to untreated control stethoscopes, the UV-C cycle reduced the frequency of recovery of MRSA from 17 of 45 (38%) to 4 of 45 (9%) ($P < .01$). The mean number of MRSA colonies was reduced from 4 to 0.08 ($P = .045$). Moreover, 20 MRSA-colonized patients participated in the assessment of the efficacy of alcohol pads in removing MRSA. In comparison to untreated control stethoscopes, the alcohol pads reduced the frequency of recovery of MRSA from 7 of 20 (35%) to 0 of 20 (0%) ($P < .01$).

Our results demonstrate that the wearable semiautomated UV-C device is effective in reducing pathogens inoculated on stethoscope diaphragms and in reducing MRSA transferred to stethoscopes during examination of colonized patients. The device uses UV-C generated by an LED, which is well-suited for decontamination of small items in close proximity to the UV-C source due to its compact size.[7] LEDs have other potential advantages, including lower energy requirement, long lifespan, minimal warm-up time, and absence of mercury.[7]

Our study has some limitations. We tested only the efficacy of one 3-minute cycle. In practice stethoscopes would receive numerous cycles per day. We did not test a gram-negative pathogen, but previous studies have demonstrated similar efficacy of UV-C versus gram-positive and gram-negative pathogens.[9] The device would not address contamination of the stethoscope tubing, which is also common.[2] We did not compare the use of the device with other novel approaches for prevention of pathogen transmission

by stethoscopes such as coating stethoscopes with antimicrobial copper.[10] Finally, our results suggest that the UV-C device may be less effective than alcohol wipes for the removal of pathogens such as MRSA.

In summary, we found that a novel UV-C device was effective in reducing contamination on stethoscope diaphragms. Future studies are needed to evaluate whether routine use of the device will be effective in reducing contamination of stethoscopes used in clinical settings.

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The little things matter—How peer audits contribute to CLABSI prevention

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Prevention of central-line–associated bloodstream infections (CLABSIs) requires a comprehensive approach addressing the insertion, access, and maintenance of central lines.[1–3] CLABSI prevention efforts are most successful when owned by local physicians and nurses, rather than seen as a problem to be solved by infection prevention or quality departments.[4] Groups such as the Agency for Healthcare Research and Quality and the Joint Commission recommend unit-based audits as one tool for CLABSI prevention.[5,6]

At the University of North Carolina (UNC) Medical Center, a 945-bed academic hospital, our rate had stagnated at >2.00 CLABSIs per 1,000 central-line days after years of reductions. A fiscal year 2018 (FY18) organizational goal was set to reduce our CLABSI rate by 10% from our FY17 baseline of 2.11. One initial intervention was the use of a compliance coach, an infection prevention staff member who worked as an auditor/educator on central venous access device (CVAD) care and maintenance.[7] We expanded this initiative by implementing a hospital-wide peer-audit model in FY18, in which frontline staff provided real-time feedback and submitted compliance data on process measures related to CVAD care.

Methods

The rollout of the hospital-wide peer audit occurred in 3 phases prior to launch. First, a team of nurses, infection preventionists, and quality improvement staff created and piloted an audit tool as part of a service-wide quality improvement initiative. Second, infection prevention staff met with units that already had their own audit processes in place to get them using the hospital-wide tool. Third, infection prevention staff conducted individual trainings with remaining units and multiple hospital committees to ensure awareness and buy-in from stakeholders.

Trainings included the "why" and "how" of central line dressing/tubing peer audits and reviewed the tool to ensure standard use. The tool included the following measures: line type; dressing and/or tubing labeled correctly and not expired; dressing clean, dry, intact, and applied correctly; feedback given.

Trainers gave tips on how to give and/or receive feedback, including sharing opportunities for improvement (just-in-time

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