Letter To Editor

Role of ventilation in a healthcare facility to contain COVID-19

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In this unprecedented time, adequate ventilation of healthcare facilities through natural or mechanical ventilation systems to prevent the spread of infectious diseases is fundamental. Positive and negative pressure rooms are common terminologies used in the current pandemic. Healthcare workers should have a clear concept regarding such engineering along with personal protective equipments (PPE).

Historically, the idea of airborne spread was first described by Wells (1934) and then by Riley (1961). The Wells–Riley equation (1978) was used to evaluate the effect of ventilation, filtration, and other physical processes on transmission through droplet nuclei.[1] Unfortunately, there is little evidence which suggests that ventilation directly reduces the risk of disease transmission, however many studies indicate that insufficient ventilation increases disease transmission. Several studies have looked at the possible transmission routes of diseases, but few have looked at the direct impact of ventilation on disease transmission. The diseases which showed a possible association between transmission among humans and ventilation were pulmonary tuberculosis, nosocomial aspergillosis, chickenpox, measles,[2] and smallpox.[3] Evidence advocating the use of positive pressure rooms for other purposes is lacking. A real challenge is when a patient requiring protective isolation has a contagious infection as well, particularly droplet or airborne; for example, a renal transplant patient with SARS-CoV-2.

In a positive pressure room, higher air pressure is maintained than that of the surrounding areas, so air can passively leave the room without circulating back. This is achieved via an exhaust system that removes a quantity of air less than that of the supply system. As a result, any airborne particle which originates in the room is filtered out and would not be able to re-enter the room from the surrounding environment. Some examples of positive pressure rooms are in vitro fertilization labs and operating theatres. The recommended pressure is +ve 30 pascal.[4]

In a negative pressure room, lower air pressure is maintained to segregate an area so that contamination from the room does not flow out into the surrounding areas. To maintain negative pressure, a dedicated exhaust system removes a quantity of air greater than that of the supply air. The recommended pressure is –ve 30 pascal. Rooms that should be negatively pressurized are emergency department & radiology waiting areas, triage, bathrooms, Airborne Infection Isolation (AII) rooms, laboratory, autopsy, dark and soiled rooms.

An isolation facility aims to control the airflow and pressure in the room to reduce cross-infection. Airflow is controlled so it always flows from less to more contaminated areas. Control is achieved by adjusting the pressure differential between supply and exhaust air. Isolation rooms have fairly high rates of air exchange relative to other patient areas. A minimum of 12 air changes per hour (ACH) or 145 litres per second per patient is required.[4] The actual amount of air changed in a well-mixed ventilation scenario will be 63.2% after 1 hour and 1 ACH. High airflow may result in potential draughts, therefore thermal comfort of the patient needs special attention. Consideration should be given to installing individual thermostats in each room so air temperature (20–26°C±0.5°C) and relative humidity (55%±5%)can be controlled.[5]Pressurized rooms require several additional components to remain effective, including high-efficiency particulate air (HEPA) filters, self-closing entryway, thoroughly sealed floors, ceiling, walls, and windows; as well as the presence of fans and ductwork to move air in the desired directions.

When rooms are not properly pressurized, airborne contaminants can escape putting the health of the people at risk. The essential part is to control air intake and exhaust along with pressure differentials. All pressurized rooms should be labelled and provided monitoring systems with alarms in case of pressure failure. Finally, future studies are required to establish guidelines regarding the use of positive and negative pressure rooms for contagious diseases such as COVID-19.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this letter.

References

1. Fennelly KP, Nardell EA. The Relative Efficacy of Respirators and Room Ventilation in Preventing Occupational Tuberculosis. *Infect Control Hosp Epidemiol.* 1998;19(10):754–749.
2. Bloch AB, Orenstein WA, Ewing WM, et al. Measles outbreak in a pediatric practice: Airborne transmission in an office setting. *Pediatrics.* 1985:75(4):676–683.

3. Wehrle PF, Posch J, Richter KH, et al. An airborne outbreak of smallpox in a German hospital and its significance with respect to other recent outbreaks in Europe. *Bull World Health Organ.* 1970;43(5):669–679.

4. Moran R. Guidelines for the Classification and Design of Isolation Rooms in Health Care Facilities Standing Committee on Infection Control. *Design.* 1999.

5. Chow TT, Kwan A, Lin Z, et al. A computer evaluation of ventilation performance in a negative-pressure operating theater. *Anesth Analg.* 2006;103(4):913–918.

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