Reviewer’s report

**Title:** Evaluation of an automated ultraviolet radiation device for decontamination of Clostridium difficile and other healthcare-associated pathogens in hospital rooms

**Version:** 1  **Date:** 9 February 2010

**Reviewer:** Stephanie Dancer

**Reviewer’s report:**

Thank you for inviting me to review this article. It is an innovative attempt to assess a novel intervention for decontaminating the hospital environment. Unfortunately, I do not think that the methods employed were sufficiently robust to accept the findings and the paper is not publishable at it stands.

Major points, which require response and additional data or justification:

1. Line 95; how can surfaces be selectively treated by the device? Is this managed by positioning? Given the nature of the disinfectant vapour devices currently on the market, room disinfection is usually achieved by positioning the robot in the middle of the area to be decontaminated and the room sealed off. It is presumed that all superficial surfaces are exposed to the disinfectant fumes in the room. Is this not the case for this device?

2. Line 97; no information on density of original inoculation onto surfaces, ie. cfu/cm². Similarly, the surface area sampled by swabs taken after irradiation is not detailed.

3. Line 105; generally speaking, this sort of sampling is repeated in triplicate for in-vitro experiments, especially when disinfectant activity is being assessed.

4. Line 108; it is entirely appropriate to specify the areas sampled in rooms of discharged patients but how was this determined? Was it guesswork or was a template of some sort utilised? An approximate value for the surface area of the call button and telephone should be included.

5. Line 121; what was the inoculum of Staphylococcus warneri placed on additional surfaces? Density of inoculum on the surface per cm²? Was it standardised between different sites? Knowledge of the absolute areas of treated surfaces is important for several reasons, but particularly so when the output of the device itself is measured quantitatively in cm².

6. No data given in the methods section on the total number of sites sampled. It is not actually clear in the methods whether the clinical environmental sites were inoculated with test pathogens (presumably not) or whether the investigators assumed that there would be plenty of sites positive for the chosen pathogens, depending upon which patient rooms were selected for testing. Were rooms
chosen on the basis of prior occupants being positive for one or more of the pathogens of interest, other than MRSA?

7. Line 171; given the lack of data on areas sampled for some sites, I feel somewhat uneasy at the statement regarding the reduction of cfu’s following device exposure. If the sampling had been rigorously standardised, then the investigators would be able to more accurately titrate the effect of the UV-device.

8. Line 179; How was S.warneri identified from surface samples after routine cleaning and exposure to the UV device? How does the team know that it was the same organism as planted previously? Could post-treatment samples not have been contaminated with other strains of S.warneri, or indeed, other types of coagulase-negative staphylococci? Similarly, given the lack of data on original inoculation and areas sampled, any comments regarding reduction of growth density are not justified.

9. There are too many Figures, most of which are not needed to demonstrate overall effect of the UV-device. I would suggest choosing one or two at most to illustrate the log reduction of organisms before and after exposure.

A few minor points:

1. Enterococcus should not be italicized; lines 27, 45
2. Five figures but no photograph or illustration of the device itself. Perhaps this could be included provided no legal caveat?
3. The report is over referenced, particularly on papers about the effects of UV light.
4. How big is the device? Is it portable? Comment on purchase cost?

Conclusion

It is certainly nice to see innovative attempts at assessing environmental cleaning in hospitals, but this study needs considerable tightening on its methods of quantitative sampling. In addition, seeding sites with coagulase-negative staphylococci in the hospital environment might actually arouse ethical interest, since no data is given on the probity of the strain used. Previous studies have used pieces of virus that are non-active, followed by molecular methods to confirm persistence; others have used genotyping to confirm identity. The paper is not publishable at present, but could be returned for review if other referees are more kindly disposed. I would suggest that the team rewrite their protocol and repeat this interesting experiment.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a
statistician.