

# Smart Solutions for HCAI



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## EVALUATION REPORT: The Inov8 AD (air decontamination) unit

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### Introduction

Smart Solutions for Healthcare Associated Infections (HCAI) is a national programme that aims to bring forward new technologies with the potential to reduce HCAI rates within the NHS. The programme was run by *TrusTECH*®, The North West of England NHS Innovations Hub, on behalf of the Department of Health's HCAI Technology Innovation Programme, and supported by the NHS National Innovation Centre.

Following a national call for innovative products and technologies from a range of diverse industries, nine products were selected for further evaluation within an NHS setting. The aim of the evaluation was to assess the potential of the product to contribute to the reduction of HCAs in a scientifically robust manner.

The AD (air decontamination) unit from Inov8 Science was one of the products selected for evaluation. The AD emits hydroxyl radicals - often referred to as the 'open air factor' - which destroy pathogens, replicating the way in which the natural environment disinfects the air in open spaces. This process is self-perpetuating as the destruction of one pathogen releases more hydroxyl radicals.

The AD was one of three portable air decontamination products evaluated at the Royal Free Hospital, London (Royal Free and Hampstead NHS Trust).

### Objectives

- To assess the effect on environmental microbial load of deploying air decontamination devices in a general ward environment.
- To compare the efficacy of these devices during the test period.
- To assess ease of use and acceptability of air decontamination devices in a general ward environment.

### Methodology

Four-bedded bays and single rooms of general medical/elderly care wards were used for the study. Each device was trialled over a 16-week period divided into five periods as follows:

Period 1	2 weeks	Devices off	(baseline data collection)
Period 2	5 weeks	Devices on	
Period 3	2 weeks	Devices off	
Period 4	5 weeks	Devices on	
Period 5	2 weeks	Devices off	

Devices were placed in three bays/rooms and a fourth bay/room acted as a control. The exact location and number of floor areas used for the study was dependent on the bed use at the time. The standard cleaning regimen for the wards was not to be modified in any way during the duration of the study.

Wherever possible during the study period, the sampling protocol was adhered to with the same personnel performing the sampling. The presence of any patients colonised with alert organisms was recorded. Results of hand hygiene audits were used to ensure that hand hygiene compliance had been comparable throughout.

A total of 21 standardised sites for surface sampling were identified in the four-bed bays, consisting of 12 high surfaces and nine low surfaces. Each was sampled five times per week, alternating between morning pre-cleaning and afternoon post-cleaning.

Up to 17 standardised sites were identified in the side rooms for surface sampling (nine high surfaces and eight low surfaces). Each was sampled five times per week, alternating between morning pre-cleaning and afternoon post-cleaning. Up to six air samples were taken per day, four times weekly in each bay and room.

### Evaluation

- Surface sampling was by contact agar plates for determining total viable count (TVC) and meticillin-resistant *Staphylococcus aureus* (MRSA). *Clostridium difficile* and Enterobacteriaceae were measured if positive patients had been identified in the locations used in the study.
- Air samples were collected for TVC, fungi (Sabouraud dextrose agar, SAB) and MRSA. Air sampling was performed using AirTrace slit-to-agar microbial air sampler. A total of 200 L of air was sampled per plate. *C. difficile* and Enterobacteriaceae were measured if positive patients were identified.
- A standardised questionnaire was used to obtain feedback from staff.

### Results

- The evaluation demonstrated no particular trend for the effect of the AD on environmental bacteria, either airborne or surface organisms.
- No significant differences in the occurrence of environmental surface TVCs were observed between locations with a device (on or off) and external controls, and no effect on environmental air TVC. Likewise, environmental MRSA, which accounted for less than 2% of surface TVCs and less than 5% of air TVCs, did not generally change significantly. The exceptions were the odds of an occurrence of surface MRSA being significantly higher with the device off compared to the external control, yet environmental air MRSA was significantly lower (25%) than the external control when the device was switched on. The odds of an occurrence of air fungi were no different from the external control, except they were significantly lower (44%) for rooms with the device on.
- The alternative analyses of the internal comparison of the effect of the device switched on versus off (internal control) also demonstrated variable findings. The results showed that a reduction in environmental surface TVCs was only significant for high surfaces in single rooms, and no significant changes were observed for air TVCs. No effect on environmental MRSA was evident after 48 hours. The occurrence of environmental air fungi was significantly lower with the device on in rooms, but no effect was observed in bays.

- It is considered that the inconsistencies in the differences between the device and the external control could have been due to underlying differences between the locations. Additionally, the relationship with cleaning status (whether a sample had been taken pre- or post-cleaning, although this was alternated) may have had a bearing on the results. The internal comparison of the device on versus off provided an alternative confirmatory method of analysis. However, further investigations of the AD, particularly with regard to controls, are required in order to fully establish the effect of this device.
- Feedback from a small number of ward staff showed that generally the AD was acceptable. All ten respondents (five nurses, one healthcare assistant, one ward manager, one pathway coordinator, one dignity development nurse and one consultant) indicated that the device did not increase the level of noise, seven out of ten indicated an improvement in cleanliness and six respondents thought it reduced odour.

### Conclusions

Few obvious trends in the effect of the AD on environmental bacteria were observed in the study. The clearest indication of a reduction in contamination was shown for MRSA levels.

The device was found generally easy to use and acceptable, complementing standard deep cleaning procedures. Further investigations are required to establish the effect of the AD in reducing contamination within hospital ward settings.

### **Further information:**

Smart Solutions for HCAI is run by TrusTECH®, the North West Innovations Hub.

[www.smartsolutionsforhcai.co.uk](http://www.smartsolutionsforhcai.co.uk)

[www.trustech.org.uk](http://www.trustech.org.uk)

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