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Background

Traditional and novel approaches to decontaminate hospital surfaces have significant limitations due to the length of time required or because of potential toxicity.

Objectives

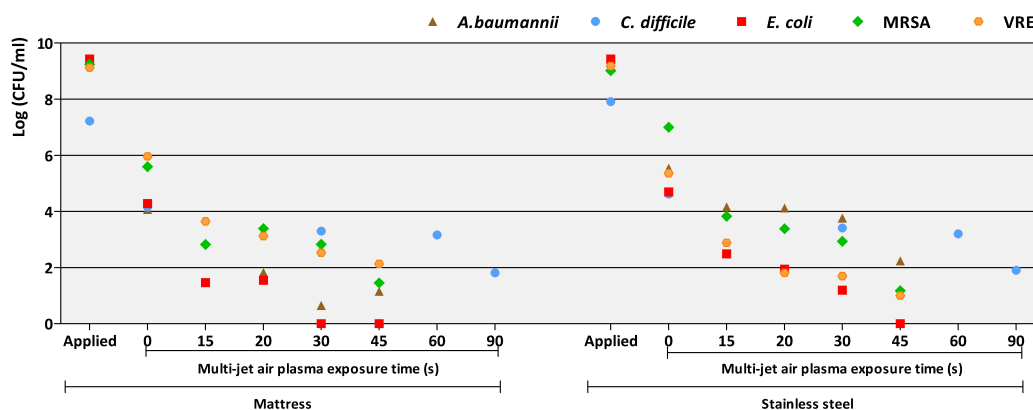
To evaluate *in vitro* the use of a new multi-jet air plasma device for decontamination of hospital inanimate surfaces.

Methods

Acinetobacter baumannii, *Clostridium difficile* spores, extended spectrum b-lactamase (ESBL) producing *Escherichia coli*, methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococcus (VRE) cultures of log 7 to log 9 colony forming units (CFU) per mL were applied to 6cm² sections of mattress and stainless steel, replicating surfaces in the hospital environment. Inoculated surfaces were treated with an air plasma multi-jet (consisting of nine plasma jets in an array) operating at approximately 140 W and 20 L/min flow rate over various exposure times up to 90s. Both test and control (non-treated) surfaces were swabbed using flocked swabs and cultured for bacterial enumeration.

Results

The microbicidal effect of the air plasma multi-jet prototype varied depending on the type of surface and microorganism (Figure 1). On the mattress, a 45s exposure time reduced the bacterial load of *A. baumannii*, ESBL- *E. coli* and MRSA by log 4 and VRE by log 3. On stainless steel, 45s reduced the bacterial load of *A. baumannii* by log 3, ESBL-*E. coli* by log 4, MRSA by log 6, and VRE by log 4. *C. difficile* spores inoculated on to either mattress or stainless steel were more resistant; following an exposure time of 90s there was a reduction in the bacterial load of log 2.



Conclusions

A multi-jet air plasma prototype reduced the bacterial load of all of the five strains tested on mattress and stainless steel surfaces. Further work will follow to improve the efficacy of the multi-jet plasma device against *C. difficile* spores.