Independent Schools Victoria

Briefing paper

COVID-19 Advice on Ventilation

Transmission of respiratory viruses occurs when aerosols or respiratory droplets carrying the virus are inhaled by a susceptible person or land on another surface, which is touched by a susceptible person who subsequently touches their nose, eyes or mouth.

With the Delta strain of SARS-CoV-2 being the current dominant strain causing COVID-19, virus-containing aerosols appear to be the major COVID-19 transmission route. COVID-19 is also spread via the respiratory droplets excreted when an infected person coughs, sneezes or talks. In many cases, a person producing such virus-containing aerosols is unaware that they are infected, as virus excretion may occur prior to their experiencing disease symptoms. Poor ventilation and airflow in an indoor environment have been implicated as increasing the risk of transmission of COVID-19.

SARS-CoV-2 viral particles spread between people more rapidly indoors than outdoors. Indoors the concentration of viral particles is often higher than outdoors, where even a light wind can rapidly reduce concentrations. When indoors, ventilation mitigation strategies can help reduce viral particle concentration. The lower the concentration, the less likely viral particles will be inhaled into the lungs - potentially lowering the inhaled dose; contact eyes, nose or mouth; or fall out of the air to accumulate on surfaces. Protective ventilation practices and interventions can reduce the airborne concentrations and reduce the overall viral dose to occupants[1].

Consequently, to enable the return of students to school as safely as practicable, it is imperative that enhanced ventilation, in addition to other infection control strategies, are implemented.

Multiple prevention strategies such as:

- Wearing a well-fitting, multi-layered mask
- Vaccination as soon as eligible
- Staying home when sick and getting tested
- Physical distancing
- Handwashing and following respiratory etiquette (sneezing and coughing into the crook of one's elbow)

[1] https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/ventilation.html

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- Contact tracing in combination with quarantine and isolation
- Cleaning and disinfection, including use of hand sanitizer, in addition to
- Good ventilation

are important layers of protection to keep schools as safe as practicable.

Enhanced Ventilation

Improving ventilation Is an important COVID-19 prevention strategy that can reduce the number of virus particles in the air. Bringing fresh outdoor air into a building helps keep virus particles from concentrating inside. This is achieved by opening multiple doors and windows, using child safe fans to increase the effectiveness of open windows, and where possible, making changes to the Heating Ventilation and Air Conditioning (HVAC) or air filtration systems.

The most important strategy to improve ventilation is to bring in as much outdoor air as possible including:

- If it is safe to do so, open windows and doors. This helps increase outdoor airflow and helps decrease the potential concentration of virus particles in the air
- Use child-safe fans to increase the effectiveness of open windows. Safely secure fans in a window to blow potentially contaminated air out and pull fresh air in through other open windows and doors
- Where possible, hold as many classes and activities outdoors
- Where spaces are used by different groups of students or staff, if possible, use rooms intermittently, such as every second lesson, to provide time for air exchange

Ensure HVAC settings are designed to maximise ventilation including:

- Ventilation systems are serviced regularly and meet code requirements. They seek to provide acceptable indoor air quality for the current occupancy levels for each space
- HVAC systems are set to bring in as much outdoor air as your system will safely allow. Where practical, aim to reduce, or ideally eliminate HVAC air REcirculation. This may require expert HVAC consultation.
- The HVAC system's total airflow supply is increased to occupied spaces where possible. Greater airflow encourages air mixing and ensures any recirculated air passes through the filter more frequently
- Demand-controlled ventilation (DCV) controls are inactivated or decreased so that air supply is not based on occupancy or temperature. In this way the air supply will be maximised and remain constant throughout the day
- Simple HVAC systems controlled by a thermostat should be set so that the fan control switch is set to 'on' from 'auto'. This will ensure that HVAC system provides continuous air filtration and distribution
- Maximise air filtration without reducing airflow
- Use portable high-efficiency particulate air (HEPA) fan/filtration systems to enhance air cleaning (especially in higher risk areas such as nurse's office or areas frequently inhabited by people with a higher likelihood of having COVID-19 and/or an increased risk of getting COVID-19
- Where possible, the HVAC system is run at the maximum outside airflow for two hours before arrival (if cleaning is undertaken after the school day) and two hours after the building is occupied to refresh air before arrival and to remove remaining particles at the end of the day. The two hours after occupancy will ensure the air is replaced at the conclusion of the school day, whilst two hours before will ensure the air is a fresh as

possible for the new school day. Where school cleaners operate prior to the start of the school day, it is important to allow a significant period of ventilation prior to the commencement of lessons.
- Where possible, classrooms used by multiple cohorts of students should ideally only be used every second lesson to enable air replacement between groups of students

Carbon dioxide (CO_2) sensors can be used to assess the quality of ventilation in an occupied room[2]. The current outdoor concentration of CO_2 is approximately 415ppm but if often higher in urban areas with lots of traffic. Indoor CO_2 concentrations are similar to those outdoors in a well-ventilated empty room but tend to increase with occupancy. An indoor CO_2 of less than 1,000ppm if often used as a proxy to indicate ventilation in a room or building is sufficient. The Health and Safety Executive of the United Kingdom recommends that a CO_2 concentration of <800ppm is likely to indicate that a space is well ventilated, whilst a CO_2 concentration of >1,500ppm indicates a poorly ventilated space. Additional information on CO_2 concentration monitoring is available on their website[3].

Exhaust fans in toilets and kitchens:
- Inspect and maintain exhaust ventilation systems in bathrooms/toilets and kitchens
- Ensure bathroom and kitchen exhaust fans are on and operating at full capacity while the school or childcare program is operating and for two hours afterwards as well as ideally for two hours prior to occupancy

Hand dryers:
- The most important factor in reducing the spread of infection during drying is to wash hands thoroughly, especially rinsing the soap off (and hence germs) before drying them. Consequently, whilst there may be some evidence that hand dryers disperse water droplets from hands during the drying process, infection risk is minimized if hands are clean. Drying hands with a hand dryer or paper towel are both considered safe practices.

Bus transport:
- During transportation, windows in buses and other forms of transportation, should be opened if doing so does not pose a safety risk. Keeping windows open only a few centimetres improves air circulation.

[2] https://www.abc.net.au/radio/programs/this-week/covid-safe-schools/13508938

[3] https://www.hse.gov.uk/coronavirus/equipment-and-machinery/air-conditioning-and-ventilation/index.htm