

Technical report on the Anti-microbial
performance of the Bactokill air sterilisation
device in the removal of airborne Clostridium
difficile vegetative cells and spores

Prepared for and Commissioned by :

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Introduction :

This report forms an addendum to earlier work conducted which investigated the efficiency of the Bactokill device in the sanitisation of atmospheres.

In this study we have examined the performance of the Bactokill device in the inactivation of both the airborne vegetative cells of *Clostridium difficile* and its spores

Protocol

Culture : In this trial we employed mid exponential phase cultures of *Clostridium difficile* ATCC 9689 grown in modified RCM. Spore suspensions were obtained by heat inactivation of cultures at 68°C for 35 minutes.

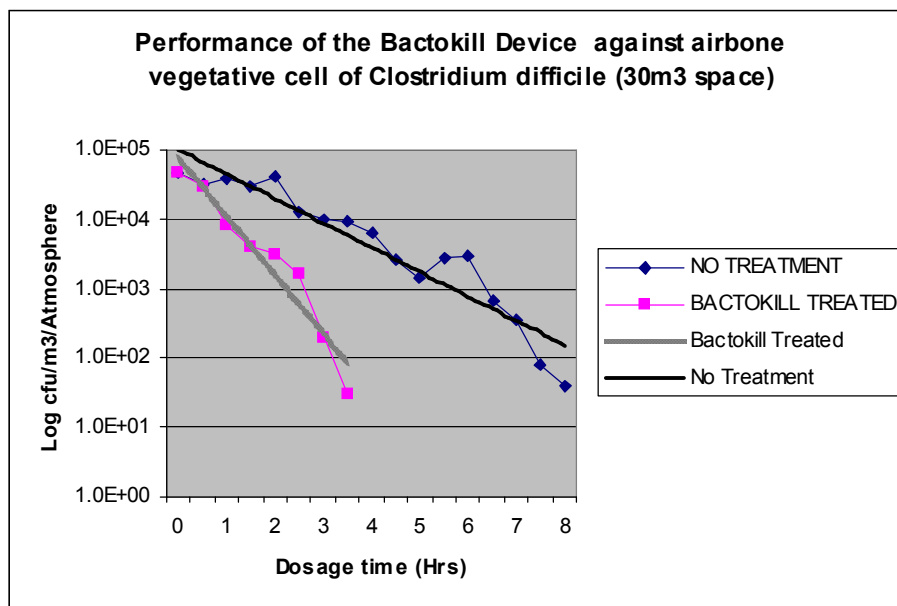
Dosage environment ; Dosage was carried out in a 30m³ H.E.P.A. vented Perspex container. Inoculation was achieved by nebulisation of the culture into a turbid atmosphere. Spores or cells were held airborne by the action of floor mounted 100 watt fans . All surfaces were treated with an anti-static compound. Recovery of atmosphere samples was achieved by aspiration of atmosphere into maximal recovery broth (100 ml). A control chamber was operated simultaneously during treatment to determine loss of microbes due to effects other than UVc treatment . Stated kill rates are therefore corrected for culture loss not attributable UVc doses.

Recovery of organisms : Recovery and enumeration of viable spores or cells after aspiration was achieved by serial dilution of the MRD recovery medium followed by plating on Brazier CCEY agar . Additional samples of recovery medium were examined by membrane filtration again employing Brazier CCEY agar. Measurement was conducted at T = 0 and thereafter for 8 hours at 30 minute intervals.

Results

Table 1 Performance of the Bactokill device in the inactivation of airborne Clostridium difficile vegetative cells

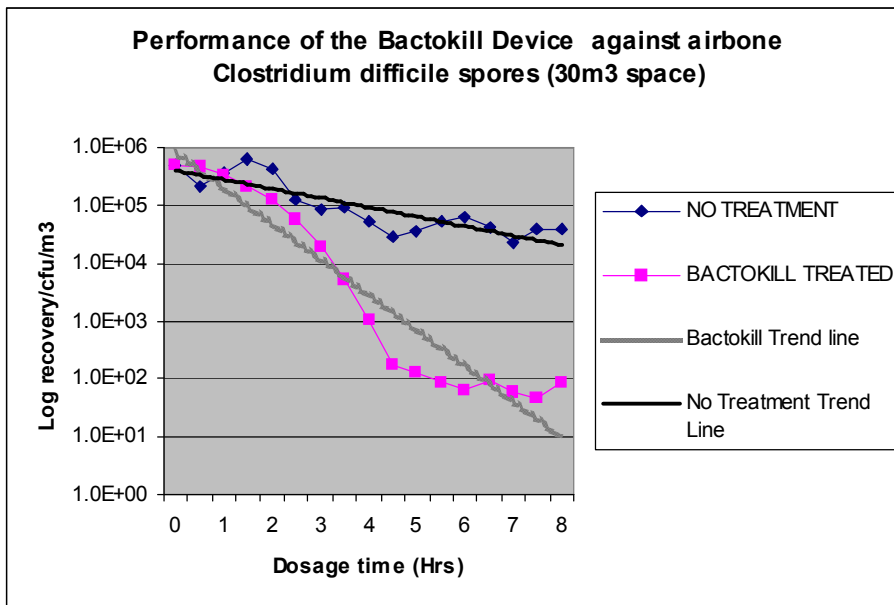
TIME hours	No Treatment	Bactokill Treatment
0	4.5E+04	4.5E+04
0.5	3.1E+04	2.9E+04
1	3.9E+04	8.2E+03
1.5	2.9E+04	4.1E+03
2	4.1E+04	3.2E+03
2.5	1.3E+04	1.6E+03
3	9.7E+03	1.9E+02
3.5	9.2E+03	3.0E+01
4	6.1E+03	No recovery
4.5	2.6E+03	No recovery
5	1.4E+03	No recovery
5.5	2.7E+03	No recovery
6	2.9E+03	No recovery
6.5	6.7E+02	No recovery
7	3.4E+02	No recovery
7.5	8.0E+01	No recovery
8	4.0E+01	No recovery



Corrected Log reduction 4.2 at 3.5 hours dosage

Table 2 Performance of the Bactokill device in the inact Clostridium difficile spores

TIME hours	No Treatment	Bactokill Treatment
0	5.1E+05	5.1E+05
0.5	2.1E+05	4.6E+05
1	3.7E+05	3.5E+05
1.5	6.2E+05	2.2E+05
2	4.2E+05	1.3E+05
2.5	1.2E+05	6.0E+04
3	8.3E+04	1.9E+04
3.5	9.1E+04	5.3E+03
4	5.2E+04	1.0E+03
4.5	2.9E+04	1.7E+02
5	3.7E+04	1.3E+02
5.5	5.2E+04	8.8E+01
6	6.1E+04	6.3E+01
6.5	4.2E+04	9.2E+01
7	2.3E+04	5.8E+01
7.5	3.9E+04	4.7E+01
8	3.8E+04	9.0E+01



Corrected Log reduction 4.0 at 7.5 hours dosage

Discussion :

By comparison with the data obtained for the decrease of both vegetative cells and spores of Clostridium difficile in the none UVC treated environment, our findings indicate that the Bactokill device is capable of reducing the levels of Clostridium difficile in atmospheres.

After appropriate correction of kill rate our data indicates the device is capable of 4 log cycles of reduction of vegetative cells over a 3.5 hour period. In the case of airborne spores a 4.0 log cycle reduction was obtained after 7.5 hours of dosing.

Given continuous operation the device, in my opinion represents an important addition to the infection control effort.

A handwritten signature in blue ink, appearing to read 'D.O'Connor', with a horizontal line underneath.

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D.O'Connor B.Sc. Ci.Biol M.I.F.S.T.