

COVID-19: Transmission, Aerosols and Ventilation

[Coronavirus disease 2019 \(COVID-19\)](#) is a respiratory illness caused by a new coronavirus.

Scientists and researchers are continually gathering new evidence about this disease, including on routes of transmission. New data suggests that it is possible for COVID-19 to spread through the air among people who are in enclosed, crowded spaces with poor ventilation for a prolonged period of time. Factors contributing to transmission may include activities that cause heavy breathing, such as singing, dancing or exercise, especially without precautions such as wearing a mask or keeping a physical distance. However, close, person-to-person contact with an infected person before they show symptoms remains the most common method of transmission.

Respiratory droplets and aerosols

The virus that causes COVID-19 is spread by respiratory droplets that are produced when we breathe, speak, sing, laugh, sneeze or cough. The larger, heavier respiratory droplets will fall more quickly due to gravity. The smaller, lighter droplets, sometimes called aerosols, may stay suspended in the air longer than larger droplets.

There are certain medical and dental procedures such as intubation and suctioning that generate aerosols, which can remain suspended in the air for a time. Healthcare workers performing these procedures should always wear appropriate personal protective equipment (PPE).

The amount of virus in respiratory droplets and aerosols produced by a person may differ based on where in their respiratory tract they originate, and the stage of illness the person is in. A person is contagious two days before they begin to show symptoms. Environmental conditions such as humidity, temperature, and air flow may also affect virus survival, risk of exposure and movement of the particles carrying the virus.

The risk of transmission from aerosols may be possible when there are a higher number of people indoors, for a longer period of time, with poor airflow or ventilation. With proper airflow or ventilation, the smaller particle will become diluted and disperse faster, similar to what occurs when you open windows to air out a smoky room.

While aerosols may contribute to the spread of COVID-19, close contact transmission is still the most common and efficient method of infection. Most infections are still linked to person-to-person transmission through close direct contact with someone who was contagious.

Heating, ventilation and air conditioning (HVAC) systems

HVACs and their filters are designed to reduce airborne pollutants, including virus particles, when they circulate through the system. HVAC filtration can protect people indoors when used with other public health measures. It is important to ensure regular maintenance of the HVAC systems in your home, business, workplace or school.

- Increase air-exchange settings on the HVAC system, if possible.
- Use the highest efficiency filters that are compatible with the HVAC system(s).
- Keep areas near HVAC inlets and outlets clear.
- Arrange furniture away from air vents and high airflow areas.

Use of air purifiers

Presently, there is no evidence to show that air purifiers on their own are effective in reducing the spread of COVID-19 transmission. Portable air cleaners or air purifiers may be useful as a supplement to HVAC ventilation or if there is no outdoor air exchange. Ensure the exhaust air of the air purifier is not blowing directly at a person.

Airflow and ventilation

In larger spaces, such as classrooms or businesses, good ventilation or airflow can help reduce the spread of COVID-19. Open windows and doors in rooms without HVAC systems, weather permitting, and if doing so does not pose a safety risk. If a room does not have ventilation (i.e. no windows or HVAC system), a portable air cleaner/purifier can be considered, but make sure the air exhaust is not blowing directly at the people in the room. If a ceiling fan or portable fan is used, make sure the airflow is upward, away from people.

Public health measures

There is not one public health measure that can guarantee protection from COVID-19; [multiple strategies](#) are needed. Measures include symptom screening and self-isolation for people with symptoms, practicing physical distancing, wearing a mask at all times when indoors*, and practicing good hand hygiene and respiratory etiquette.

** Wearing a mask contains respiratory droplets, including from coughs and sneezes, which may emit droplets into the room.*

More information

For more information, visit our website at www.toronto.ca/COVID19 or call us at 416-338-7600.

References

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