



GUIDANCE NOTE ON VENTILATION AND INDOOR AIR QUALITY (IAQ) FOR HEALTHCARE FACILITIES SETTING DURING COVID-19 PANDEMIC

1.0 INTRODUCTION

The COVID-19 pandemic has influenced the lifestyle and approach of people to their surroundings. COVID-19 is mainly transmitted by close contact and respiratory droplets which are released when an infected person coughs, sneezes, talks, or sings. It can also be spread through virus aerosols in the air under certain settings, such as enclosed environments which are poorly ventilated. Hence, it is critical to mitigate this risk by improving ventilation and air quality in indoor environments.

Healthcare Facilities are those premises used for COVID-19 treatment such as centres and wards including but not limited to hospital, clinic and *Pusat Kuarantin dan Rawatan COVID-19 (PKRC)*.

Objective of this guidance is to guide public on improving ventilation and indoor air quality at the **healthcare facilities** to reduce the risk of airborne transmission. It should be accompanied with the latest Standard Operating Procedures (SOP) established by *Majlis Keselamatan Negara (MKN)* and other key measures to reduce disease transmission, such as requiring building occupants to practice physical distancing, wearing masks, frequently washing hand, and carrying out regular disinfection of high-touch points within the building.

This guidance is developed based on the Industry Code of Practice (ICOP) on Indoor Air Quality 2010 published by Department of Occupational Safety and Health (DOSH) and other established documents published by respective international organization and other countries on ventilation and indoor air quality during COVID-19 pandemic.

This guidance applies to premises which have mechanical ventilating and air conditioning (MVAC) system, air conditioning system without fresh air supply and natural ventilation. This guidance is one of the best practices to be implemented by those who are involved in reducing the transmission of COVID-19 virus through airborne.

Note:

Mechanical Ventilation Air-Conditioning (MVAC) system is also known as Air Conditioning and Mechanical Ventilation (ACMV) system.

2.0 AIR-CONDITIONED FACILITIES WITH MECHANICAL VENTILATION

- a) To increase the ventilation rate according to system capabilities. Disable demand-control ventilation such as those with carbon dioxide, CO₂ sensors, to avoid automatic reduction of outdoor air supply.
- b) Consider reducing the maximum room occupancy.
- c) Modify airflow direction by relocating supply and return air devices if necessary.
- d) Set recirculation air dampers to a minimum according to system capabilities if possible.
- e) Use high-efficiency filters (at least MERV14 or F8 is recommended) in AHUs. Filters should be properly installed, regularly inspected, maintained and cleaned according to manufacturers' recommendation.
- f) Consider to use air-cleaning technologies that be able to kill microbe in AHUs or ducting to augment MERV14 filters. Efficacy and safety of all air-cleaning devices under the operating conditions must be considered.
- g) Consider to use a stand-alone air cleaner with appropriate filters if no other (short-term) strategy can be adopted. **The stand-alone air cleaners do not replace ventilation in any circumstance.**

3.0 AIR-CONDITIONED FACILITIES WITHOUT FRESH AIR SUPPLY

- a) Open operable windows and doors as frequently as possible, unless outdoor/outside air quality is poor. Air-conditioning should be reduced or turned off when doors and/or windows are opened.
- b) Consider reducing the maximum room occupancy.
- c) Consider positioning extractor/mounted exhaust fans at windows to blow air outwards and increase air exchange.
- d) Consider adding dedicated outdoor air supply and/or exhaust. The outdoor air system can be designed such that high-efficiency (MERV14 or F8) filters when necessary.
- e) Modifying the position of the split unit or FCUs to direct the airflow to the less clean zone or install an extractor to control the airflow where Aerosol Generating Procedures (AGP) are performed. AGP is any medical procedures that can induce the production of aerosols of various sizes (e.g. tracheal intubation, non-invasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, dental procedures).
- f) Consider to use a stand-alone air cleaner with appropriate filters if no other (short-term) strategy can be adopted. **The stand-alone air cleaners do not replace ventilation in any circumstance.**

4.0 NATURAL VENTILATION FACILITIES

- a) Assess the opening locations and opening surfaces considering potential new openings.
- b) Consider enabling cross ventilation rather than single-sided ventilation. However, this approach should not be implemented in a room or ward for COVID-19 suspected cases where AGP may take place and when the exhaust air is not properly managed and when the airflow is moving from a less clean to a clean area.
- c) Consider reducing the maximum room occupancy.
- d) The airflow direction should be from clean to less clean area.
- e) Increase natural ventilation with enhancement by fans:
 - i. Keep windows and/or doors open at all times, unless outdoor air quality is poor or the weather condition does not allow.
 - ii. Position fans at windows to blow air outwards and outside away from any air intake vents
 - iii. Operate exhaust fans (e.g. toilet, kitchen) at full capacity to expel air from the indoor space. Keep windows or other openings (e.g. back door) around exhaust fans closed to avoid short-circuiting of air flow.
- f) Consider to use a stand-alone air cleaner with appropriate filters if no other (short-term) strategy can be adopted. **The stand-alone air cleaners do not replace ventilation in any circumstance.**

References:

1. ASHRAE
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2. DOSH. *Industry Code of Practice on Indoor Air Quality*, 2010
<https://www.dosh.gov.my/index.php/legislation/codes-of-practice/chemical-management>
3. Government of Singapore, *Updated Guidance Note On Improving Ventilation And Indoor Air Quality In Buildings Amid The Covid-19 Situation* (25th May 2021)
<https://www1.bca.gov.sg/docs/default-source/docs-corp-news-and-publications/circulars/guidance-note-on-improving-ventilation-and-indoor-air-quality-in-buildings.pdf>
4. World Health Organization - *Roadmap to improve and ensure good indoor ventilation in the context of COVID-19*. (2021)
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