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Decontamination of water traps with ultraviolet-C light

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Background

Water traps are some of the most contaminated areas in hospitals and increasingly recognized as potential vehicles for transmission of multidrug-resistant bacteria to patients. The aim of this study was to evaluate the efficacy of ultraviolet-C (UV-C) light to decontaminate water traps.

Materials/Methods

A newly developed UV-C decontamination device (patent pending) developed by Danish company Dolphin Care Aps for washbasin water traps (Figure 1) was mounted on four separate washbasins (HygLab, 211, 103A and 200B).

Experimental design:
In two washbasins UV-C light was active while two washbasins were used as controls without UV-C exposure (part 1). After eight weeks, the experiment was swapped and the initial UV-C active washbasins were used as controls and the initial control washbasins were exposed to UV-C light (part 2), see Table 1.

Table 1. Experimental design.

	Part 1	Part 2
Day	0 - 58	59 - 95
UV-C Active	HygLab, 211	103A, 200B
Control	103A, 200B	HygLab, 211

Collection and identification of samples:
- Swabs were taken weekly from the top and the bottom of the washbasin tailpipes and grown on blood agar- and lactose agar plates. Bacteria were quantified semi-quantitatively.
- Water was collected from the water traps weekly and serial 10-fold dilutions were made in order to determine total bacterial counts (CFU/mL).
- Bacterial colonies were identified by MALDI-TOF MS technique.

Results

Bacterial counts (CFU/mL):
- A marked reduction in bacterial counts was observed within the first week in the UV-C active water traps compared with the control washbasins in both part 1 and 2 of the experiment. Bacterial counts were reduced by a factor 10^5 – 10^6 in the UV-C active water traps in part 2 of the experiment (Figure 2).
- Overall a marked difference in bacterial counts was observed between water traps exposed to UV-C light and control water traps throughout the experimental period.
- Within the first two weeks of part 2 of the experiment the bacterial counts in the new control water traps markedly increased to a level similar to the control water traps in part 1 of the experiment (Figure 2).

Species identified:
- UV-C decontamination reduced the total number of different bacteria identified in water traps exposed to UV-C light (UV-C active=5; controls=9).
- After exposure to UV-C light was interrupted the total number of species identified increased.
- Under UV-C light exposure *Pseudomonas aeruginosa* and Gram negative intestinal commensals disappeared while *Stenotrophomonas maltophilia* was markedly reduced.

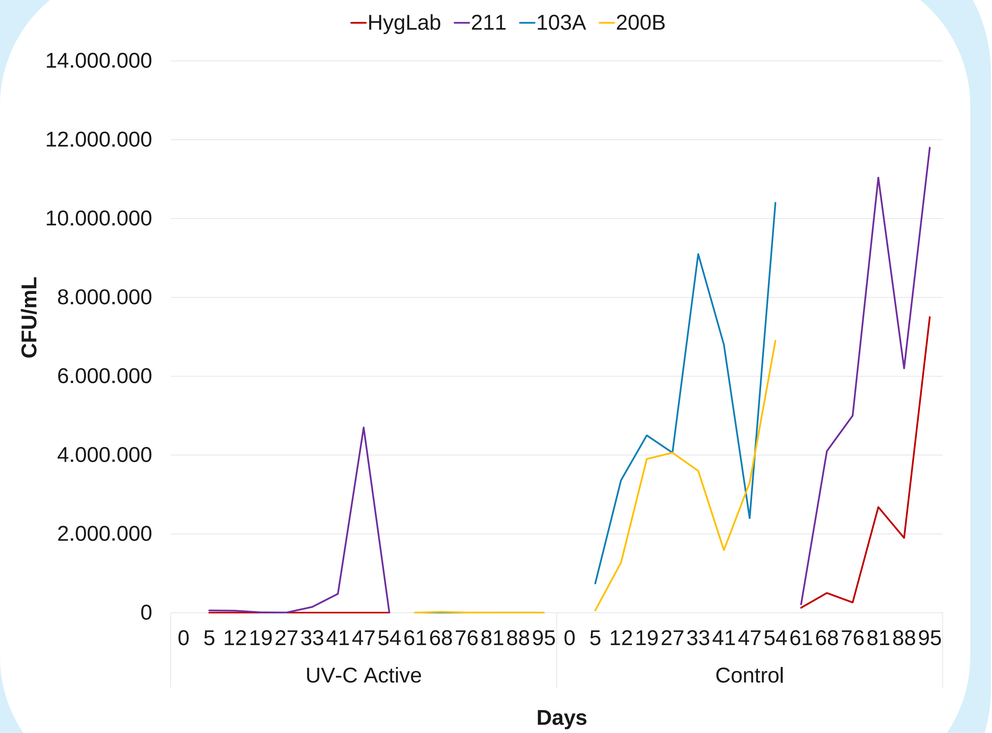

Figure 2. Development of bacterial counts in washbasins exposed to UV-C light (UV-C active) and control washbasins (Control) in part 1 and 2 of the experiment.

Figure 1. UV-C decontamination device for washbasin water traps.

Conclusion

UV-C decontamination of water traps reduces bacterial counts effectively within the first week of use. However, they are quickly contaminated after discontinued UV-C exposure.

UV-C decontamination of water traps may be a feasible adjunctive for prevention of spread of multi-resistant water bacteria from washbasins to immunocompromised patients.

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