Project Title: Health care facility ventilation system design to minimize cross infection risk against airborne COVID-19

Expected outcome: Evidence-based recommendations with respect to ventilation design for COVID-19 isolation rooms in health care facilities to prevent airborne infection risk.

Expected time: 12 months

Remarks: This research study directly aligns with WHO recommendations of airborne precautions with the objective to mitigate rapid spread of COVID-19 and its potential negative consequences of frontline workers in hospitals.

Project Investigators:

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Project Details:

Current Scenario and research gap

This project helps to address asymptomatic and pre-symptomatic transmission, implement source control for everyone entering a healthcare facility (e.g., healthcare personnel, patients, visitors), regardless of symptoms. Recent research study suggests that viral droplets can travel farther than 6 feet in certain conditions and that live coronavirus can persist in the air in aerosol form. Such aerosols pose a disproportionate risk to people in hospital settings. Currently, it is not clear how human-generated bio aerosols affect airborne virus transmission and how HVAC systems should be optimally designed and operated to reduce the risk of transmission.

Methodology

Engineering and environmental controls primarily intervene after pathogens leave the breathing zone from one person before they enter the breathing zone of another. At the simplest level, an engineering control might involve role of ventilation in removing exhaled airborne bio-aerosols and preventing cross infections. To control and maintain the airflow direction from hygienic environment to infected zone is an effective way to remove the droplets nuclei efficiently so as to minimize the cross infection risk and to supply pathogen-free fresh air for breathing in hospital isolation rooms. Thermal stratification lock up phenomena is studied and an improved local ventilation system is proposed by combined personalised ventilation (PV) and personalised exhaust (PE) configurations. This study aims to assess the Evacuation Efficiency (ratio of tracer gas concentration at exhaust without PV-PE to the tracer-gas concentration at the breathing zone of health workers with and without the PV-PE) at the breathing zone of the health workers as the evaluation index and thereby building code for isolation wards can be recommended.

Funding requirements: 8 Lakhs