Analysis of an Air Sanitising Unit.

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Project Report Prepared for GAMA Healthcare.

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Analysis of an Air Sanitising Unit.

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Introduction

An air sanitising unit was supplied for testing to analyse its antibacterial properties against airborne bacterial contamination.

1 Test Procedures

1.1 Experimental set up

A 1.0 m^3 air tight perspex chamber (Figures 1 and 2) was used to evaluate the ability of the Novaerus air sanitation unit to remove *Staphylococcus epidermidis* aerosols. The chamber was fitted with an internal fan to maintain mixing, sampling and injection ports, and the sanitation unit. The fan and the sanitation unit were activated from outside of the chamber as and when required.

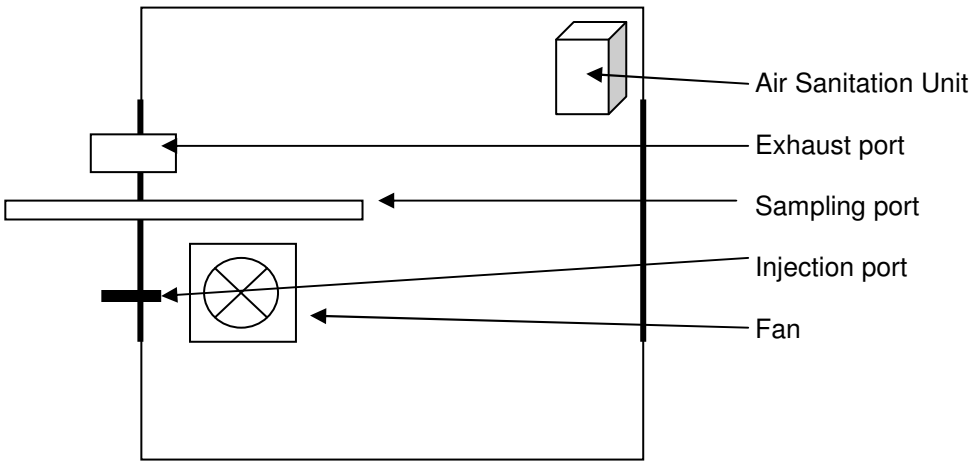

Figure 1. Schematic of Air Sampling Chamber

1.2 Contamination and sampling of the chamber

The chamber was contaminated by aspirating 2 ml of bacterial suspension into the chamber using an airbrush and compressor. The aerosol stream was injected above the internal fan to ensure mixing. The chamber was left to equilibrate for 1 minute prior to sampling. The chamber was sampled at regular intervals using SKC Biosamplers containing 20 ml of MRD and operating at 12.5 l/min. The number of surviving bacteria was then determined by plating onto TSA followed by incubation at 37°C for 24 to 48 hours. The impact of the sanitation unit was determined by comparison with a control run where the unit was not in operation.

1.2.1 Test suspension

The bacterial test suspension was prepared by using a broth culture of *Staphylococcus epidermidis* grown on Tryptone Soya Broth (TSB) at 37°C, 130 rpm for 24 hours.

2 Results & Conclusion

The presence of the air sanitation unit does appear to have had a significant impact on the levels of aerosols present in the sampling chamber over and above that seen in the control run (Figure 2). Both the rate of removal and the final log reduction are both greater in the presence of the sanitation unit. Over the 30 minutes sampled the sanitation unit removed 95% of the contamination as opposed to 72% in the control run. The loss of aerosols in the control run are likely to be associated with sedimentation and coalescence on the walls of the chamber. Although the difference (23%) appears small it does equate to >6.7 million cfu/m^3, a significant amount of contamination and represents a rate of removal of >3700 cfu/m^3/sec.

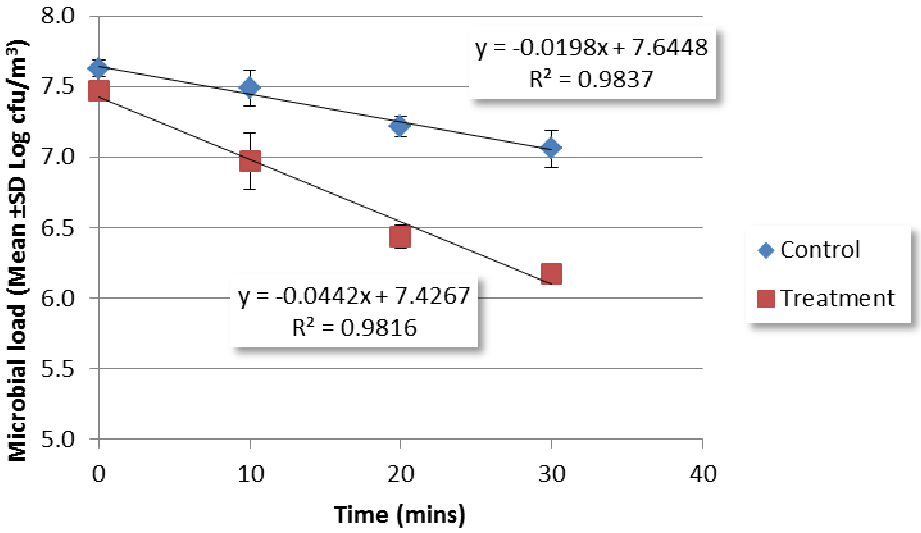

Figure 2. Removal of aerosols

These results indicate that the Novaerus air sanitation unit is able to make a significant impact on the levels of aerosol contamination under laboratory conditions. The levels of contamination used to challenge the system in this case are much higher than would be experienced in healthcare settings suggesting that the unit is likely to be able to make a significant impact on airborne contamination.

It may be useful to repeat this work at lower initial levels of contamination to ensure that the rate of removal is consistent over a range of contamination levels and to repeat the work with other microbial contaminants such as moulds and bacterial spores.