



INNOVATION AGENCY
Academic Health Science Network
for the North West Coast



TESTING AIR 'SCRUBBER' MACHINES



Lucy Smith and Greg Collins
testing samples
at the Feedwater lab

Case study | September 2022

Testing air 'scrubber' machines

Summary

A collaboration created by the Innovation Agency has established a reliable and consistent process for determining the effectiveness of units which reduce airborne infections.

This development has the potential to reduce hospital-acquired infections. NHS Supply Chain now recommends that all companies supplying air disinfection equipment should have biovalidation data that indicates the impact of air disinfection equipment on a recognised COVID-19 surrogate organism to be eligible for procurement. Currently there is a single facility in Liverpool that was recently set up which can provide this data.

The challenge

Many hospital-acquired, or nosocomial, infections occurred throughout the pandemic. Many health staff and patients without COVID-19 were infected when entering hospital. The problem has been particularly acute in trust buildings built between the 1960s and 1990s because they often have poor ventilation.

Social distancing and the requirement to deep-clean between procedures has led to a significant reduction in available facilities. While there are several air-disinfecting products on the market that might meet this challenge, there is no standard method to give assurance that the equipment is effective at killing airborne pathogens.

Actions

The NHS England Chief Scientific Officer commissioned the Innovation Agency to develop a method to ascertain the efficacy of machines that disinfect air, specifically short wavelength ultraviolet (UVC) air purification devices.

Procurement teams and others needed objective data for greater confidence when procuring air disinfection equipment.

The Innovation Agency used its contacts in the health, care and commercial sectors to convene a collaboration: Liverpool University Hospitals NHS FT, water treatment specialists Feedwater Ltd from Wirral, and laboratory and consultancy company Essential Microbiology, from Gloucester.

The partnership developed a protocol to determine the efficacy of UV air decontamination units. It did so after setting up a test facility at Liverpool University Hospitals where a bio-validation and bio-evaluation process has been developed. This will form the basis of a British Standards Institute standard for air disinfection equipment.

The test facility is a bio-secure unit with chambers of various sizes which can be dosed with bacteria. Air is mixed using recirculating electric fans. Air samples were collected both before and after the UV devices were turned on, drawing air through the UV unit, at different intervals over a period of an hour. Air was sampled using the Coriolis principle by creating a cyclone, trapping bacteria in the air samples in liquid. The samples were then taken to the Feedwater laboratory to analyse the reduction in viable bacterial colonies. From this data, the team was able to accurately calculate the capability of different devices to disinfect air.

The role of the Innovation Agency

The Innovation Agency was the catalyst for the project, securing a contract for the work and bringing together the partners. The test method was set up and comprehensively tested over several months. The Innovation Agency then provided this as a commercial, paid-for service, giving air scrubber manufacturers and suppliers the facility to test their devices.

Results

The project has established a reliable and consistent process for determining the effectiveness of units which reduce airborne microbial counts. The method is clearly defined and generates data that allows equipment to be meaningfully compared. The method could also be adapted to evaluate other types of device, including ozone or plasma-based equipment.

The resulting protocol has been adopted by NHS Supply Chain as part of their criteria for accepting companies; and it is expected to contribute to the new British and subsequently International Organisation for Standardisation, or ISO, standard for such analysis.

Testimonials

“This work has provided the evidence through a scientific study that this technology is safe and effective. The technology is now clinically proven to provide an invaluable contribution to infection prevention and control and, in addition, requires considerably less energy than conventional ventilation systems, which will be important across our NHS estate, as we move towards net zero carbon emissions.”

Angela Douglas

Deputy Chief Scientific Officer at NHS England.

“The AHSN were genuinely interested in our unique technology from first contact and welcomed our application to their Innovation Exchange. Their coordinated approach swiftly brokered us into a very relevant project where their agile team ensured our devices were successfully validated.”

Maria Silabon

Marketing and Business Development Director at H&R Healthcare, distributor of the Novaerus air disinfection machine, which was tested according to the protocol.

Next steps

Several manufacturers have used the evaluation service in Liverpool. Hospital trusts can take advantage of the service to redesign ventilation systems that reduce the potential for infection and require less energy than conventional ventilation systems.

For further information

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