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At home: Using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19

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Preamble

Improving indoor air quality is particularly important at this time because Canadians are spending more of their time at home and indoors. The recommendations below will help to improve the overall air quality in the home, as well as help reduce the risk of aerosol transmission of COVID-19 by reducing the number of viruses suspended in the air. This is particularly important when people from outside your immediate household are present. It is important to recognize that although ventilation is an important part of an overall strategy to reduce potential risk of COVID-19 transmission, ventilation is not likely to reduce transmission between individuals in close proximity, which is the

predominant mode. Individuals who are physically near a person who is infected remain at risk from both droplet and aerosol transmission. This is due to their close proximity to the person who is infected. The actions listed below may not be possible for every situation, but each one, as well as their sum, can have a positive impact to reduce transmission risk.

Canadian public health guidance related to COVID-19 has evolved as our understanding of COVID-19 improves. We continually review the evidence as it's produced and work with our partners across the country and around the world. This ensures that we integrate the most up to date and highest quality information into our guidance.

General recommendations

Follow personal preventive practices and always check with your local public health authority on these and any additional advice on indoor gatherings for your jurisdiction. Follow applicable guidelines if you need to isolate or quarantine, or if you are caring for someone with COVID-19 at home.

To reduce transmission of COVID-19 when interacting with people from outside of your immediate household:

- Avoid crowded spaces
- Choose larger rooms where you can maximize your distance from others
- Properly wear a well-constructed and well-fitting mask
- Keep interactions as brief as possible
- Maintain good hand hygiene and respiratory etiquette
- Move gatherings outdoors whenever possible or
- Consider changing your plans if you are unable to go outside (e.g.,

inclement weather)

Increasing the number of people in your home can increase the likelihood that a person who is infectious is present, and the possibility for transmission to others in the home. Households with more members may have a higher likelihood of exposure to COVID-19, due to more potential contacts outside of the household. In addition, multi-generational households and homes with occupants with underlying risk factors may have members that are at a higher risk of COVID-19 and/or severe disease outcomes.

To reduce the risk of COVID-19, it is recommended that few people from outside your immediate household, if any, are present inside your home. Activities that can more easily spread COVID-19 should be avoided, such as singing, partying, shouting or heavy breathing (e.g., during aerobic exercise). Maintain physical distancing from people you do not live with, and properly wear a well-constructed, well-fitting mask to reduce the risk of infection.

Ventilation considerations

If you have a forced air system to heat and/or cool your home, ensure that it is properly installed, maintained and operated. Refer to the owner's manual for instructions on operation and maintenance, for example, replacing filters at regular intervals. If possible, consult a heating, ventilation and air conditioning (HVAC) professional to ensure your system is running properly. The forced air system in your residence can only filter particles when it is running. Operate the forced air system more often (e.g., set to Fan On position) to filter or dilute indoor particles, including aerosols that can carry viruses. Note that this may

increase costs due to additional electricity use.

Use the highest efficiency particulate filter that the forced air system is capable of handling, without impeding airflows. For example, the Minimum Efficiency Reporting Value (MERV) indicates a filter's ability to capture particles. Upgrading to a filter with a higher MERV rating can help reduce the amount of small particles in the air. However, higher MERV-rated filters can also reduce airflow through the forced air system, which can lead to mechanical damage, less filtered air, or air bypassing the filter. Always consult the forced air system manual or an HVAC professional to check what filter the system in your residence can handle. Ensure that the filter on the forced air system in your residence is properly sized to prevent air leakage around the filter. The owner's manual will provide the proper size of the replacement filter. Replace the filter according to the manufacturers' instructions. Note that some residences may not have any forced air system, for example, if relying on hot water or radiant heating systems.

Take advantage of natural ventilation, by opening windows and doors, especially if someone from outside the household is entering the residence, and depending on outdoor weather and temperature (e.g., ensure frost buildup will not prevent them from being closed again). Opening multiple windows can increase ventilation by promoting a cross-breeze through a room. Before using natural ventilation, check that there are no air pollution advisories in your area, and that allergens are at safe levels for occupants. Make sure that opening windows and doors does not pose a security or safety risk (e.g., from falling).

In multi-unit dwellings, ensure that all plumbing traps remain full at all times to reduce the possibility of cross-contaminants being passed through shared drainage systems that become dried out from lack of use

(i.e., floor drains).

Options if ventilation cannot be improved

Portable or ceiling fans, or single unit air conditioners may circulate air within the room, but they do not exchange air. Fans can blow infectious droplets and particles further from their source, which may have contributed to some COVID-19 infections. If the use of a window air conditioner unit or a fan is necessary, aim the air stream to avoid blowing directly at or between people in the room, to reduce the spread of potentially infectious particles. Use fans with shielded blades, keep them out of reach of children, and place them where they won't easily fall over.

A box fan in a window, or bathroom and kitchen exhaust fans that are vented to the outside can help remove potentially contaminated air, where appropriate. To make-up for the air being vented to the outside, consider opening a window so that contaminated replacement air is not being drawn indoors from crawlspaces, or combustion appliances.

High-quality, high efficiency particulate air (HEPA) filters are effective in capturing airborne particles, including some viruses. To date, there is no direct evidence that portable HEPA air cleaners are effective in reducing SARS-CoV-2 transmission in closed spaces. As such, they should not be seen as a replacement for adequate ventilation, physical distancing and hygienic measures, but could be considered as an additional protection in situations where enhancing natural or mechanical ventilation is not possible and in rooms that are not crowded. Even when a portable air cleaner is being used, it is still important that interactions between individuals are as few, as brief, and occur from the greatest physical distance, as possible. If used, to maximize efficiency, portable air cleaners

should be run continuously, and positioned to allow unimpeded air flow. Position the air cleaner to avoid blowing directly at or between people in the room, which may increase infection risk. Ensure the device's air intake is unobstructed by furniture or walls.

To ensure quality, be sure to look for certification by a recognized body such as the Association of Home Appliance Manufacturers (AHAM). Select an air cleaner with a Clean Air Delivery Rate (CADR) high enough for the size of room where it will be located. Follow the manufacturer's recommendations for operating, maintaining and cleaning the unit. Replace filters according to the manufacturer's instructions. Some portable air cleaners can produce by-products that are a health hazard. In particular, ozone producing air cleaners should be avoided.

Other ventilation appliances may be used to improve air quality in the home, such as heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. HRV systems exchange stale indoor air for outdoor air while transferring the heat between the expelled indoor air to the incoming outdoor air. In cooler weather the heat is retained in the home, while in the warmer months the heat is expelled outside. This improves indoor ventilation while maintaining energy efficiency. ERVs transfer humidity, in addition to heat. Check that HRVs and ERVs are properly installed, maintained, and operational. Other than for servicing, the HRV or ERV should be running continuously and at the highest settings for fresh air ventilation.

While humidifiers do not remove SARS-CoV-2 virus from the indoor air environment, they could impact the duration that particles that contain virus are suspended in the air, and how long they remain infectious. It is therefore important to maintain an optimal humidity level, between 30% and 50% in indoor settings. Lower humidity levels can cause droplets to

shrink, and smaller particles (e.g., aerosols) can stay suspended in the air for longer. However, increasing humidity too much can lead to condensation on surfaces, as well as inside walls and building areas where it cannot be seen. This can lead to mould growth and the proliferation of mites. For more information, see the Health Canada Factsheet: Relative humidity indoors.

Other considerations

Garages are not ventilated in the same way as a house. If gathering in a garage with those who live outside your household, open windows or leave the garage door open to ensure adequate ventilation. If you heat your garage with a combustion device (e.g., wood-burning stove, propane or kerosene space heater), ensure that you are operating it correctly and that it is properly vented to the outside. Fuel burning equipment produces carbon monoxide which can cause health effects and, at high levels, death. Install a carbon monoxide alarm in your garage with a digital display.

Vehicles, fuel-powered equipment, and gasoline containers are often stored in garages, and can contribute to increased levels of volatile organic compounds in the air. If possible, store equipment and gasoline containers in a separate building not connected to the house. Do not idle your car or other combustion equipment in the garage.

Further reading

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