

Matthew Anderson

*Redesigning Ventilation to Minimize Airborne Pathogen Transmission in Multiple-Bed Hospital Wards*

We investigated how to minimize infection in multiple-bed hospital ward patients from airborne pathogens while maintaining patient thermal comfort and cost-effectiveness. We tried to find the optimal configuration of four ventilation control factors (humidity, airspeed, air change rate, and ventilation regime) that minimize the mean age of air in ward patients' breathing zones using computational fluid dynamics and Taguchi design. We discovered that the optimal configuration of ventilation control factors was: 45% humidity, 1 m/s inlet airspeed, 12 air changes per hour, a supply vent above the patients' bed on the wall, and a return vent to the lower right of the bed/ The mean age of air in this configuration was 93.4% better than the current standard in hospital wards and was 86.8% better than the mean configuration of ventilation control factors. This configuration was also able to maintain cost efficiency and patient thermal comfort.