

## **Do ventilation, filtration, or portable air cleaners help control the spread of COVID-19?**

Plain Language Summary, June 2023

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### **Why do we need to know about the effects of ventilation, filtration and portable air cleaners?**

The virus that causes COVID-19 can spread through the air in small particles. You may have also heard these referred to as “droplets” or “aerosols”. These particles can spread from a person who is infected and then be breathed in by others. Particles can stay in the air for a long time and travel long distances. Some particles are so small that they cannot be seen, and they follow the air movement like smoke does, never settling on the ground. The smaller the indoor setting, the less diluted the exhaled particles are for other people inhaling them.

Ventilation can change where particles go, and how far they travel. Ventilation also works by replacing contaminated indoor air with outdoor air. This can be done by opening windows and doors, or using a mechanical heating, ventilation and air conditioning (HVAC) system.

Filters can remove particles from the air. Many mechanical ventilation systems and portable air cleaners have such filters. They can also use other technologies, such as ultraviolet light, to kill infectious agents (e.g., viruses) in the particles.

While we know that ventilation and filtration can affect the spread of infectious particles, we do not know which strategies are the best at decreasing the risk of COVID-19. We also do not know how well portable air cleaners reduce the risk of COVID-19. More information about these strategies can help those who maintain public places such as schools, daycares, office buildings, shopping centres, athletic facilities, etc. These strategies can also be used in residential buildings and private homes.

### **What questions did we want to answer?**

- (1) How well do different ventilation strategies, filter types, and portable air cleaners reduce the risk of COVID-19; and,
- (2) What are the bad results that come from using ventilation, filters, and portable air cleaners?

### **How did we answer these questions?**

We looked for all scientific studies published since January 1, 2020 that looked at how ventilation, filters or portable air cleaners affected the spread of COVID-19. We focused on studies that were done in the real world, such as schools and work places. We did not include studies done in a science lab or those done using computer simulations, unless they simulated the conditions of an actual outbreak of COVID-19. We took all of these studies and described them, including what they studied and what they found out.

### **What did we learn?**

We found eight studies about ventilation in different places. Four studies in schools found that improving ventilation could reduce COVID-19 infection. Two studies in different work places found

different effects of ventilation (i.e., one study found an association between ventilation and COVID-19 illness while the other study did not find an association). Two studies in private homes also found different effects of ventilation. In general, studies that only looked at ventilation found that it helped reduce COVID-19 infection. However, studies that looked at a variety of different factors sometimes found that other factors (such as handwashing and social distancing) worked better at helping stop COVID-19 infection than ventilation.

We found five studies that ran computer simulations to understand COVID-19 outbreaks. Three studies showed that better ventilation (increasing air flow rates and fresh air supply) was linked to less risk of COVID-19 infection. One study found there were many factors that affected someone getting COVID-19. Ventilation was one, as well as how long someone was near an infected person. How much contaminated air was released by the infected person also affected how likely someone was to get COVID-19. One study showed that there was less chance of getting COVID-19 infection if masks were used and not ventilation.

We found one study of portable air cleaners. The study found a lower risk of COVID-19 infection in a restaurant that used ultraviolet air cleaners compared to a restaurant without air cleaners. The restaurant with the air cleaners was studied later in the pandemic, while the restaurant without air cleaners was studied early on in the pandemic. Other public health measures were not looked at, including vaccines which became available during the study period and could have helped lower the risk in the restaurant with air cleaners.

We did not find any studies that reported on any bad results from improving ventilation to reduce COVID-19 infection. We found one study that asked students and teachers about what they thought about portable air cleaners used in classrooms during the COVID-19 pandemic. The survey found that they were disturbed by the noise that made communication more difficult. The air cleaners were more acceptable when the noise level was reduced (which also reduced the rate that particles were removed from the air).

### **What can we learn from this information?**

A number of studies that we found showed that improving ventilation could reduce the risk of COVID-19 infection. There are different ways to improve ventilation, such as increasing ventilation rates (or how fast air flows), increasing the amount of clean outdoor air (or fresh air) either through mechanical ventilation systems or by opening doors or windows, and improving the use and maintenance of mechanical (HVAC) ventilation systems. However, the studies did not provide specifics about these strategies, such as the best air flow rates or how long to keep windows open. We found very few studies looking at how well portable air cleaners helped. This should be a priority for future research.

Reducing risk of infection in any place will require multiple methods in addition to improving ventilation. Other ways include reducing the number of people in one space (avoiding crowded spaces), not being too close to infected people or for too long and combining ventilation strategies with other public health measures.

This summary is based on a larger report that can be found at:

<https://www.mcmasterforum.org/docs/default-source/product-documents/living-evidence-syntheses/covid-19-living-evidence-synthesis-15.2---effectiveness-of-ventilation-for-reducing->



[transmission-of-covid-19.pdf?sfvrsn=9fbba57b\\_8](#)

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