

Microbiological evaluation of UV disinfection effectiveness in a specialist cystic fibrosis clinic

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Introduction

Cystic Fibrosis (CF) is an autosomal recessive disorder that mostly affects lungs. Patients with CF are more prone to infections, and over 50% of CF patients that attend Royal Papworth Hospital are infected with multi-drug resistant bacteria leading to longer hospital stays and complications. Therefore, appropriate cleaning and disinfection methods need to be implemented within the hospital to prevent cross infection of these bacteria.

Aim

The aim of the study was to compare the effectiveness of Ultra-V UV-C versus current disinfection method chlorine-containing solution (Tristel) in CF clinic at Royal Papworth Hospital.

Methods

- The study was carried out in 11 rooms in the Adult Cystic Fibrosis Centre at Royal Papworth Hospital after patients known to be infected with *P. aeruginosa*, MRSA, *E. coli* ESBL and *M. abscessus* had left their clinic rooms following an appointment
- UV-C Ultra-V Hygiene Solutions system was used for disinfection process
- Surfaces including the desk, patient chair, sink upper surface, door handle and the spirometer were sampled with Tryptone Soya agar Thermo Scientific contact plates by touching surfaces within the template of 0.25m²
- Patient rooms were tested with contact agar plates 3 times: immediately after the patient left the room, 2 minutes after standard disinfection by Tristel solution and immediately after UV disinfection carried out after Tristel disinfection

Figure 1: Ultra-V UV-C system



Figure 2: The desk



Figure 3: Spirometer



The images above demonstrate automated bio-decontamination system Ultra-V UV-C (Figure 1) and touching surfaces used for sampling (Figure 2 and 3)

Results

- Surface disinfection with Tristel solution showed some reduction in total viable count (TVC)
- On some surfaces, disinfection with Tristel had no effect or even led to increased numbers of TVC
- Usage of Ultra-V UV-C biodecontamination system had significantly stronger effect on microorganisms in comparison to manual cleaning disinfection
- In majority cases, usage of Ultra-V UV-C resulted in complete elimination of microorganisms

Figure 4: TVC on the sink in room 6



Figure 5: The median of TVC in samples.

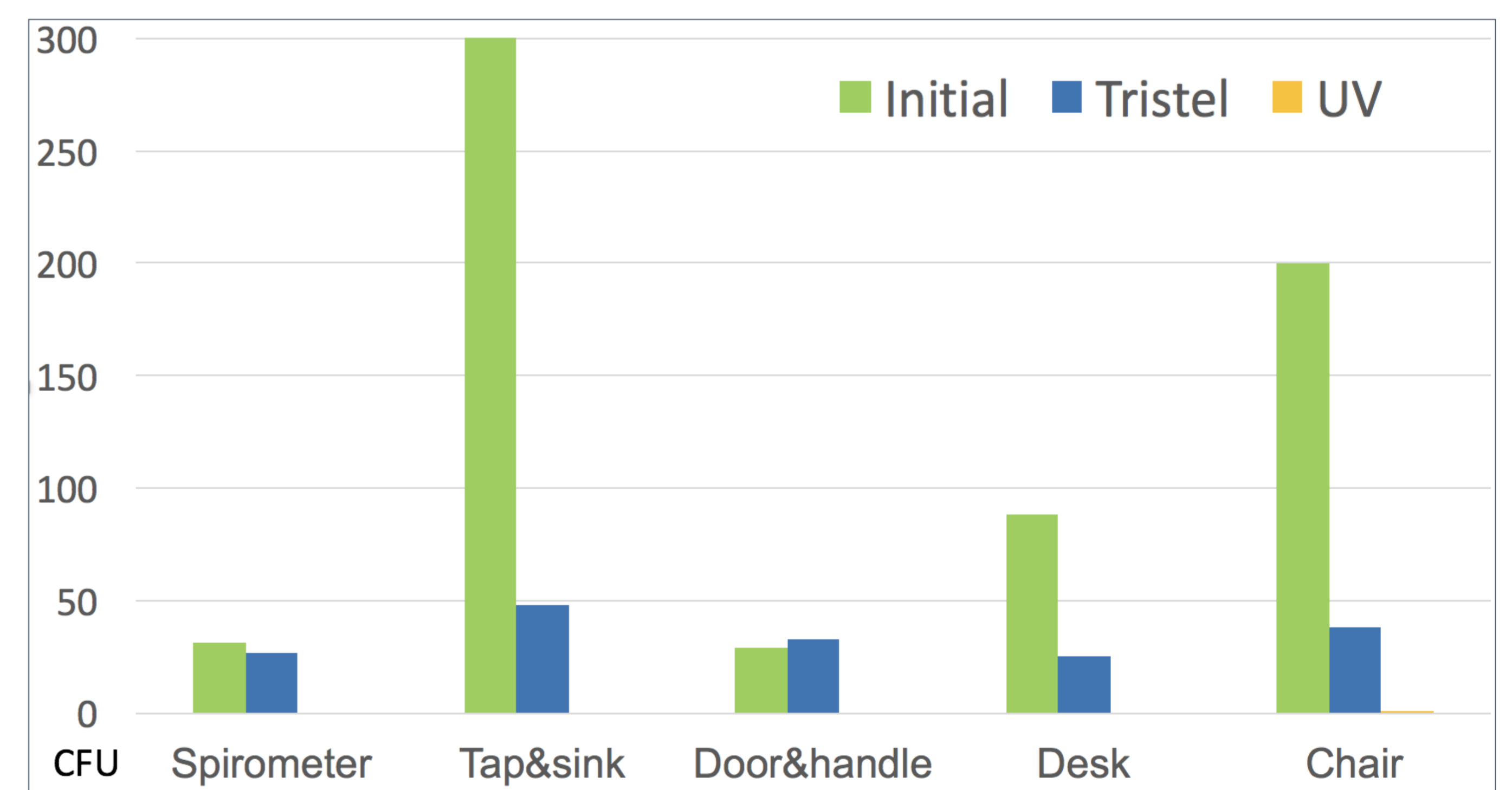


Table 1: TVC trend after patients 1 and 2 clinics following Tristel and subsequent UV disinfection

Surfaces	Patient 1			Patient 2		
	Initial	Tristel	UV	Initial	Tristel	UV
Spirometer	22	27	3	102	+++	0
Tap & sink	+++	132	3	+++	++	0
Door & handle	+++	37	0	19	41	1
Desk	102	8	4	+++	11	0
Chair	+++	81	1	+++	++	3

Conclusion

- The study demonstrated that Ultra-V UV-C disinfection is highly effective in eliminating bacteria from surfaces in the healthcare environment that is likely to be contaminated with multi-resistant organisms and especially in CF clinics
- Usage of Tristel can in some cases lead to increased pathogen contamination
- Ultra-V UV-C Hygiene Solutions system allows to monitor cumulative exposure to UV-C in real-time via Spectrome™ monitoring technology and, therefore, gives assurance of an effective decontamination process every time.