Potential for Air Disinfection Technologies to Contribute to Airborne Infection Control

A.McDonagh[1], C.J. Noakes[1], L.A. Fletcher[1]

[1]Pathogen Control Engineering Institute, School of Civil Engineering, University of Leeds

Abstract

Increasing awareness of indoor air quality, including potential for airborne disease transmission, have led to development of numerous devices to remove or inactivate indoor air pollutants. These incorporate a range of approaches including filtration, UV-C irradiation, air ions, hydroxyl radicals, hydrogen peroxide and ozone. Devices may be applied in ventilation ducts to treat supply/extract air, or located within a room to tackle locally generated pollutants. While some devices have credible data to support performance claims, many lack data on efficacy and appropriate application.

This paper presents data from laboratory studies and ventilation models to explore the effectiveness and potential for application of a number of these devices. Experiments conducted in a room scale bioaerosol chamber compare the performance of devices based on filtration and UV-C technologies. A pure culture bacterial aerosol generated using a collision nebuliser was introduced to the room under steady-state ventilation conditions and samples taken with and without the devices operational using an Anderson sampler. Ventilation mixing models are used to explore the predicted concentrations under a range of ventilation and device performance scenarios.

Results show that even in controlled laboratory conditions, reliably quantifying performance is difficult as it is dependent on the location and specific design of the device as well as the experimental test conditions. Ventilation models suggest that some devices may be very effective in poorly ventilated environments, but they are likely to be constrained by the ability to pass sufficient contaminated air through the active components of the device in many cases.