Wildfire Smoke and COVID-19 in Long-Term Care and Assisted Living Facilities

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Introduction

Wildfire season brings the threat of severe smoke pollution, and good preparation is even more critical in the context of the COVID-19 pandemic in B.C. Many residents of long-term care and assisted living facilities are vulnerable to both threats.

COVID-19 and Wildfire Smoke

Wildfire smoke is a complex mixture of small particles and gases that can irritate the lungs, cause inflammation, and alter immune function. When there are wildfires burning in the province, the outdoor air may be polluted with smoke even when the fires are far away. Wildfire smoke can pass through open doors and windows, crack and gaps in the building, and through mechanical heating, ventilation, and air conditioning (HVAC) systems.

COVID-19 illness is caused by the SARS-CoV-2 virus and common symptoms include, fever, sore throat, shortness of breath, cough and sore throat. People exposed to wildfire smoke and the SARS-CoV-2 virus are more likely to develop complications from COVID-19 illness. The combination of smoke and COVID-19 illness may cause even more severe health complications in older people and those with pre-existing health conditions.

Cleaner indoor air is the best way to protect clients in long-term care and assisted living facilities when conditions are smoky. There are different ways to achieve cleaner indoor air, including preventing smoke from getting into the building and cleaning smoke out of the indoor air.

Preventing Smoke from Getting Into the Building

Filter air coming through the HVAC system

- HVAC systems are the first line of defense against wildfire smoke, but systems differ from building to building.
- Air coming in through the HVAC system must be passed through a filter, and some types of filters can help to remove smoke particles from the incoming air.
- Filters are usually described by their minimum efficiency reporting value (MERV) rating, which ranges from one to 16.
- Filters with higher MERV ratings catch more particles and smaller particles.
- The higher the MERV rating, the more restricted airflow becomes in the HVAC system, so it is important to know what rating each system can handle.
- A minimum MERV rating of 13 is recommended for wildfire smoke, whenever possible.
- Some systems may be able to accommodate:
    - High-efficiency particulate air (HEPA) filters, which can filter out even smaller particles than MERV 16
    - Filters with activated carbon, which can help to remove harmful gases and odours in wildfire smoke
- Air will always take the path of least resistance through the HVAC system, so tight seals are necessary around all filters to ensure that air passes through them.
- HVAC systems are also used to maintain healthy indoor temperature and relative humidity, so the effects of any changes to air filtration should be assessed.
- A relative humidity of 30- 50% is both comfortable for residents and provides an environment that is unfavourable for COVID-19 transmission.

- Smoke can overload filters and adversely impact an air cleaner's ability to function properly, so regular inspection and replacement of filters is needed.

Close doors and windows

- Smoke passes easily through doors that open and close frequently.
- Restrict the number of building entrance points during smoky periods; if there are fewer entrances and many visitors, wait to enter the building so people can maintain physical distance at entrances.
- Use entrances with double doors, whenever possible, so that smoke is trapped in the vestibule.
- Consider establishing a physical or mechanical air curtain at heavily used entrances and windows.
- Make sure that the seals and weather stripping on doors and windows are intact.
- Keep windows closed unless there is risk of clients overheating.

Air cleaning

- Most home air cleaners and industrial air scrubbers use HEPA filters to remove smoke particles from the air.
- Home air cleaners can be used to remove smoke from smaller areas, such as a single room or living unit.
- Industrial air scrubbers can be used to remove smoke from larger common areas, such as hallways and dining rooms.
- Some units also have activated carbon to remove harmful gases and odours.
- Air cleaners and scrubbers should perform 10 air changes per hour – check this by comparing the air return rate of the machine with total cubic feet of the room (floor area x ceiling height).

Preparation Requires Professional Support

Every building is different, and it is best to plan ahead and engage a qualified professional to assess the strengths and weaknesses of any specific building HVAC system when considering how to prepare to mitigate the impacts of wildfire smoke. It is strongly recommended to contact an HVAC and building envelope technician to help develop a wildfire smoke plan, including:

- Upgraded MERV ratings for all filters in the HVAC system
- Methods for sealing the filtration system to ensure that incoming air is properly filtered
- Adequate filter replacement stock and schedule for replacement
- Suggested locations for air cleaners and scrubbers
- Suggested restriction of entrances and methods for reducing smoke coming in through entrance doors
- Conditions for returning to normal operations.

Document the plan and share with staff so that everyone knows what to do when conditions get smoky. See Appendix A for a checklist for planning for wildfire season for long-term care and assisted living facilities.

Useful resources:

- Wildfire smoke and COVID-19: http://www.bccdc.ca/Health-Info-Site/Documents/COVID19_WildfireSmoke.pdf

- How to prepare for wildfire smoke season, including where to get information about air quality: http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_HowToPrepare.pdf
- Portable air cleaners for wildfire smoke: http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_PortableAirCleaners.pdf
- Evidence Review: Filtration in institutional settings during wildfire smoke events: http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/WFSG_EvidenceReview_FiltrationinInstitutions_FINAL_v3_edstrs.pdf

Appendix A:
Checklist for planning for wildfire seasons in long-term care and assisted living facilities during the COVID-19 pandemic

Make appointment with a Heating Ventilation Air Conditioning (HVAC) consultant **early in the season** to discuss the following issues:

1. Filter air coming through the HVAC system, including the Energy Recovery Ventilator (ERV) if present
    - Check the MERV rating of the filters normally used.
    - Identify the maximum MERV that the system can handle while maintaining effective ventilation, indoor temperature, and relative humidity.
    - Decide when the regular filters should be changed to higher MERV filters (e.g. when there are active fires in province, when the smoke forecast is above certain value, etc.), and when to switch back to the regular filters.
    - Decide how often the higher MERV filters should be replaced if smoke is prolonged (e.g. set up a schedule for different smoke scenarios, or consider monitoring the indoor air quality).
    - Evaluate whether HEPA filter or filters with activated carbon for gases can be used. If so, set up a similar plan for installing and changing filters.
    - Ensure that there is enough stock of replacement filters for the wildfire smoke season.
    - Develop a method for sealing filters in the HVAC system so that incoming air passes through them rather than around them.
    - Follow the regular maintenance HVAC maintenance schedule before the wildfire smoke season, and discuss whether additional maintenance is required during the wildfire season.

2. Reducing smoke coming in through doors and windows
    - Evaluate whether the building can maintain effective ventilation (0.5 air exchanges per hour) with its doors and windows closed. If not, consider strategies for dealing with multiple threats from smoke, heat and COVID-19.
    - Identify designated entrance points for smoky periods, prioritizing entrances with double doors.
    - For single doors, consider options for establishing an air curtain.
    - Check that window and door seals are in good condition.
    - Decide when entrance to the building should be restricted to designated entrance points (e.g. when there are active fires in province, when the smoke forecast is above certain value, etc.), and when to go back to normal.
    - Decide when doors and windows should be closed or airflow from outdoors restricted to prevent smoke from getting in. Develop a plan for different scenarios where the levels of threat from COVID-19, heat, and smoke vary.
    - Be aware of air movement into the building through the stack effect (e.g. cool air drawn in to a warm building at ground level) or negative pressure differences (e.g. exhaust fans having more capacity than intake fans causing air from the outside to be drawn in through openings in the walls, roof, sewer vents, and other openings).

3. Air cleaning
    - Designate locations for home air cleaners and industrial air scrubbers in the building.
    - Decide which type of air cleaner should be used in each of the locations based on the volume of air (floor area X ceiling height) to be cleaned.
    - Consider how air cleaners will affect the air flow of the room. This is important to understand so that the set-up of the air cleaner will not increase transmission risk if there are cases of COVID-19 in the facility.
    - Schedule HEPA filter changes for prolonged smoke scenarios.