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Evaluation Of Ultra-V Decontamination As An Adjunctive To Manual Cleaning At Barnsley Hospital

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Section 1 – Objectives

Barnsley Hospital NHS Foundation Trust has been using a hydrogen peroxide vapour (HPV) system to decontaminate the environment. However, this introduces a significant downtime of several hours which the Trust is working to reduce. This has led to an evaluation of UV-C decontamination as a new technology to reduce environmental contamination. The purpose of this evaluation was to assess the efficacy of UV-C decontamination (Ultra-V) on surfaces both directly and indirectly exposed to UV-C radiation, using a Total Viability Count (TVC) method to culture aerobically forming colonies.

Section 2 – Materials and Methods

The resources used in this study where:

- Ultra-V decontamination System
- Rodac Agar Plates x300 - Pro-Tect TWI (Contact Plate) - Product Code PO0678D
- List of Surface Sampling Points for each room
- Sterile Gloves

Testing was carried out in the following steps:

1. On discharge of a patient, 5 samples were taken from the room prior to cleaning from the following locations: inside of chair arm; under bed; windowsill; mattress; and door handle. See 'Method of Sampling' below.
2. The room was then cleaned and allowed to dry.
3. Samples were taken from the same locations post-cleaning
4. The Ultra-V decontamination system was then deployed and the process time recorded.
5. Another 5 samples were taken from the standard sample sites

Section 3 – Method of Sampling

1. The agar plate was numbered with an indelible marker
2. The agar was placed on the surface to ensure contact.
3. The plate was lifted from the surface and lid replaced
4. The plate was placed in an insulated box.
5. The plate number and surface contacted were recorded in the table
6. The process was repeated at all sample sites through all stages

Sterile gloves were worn and care was taken not to contaminate the samples at any point.

Section 4 – Results

Mean average process time of 21.4 minutes. Range 12-30 minutes.

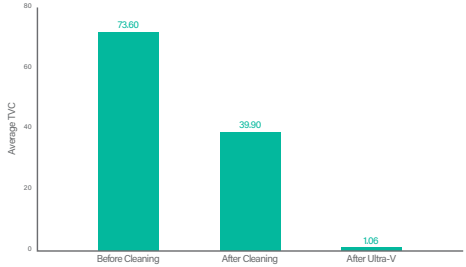

Figure 1. Average Total Viability Count (TVC) by Stage

Discussion

Figure 1 shows the averages from the sample sites, and the corresponding total viability counts cultured at the varying stages of the process. This showed on average, cleaning led to a reduction in the overall bio-burden, (73.6 - 39.902), but with a significant level of contamination still remaining. The introduction of Ultra-V decontamination led to a further reduction in the total count (39.902 – 1.06). It should be noted that these results from UV-C are from sites both directly and indirectly exposed to the UV-C rays.

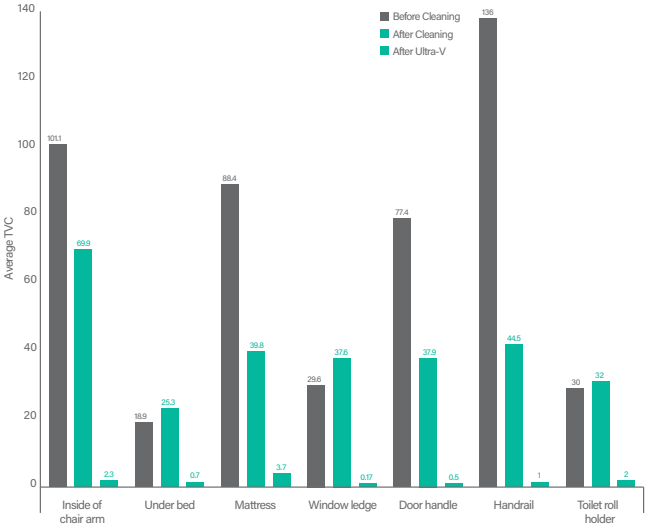

Figure 2. Average TVC by Site at Each Stage

Discussion Continued

Figure 2 shows the average total viability counts at each stage of the process, at the different sites that were sampled around the room. The patient hand rail was the site on which most contamination was found, with the average before and after counts of 136 and 44.5 respectively. However, after Ultra-V it had an average colony count of only 1. The Inside of Chair Arm, Mattress and Door Handle were all identified to be sites with high contamination both before and after cleaning, suggesting that manual cleaning as a process still leaves significant risk to the next patient. This clearly highlights that manual cleaning alone does not fully remove the risk of environmental organisms to our patients. However, after Ultra-V, all of these sites showed low levels of contamination (2.3, 3.7 and 0.5 on average respectively), significantly reducing that risk. The data also shows us that although there is generally a reduction after cleaning, a significant bio-burden is still detected in the room (average 39.902 Figure 1), but after Ultra-V there were consistently low counts, even on sites in the en-suite which we would not expect to be directly exposed to the UV-C rays due to obstructions in the direct line of sight.

Conclusion

Owing to the fact that the Ultra-V requires no vapour-impermeable sealing and is a rapid process, this technology may be particularly suited to high-pressure environments for example ED, ICU and theatres and would enhance any bed management programme. Pressure to release beds for new patitents is a continual concern and needs to be balanced with providing a safe and clean environment. The Ultra-V could be an integral part of securing patient safety whilst optimising bed flow.

Section 5 – Further Work

This evaluation assesses viable aerobically-forming organisms and does not evaluate efficacy against spores

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