EVIDENCE SYNTHESIS BRIEFING NOTE

TOPIC: DESIGN STRATEGIES TO PREVENT RESPIRATORY INFECTION IN CONGREGATE CARE SETTINGS

Information finalized as of June 1, 2021.[a] This Briefing Note was completed by the Research, Analysis, and Evaluation Branch (Ministry of Health) in collaboration with McMaster Health Forum, a member of the COVID-19 Evidence Synthesis Network. Please refer to the Methods section for further information.

Purpose: This briefing note summarizes research evidence and guidance on design strategies used to mitigate the spread of respiratory infection in congregate care settings, such as long-term care (LTC) homes.
Key Findings: Protecting residents during infectious disease events is best accommodated by including a mechanical system in facility planning and design, which provides adequate ventilation, filtration, and temperature and humidification controls.

- **Heating, Ventilation, Air Conditioning (HVAC) Systems**: Two reviews and two guidance documents (WHO, PHAC) recommend improvements to HVAC systems in LTC resident accommodations, including shared spaces and common spaces. This should be done in addition maintaining infection prevention and control (IPAC) measures (e.g., mask wearing, physical distancing, hand hygiene, disinfecting surfaces, vaccinating staff and residents, testing, isolating suspected cases, contact tracing). The Public Health Agency of Canada (PHAC) recommends that LTC homes invest in the highest-efficiency particulate filter possible for their HVAC systems to ensure that residents' rooms and common areas have adequate air exchanges, including natural ventilation to reduce aerosol transmission of COVID-19.
  - Zoning Using Separate Air Systems for Resident Clusters: A zone serving a cluster of rooms with a common HVAC unit minimizes air recirculation between clusters and supports better segregation of a portion of the facility, if needed (e.g., as an isolation unit).
- **Temporary Airborne Infection Control**: When HVAC systems cannot be upgraded, LTC homes should invest in fans and single unit air conditioners to improve circulation. Portable units should be strategically located (e.g., positioned at patient-level or higher) to minimize risk of potential health-associated infections, and require routine cleaning and preventative maintenance. Other temporary methods include using portable high-efficiency particulate air (HEPA) filtration systems, ventilated headboards and negative pressure rooms.
- **Building Layout, Density, Signage**: Small intentional environments for smaller cohorts of aging residents (e.g., household environments serving fewer than 20 residents) supported by staff in a decentralized manner offer a strong defense against infection transmission (i.e., by reducing or preventing the need for staff to travel around a larger building and pass through unrelated resident areas and workspaces). Descriptive signage help visitors and service providers navigate semi-public and semi-private spaces and limit unnecessary mixing. Staff should have a dedicated building entrance and exit that is separate from residents, visitors, and other services.
  - Private Rooms: Two studies report that communities with a high percentage of private rooms had significantly lower rates of COVID-19 and fewer deaths.

Analysis for Ontario: Planning and designing congregate care settings should consider including a mechanical system that provides adequate ventilation, filtration, and temperature and humidification controls.
Implementation Implications: In addition to HVAC systems, decentralized small-cohort LTC facility design with dedicated staff reduce airborne disease transmission.

[a] This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

Supporting Evidence

Table 1 lists and summarizes scientific evidence (systematic reviews, reviews, or single studies) and guidance from the grey literature (e.g., World Health Organization [WHO]) that describe design features that prevent the spread of respiratory infection in congregate living settings, including long-term care (LTC) homes. The information presented is primarily taken directly from the original sources.

Terminology

The following terms are used throughout this briefing note:

- A **heating, ventilation and air conditioning (HVAC) system** comprises the equipment, distribution system, and terminals that provide, either collectively or individually, the processes of heating, ventilating, or air conditioning to a building or portion of a building. Most HVAC systems also incorporate filtration.
- **Mechanical filtration** involves the use of different types of fibrous media designed to remove particles from the airstream. A portion of the particles in the air entering a filter attach to the fibrous media and are removed from the air as it passes through the filter. The particle removal efficiency of the filter, the rate of air flow through the filter, location of the filter, and size of the particles filtered by the filtration system all contribute to the reduction of indoor particle concentrations.
- **Ventilation** is the supply/distribution or removal of air from a space using mechanical or natural means. Ventilation can be for the purposes of controlling air contaminant levels, humidity, or temperature within the space. It can be achieved through natural means, such as through openings (e.g., windows, doors) and by passive infiltration. Mechanical ventilation is the active process of supplying air to or removing air from an indoor space by powered equipment such as motor-driven fans and blowers (e.g., HVAC systems, and bathroom or cooking exhaust fans).[b]

Table 1: Scientific Evidence and Jurisdictional Information on Congregate Living Facility Design Features to Prevent Respiratory Infection

Reference	Jurisdiction	Type of Evidence	Description of Findings
Scientific Evidence			
Public Health Ontario. (March 2021). Focus On: Heating, Ventilation and Air Conditioning (HVAC) Systems in Buildings and COVID-19.	Ontario	• Review	• **Purpose**: This review included peer review and preprint research articles on COVID-19 transmission related to HVAC, air, or indoor settings. • **Findings**: Well-functioning HVAC systems support measures such as physical distancing, reduced occupancy, masking, cleaning and hygiene by removing and diluting aerosols that may contain viruses from indoor spaces, but they will not eliminate the risk from COVID-19 transmission during close contact exposures. ○ HVAC Measures to Minimize the Risk from Infectious Aerosols: HVAC measures used to minimize the risk from infectious aerosols include enhancing outdoor air ventilation and/or enhancing filtration where possible.

[b] Public Health Ontario. (March 2021). Focus On: Heating, Ventilation and Air Conditioning (HVAC) Systems in Buildings and COVID-19.

Reference	Jurisdiction	Type of Evidence	Description of Findings
			▪ *Increasing Outdoor Air Ventilation:* For central air handling units at a building level or serving multiple zones, avoiding recirculation is ideal (e.g., operating on as high as possible outdoor air supply).[c] Some HVAC systems may not allow changes to outdoor air fractions, and opening windows may be a good alternative to bring in outdoor air; however, the air flow will be variable (e.g., if there is no breeze or temperature differences). Ventilation via open windows may be improved by utilizing a fan facing out to exhaust air and other open windows that bring outside air in. ▪ *Increasing Filter Efficiency:* Filtration is another strategy to remove virus and other particles from indoor air. Filters require appropriate maintenance and may also be upgraded where the system allows to maximize effectiveness. The effectiveness of a filter is rated by the Minimum Efficiency Reporting Value (MERV),[d] based on the fraction of particles removed from air passing through it under standard conditions. The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) COVID-19 guidance suggests using MERV 13 or higher rated filters based on their ability to filter virus-sized particles. ▪ *Role of Humidity:* While various organizations (e.g., ASHRAE) have suggested maintaining a relative humidity (RH) level of 40–60% as a supportive measure, there is a lack of evidence on the effectiveness of targeting a particular RH to mitigate COVID-19 transmission. ○ Air Flow (e.g., from room air conditioning (AC) units and fans): There is evidence that air flow (e.g., fans moving air from an infected individual to others nearby) can be an important factor in transmission. Avoiding direct air flow around people's breathing zones will reduce respiratory droplets being dispersed from person to person. Rather than air flow at head level, options would be to direct the air upwards or to exhaust room air out of an open window while other open windows draw fresh air in. ○ Recirculation of Indoor Air: There is limited information on recirculated air as a cause of COVID-19 transmission, and no reports have been identified of centralized HVAC systems contributing to a building wide outbreak. However, in general limiting recirculation and bringing in fresh air would lower the concentration of any viral particles present in indoor air. ○ Air Change Rates Required: Ventilation is improved by more air changes with outdoor air. Standards for air changes are set by various associations for different types of building environments. For example, the Canadian Healthcare Engineering Society (CHES) has special requirements for HVAC systems in health care facilities.[e] ○ Inspection or Maintenance: Routine inspections and maintenance as appropriate for the system are necessary (e.g., replacement of filters, adjustments to ventilation such as increased outdoor air).

[c] American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) provides guidance on COVID-19 that an HVAC professional can apply to specific building scenarios (ASHRAE, n.d.).

[d] MERV ratings, developed by ASHRAE, report the performance of different filters (i.e., one is the least efficient and 16 is the best filter at trapping specific types of particles) (US Environmental Protection Agency, 2021).

[e] For more information, see CHES, 2021.

Reference	Jurisdiction	Type of Evidence	Description of Findings
Public Health Ontario. (n.d.). At a Glance: The Use of Portable Fans and Portable Air Conditioning Units during COVID-19 in Long-Term Care and Retirement Homes	Ontario	• Review	• **Purpose**: This review included existing guidance, research articles and the grey literature on the use of portable fans and air conditioning units in LTC and retirement homes. • **Findings**: 1) Careful consideration should be given to the use of portable fans and air conditioning units in LTC homes or retirement homes; 2) Portable fans and portable air conditioning units require routine cleaning and preventative maintenance; 3) Portable fans and portable air conditioning units must be strategically located to minimize risk of potential health care-associated infections; and 4) Alternative cooling methods should be explored in the LTC setting. ○ Fan Positioning: ▪ Place the fan on a clean surface at the resident's bed level or higher. Never place the portable fan at the floor level. ▪ Airflow should be aimed in the direction of the resident, and also aimed upwards, toward the ceiling, avoiding smoke detectors. ▪ Airflow should not be directed towards the door of the room or across environmental surfaces. ▪ In non-resident areas, such as health care nursing stations, airflow should be directed within the area and not at face level. ▪ Fans should not be placed in areas used for storage of clean and sterile medical devices/supplies, or in areas where medical devices are reprocessed. ▪ Fans should not be used in a closed room where no doors or windows are able to be opened in order to allow for introduction of fresh air. ○ Portable Air Conditioning Unit Positioning: ▪ Most portable air conditioning units are window units. Some may be wall mounted. If an air conditioning unit with a condensation exhaust system has been selected, rather than a drip pan, collected water vapor should be drained to the outside of the building through an exhaust hose. ▪ In non-resident areas, such as health care nursing stations, airflow should be directed within the area rather than blowing into the hallway or other adjoining rooms. ▪ Some air conditioning units including wall-mounted ones are designed to function with recirculating indoor air. When such systems are used for cooling, additional ventilation with outdoor air should be secured; for example, by regular/periodic ventilation through a window opening. ○ Cleaning and Maintenance for Portable Fan or Air Conditioning Unit: ▪ Follow the manufacturer's instructions on how to clean, disinfect, and maintain the portable fan or air conditioning unit on a scheduled basis (e.g., daily, weekly, monthly). ▪ Assign a person who is responsible for cleaning and disinfecting the unit(s). ▪ Perform hand hygiene before and after cleaning, handling, or maintaining air conditioner components. ▪ In the case of air conditioning units, do not leave water sitting in the air conditioners when they are not in daily use. Empty, clean, and disinfect the drip pan and allow dry completely before storing. ○ Alternative Cooling Methods: In addition to such factors as adequate hydration for residents, other cooling methods include: 1) Establishing cooling areas (e.g., designated cool room, cool showers); 2) Blocking out direct sunlight using window awnings, shutters, thermal curtains or blinds, and outdoor umbrellas; 3)

Reference	Jurisdiction	Type of Evidence	Description of Findings
			Increasing air flow by opening windows, provided the humidity outdoors is low (relative humidity of 30% to 50% is normal); and 4) Central dehumidification.
Waddell, K.A., et al. COVID-19 living evidence profile #2 (version 2.3): What is known about preventing and managing COVID-19, outbreaks of COVID-19, and about supporting renewal in long-term care homes? Hamilton: McMaster Health Forum, 26 April 2021.	Canada	• Review	• **Purpose**: This living evidence profile identified and synthesized findings from guidelines and reviews from eight countries: Australia, France, Finland, the Netherlands, New Zealand, the United Kingdom (UK), and the United States (US) on preventing and managing COVID-19 outbreaks and about supporting renewal in long-term care (LTC) homes. • **Findings**: ○ Preventing Infections: In addition to infection prevention and control (IPAC) measures (e.g., mask wearing, physical distancing, hand hygiene, disinfecting surfaces), vaccinating staff and residents, testing, isolating suspected cases, contact tracing, it is recommended to adjust resident accommodations, shared spaces and common spaces including improvements to HVAC systems. ▪ For example, the Public Health Agency of Canada (PHAC) recommend that LTC homes invest in the highest-efficiency particulate filter their HVAC systems are capable of handling, as well as ensuring that residents' rooms and common areas have adequate air exchanges and are taking advantage of natural ventilation to reduce aerosol transmission of COVID-19, when safe and only after consulting with HVAC professionals. PHAC also notes that where HVAC systems cannot be upgraded LTC homes may invest in fans and single unit air conditioners to help with circulation; although their use should be limited as they can propel infectious aerosols far away from their source and can direct virus-laden air towards residents, increasing infection risk.[f] ○ LTC Renewal: Improving physical infrastructure (e.g., private rooms only, rooms grouped into 'pods' with dedicated staff, improving common areas and greenspace access, modern HVAC systems, and internet access for residents and staff).
National Collaborating Centre for Methods and Tools. (2021, March 9). What strategies mitigate risk of COVID-19 outbreaks and mortality in long-term care facilities? Update 2.	Canada	• Review	• **Purpose**: This rapid review summarizes evidence syntheses and guidance that address the question: What strategies mitigate risk of COVID-19 outbreaks and mortality in LTC facilities? • **Findings**: Most guideline and guidance document recommendations suggest using comprehensive surveillance; monitoring and evaluation of staff, resident, and visitor symptoms; limiting movement into and between LTC facilities; physical distancing; using proper ventilation; having proper provision; and using of personal protective equipment (PPE) to reduce transmission amongst residents and staff within LTC facilities. ○ Two studies reported that reduced COVID-19 transmission was associated with proper ventilation in LTC facilities. For example, a US-based skilled nursing facility implemented a negative pressure isolation space with HVAC changes and plastic barriers resulting in no transmission among facility staff or residents from May 4 to June 23, 2020.[g]

[f] Public Health Agency of Canada (PHAC). (April 12, 2021). Using Ventilation and Filtration to Reduce Aerosol Transmission of COVID-19 in Long-Term Care Homes.
[g] Miller, Shelly L., et al. (October 20. 2020). Implementing a negative pressure isolation space within a skilled nursing facility to control SARS-CoV-2 transmission. American Journal of Infection Control, 49:4, 438-446.

Reference	Jurisdiction	Type of Evidence	Description of Findings
Joseph, A. (2006). *The Impact of the Environment on Infections in Healthcare Facilities*. The Center for Health Design.	United States (US)	• Review	• **Purpose**: This review consisted of journal articles and interviews with industry experts on how nosocomial infections (i.e., originating in a hospital) spread among hospitalized patients via environmental routes and whether the design of hospitals plays a part in preventing the incidence and spread of infection. • **Findings**: Airborne infections are spread when dust and pathogens are released during hospital renovation and construction activities and through contamination and malfunction of the hospital ventilation system. Providing clean filtered air and effectively controlling indoor air pollution through ventilation are two key aspects of maintaining good air quality. ○ Filters: High-efficiency particulate air (HEPA) filters are highly effective in preventing airborne infections from entering the hospital environment (e.g., immunocompromised and other high-acuity patient groups have lower incidence of infection when housed in HEPA-filtered isolation rooms). ○ Ventilation: After filtration, the second most effective way of controlling the level of pathogens in the air is through ventilation. Ventilation guidelines are defined in terms of air volume per minute per occupant and assume that occupants and their activities are responsible for most of the contaminants in the conditioned space. Most ventilation rates for health care facilities are expressed as room air changes per hour (ACH). Peak efficiency for particle removal in the air space occurs between 12 ACH–15 ACH. ○ Laminar Airflow Room: Air contamination is the least in laminar airflow rooms[h] with HEPA filters, and this approach is recommended for operating-room suites and areas with ultraclean-room requirements such as those housing immunocompromised patient populations.
Guidance and Recommendations from the Grey Literature			
World Health Organization (WHO). (January 8, 2021). Infection Prevention and Control Guidance for Long-Term Care Facilities in the context of COVID-19.	International	• Guidance	• **Purpose**: This interim guidance is for long term care facility (LTCF) managers and corresponding infection prevention and control (IPC) focal persons in LTCF and updates the guidance published in March 2020. The document objective is to provide guidance on IPC in LTCFs in the context of COVID-19 to: 1) Prevent COVID-19-virus from entering the facility and spreading within the facility, and 2) Support safe conditions for visiting through the rigorous application of IPAC procedures for the residents' well-being. • **Ventilation Guidelines**: In addition to recommendations for IPAC procedures in the context of COVID-19 (i.e., universal and targeted masking, physical distancing, vaccination), WHO advises that adequate ventilation is important to reduce SARS-CoV-2 transmission. A well-designed, maintained, and operated system can reduce the risk of COVID-19 spread in indoor spaces by diluting the concentration of potentially infectious aerosols through ventilation with outside air and filtration and disinfection of recirculated air. Proper use of natural ventilation can provide the same benefits. ○ Residents' rooms and common areas should be well ventilated, with large quantities of fresh and clean outdoor air to control contaminants and odours. This can be achieved by using natural ventilation, by opening windows and doors to create airflow and exchange, if possible and safe to do so. ○ For mechanical systems, the percentage of outdoor air should be increased using economizer modes of heating, ventilation and air-conditioning (HVAC) operations, potentially to as high as 100%.

[h] Laminar flows are even, smooth, low-velocity airflows that are used in clean-rooms and other settings where high-quality ventilation is critical (Joseph, 2006).

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			○ If HVAC systems are used, they should be inspected, maintained and cleaned regularly. Rigorous standards for installation and maintenance of ventilation systems are essential to ensure that they are effective and contribute to a safe environment. ○ Any decision on whether to use natural, hybrid (mixed mode) or mechanical ventilation should consider climate, including prevalent wind direction, floor plan, need, availability of resources and the cost of the ventilation system. ○ In facility areas where COVID-19 cases are provided cared, specific ventilation requirements are needed. When aerosol-generating procedures are not performed, adequate ventilation is considered to be 60 litres/second per patient (L/s/patient) for naturally-ventilated areas or six air changes per hour (ACH) (equivalent to 40 L/s/patient for a 4x2x3 m^3 room) for mechanically-ventilated areas. ○ In rooms where aerosol-generating procedures are performed, specific requirements should be met. Health care facilities using natural ventilation systems should ensure that contaminated air exhaust is piped directly outdoors, away from air-intake vents, clinical areas and people. The recommended average natural ventilation rate is 160 L/s/patient. In health care facilities where a mechanical ventilation system is available, negative pressure should be created to control the direction of airflow. The ventilation rate should be six to 12 ACH (e.g., equivalent to 40–80 L/s/patient for a 4x2x3 m^3 room), ideally 12 ACH for new constructions, with a recommended negative pressure differential of ≥2.5 Pa (0.01-inch water gauge) to ensure that air flows from the corridor into the patient room.
The Facility Guidelines Institute (FGI).[i] (March 2021). Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions – White Paper.	United States (US)	• White Paper	• **Purpose**: This white paper was produced by the 130-person Emergency Conditions Committee (ECC) based on case studies, best practices, historically effective solutions, and lessons learned to provide design and operational guidance. • **Proposed Guidelines**: Faculty Guidance Institute (FGI) guidelines for emergency preparedness in residential settings highlight lessons learned from various emergency situations including infectious disease such as COVID-19. Factors to consider include: ○ Building Scale and Density: During COVID-19, FGI found that, in addition to employing infection prevention and control (IPAC) strategies (e.g., screening visitors, protocols for personal protective equipment [PPE], dedicated staff to specific areas of the building and to specific residents), building layout and scale played a critical role in reducing or preventing the need for staff to travel around the larger building and pass through unrelated resident areas and workspaces. Small intentional environments for smaller cohorts of aging residents (e.g., household environments serving fewer than 20 residents) supported by staff in a decentralized manner offer a strong defense against infection transmission. ○ Entrances, Lobbies, Vestibules, and Wayfinding: Strong wayfinding will help visitors and service providers navigate semi-public and semi-private spaces and limit unnecessary mixing. Instructions should be provided in all languages commonly found in the resident, staff and community population. Where possible, staff should have a dedicated building entrance and exit that is physically separate from that for residents, visitors, and

[i] FGI is a US-based independent not-for-profit organization dedicated to developing guidance for the planning, design, and construction of hospitals, outpatient facilities, and residential health, care, and support facilities (FGI, 2021).

Reference	Jurisdiction	Type of Evidence	Description of Findings
			other services. During a pandemic, space should be designated for a screening area upon entry into the building by either visitors or staff. Where buildings have multiple elevators, providers should consider designating one elevator for exclusive use of staff and service (e.g., as accessed by key card or fob). ○ Private Rooms in Residential Settings: Two recent studies from Canada provide evidence that suggest communities with a high percentage of private rooms had significantly lower rates of COVID-19 and fewer deaths. It was noted that although private rooms should become the industry norm, there are circumstances where a shared room is warranted (e.g., a couple or siblings). ○ Space for Family Visits: To minimize the impact of visitor restrictions during a pandemic, some providers offered dedicated outdoor visitation space, installing temporary structures, partitioning interior spaces with barriers to prevent transmission, and enhancing resident/family communication through technology. ○ Operable Windows: While the use of operable windows in residential health, care, and support facilities should be considered, they may have negative impacts on buildings with complex HVAC systems. ○ Airborne Infection Control: The need to protect residents during infectious disease events is best accommodated by facility planning and design including a mechanical system that provides adequate ventilation, filtration, and temperature and humidification controls. While the norm in hospital design and construction, this design approach is less common in most existing and newly constructed residential care facilities. ▪ *Temporary Airborne Infection Control*: When a facility HVAC system is not equipped to provide airborne protection, several rapidly deployable temporary solutions may enable a facility to provide a suitable response and appropriate safety accommodations for residents and caregivers during emergencies. • Portable HEPA Filtration Systems*:* Use of portable HEPA filtration systems has been shown to be an effective method of providing airborne infection control when employed correctly. Guidance for these strategies has been developed by the US Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH). • Ventilated Headboards*:* A ventilated headboard captures and contains contaminants close to infected patients via an exhaust and HEPA filter system integrated into the headboard. According to NIOSH, ventilated headboards are: 1) Proven to capture/remove more than 99% of airborne infectious aerosols during laboratory testing; 2) Cost effective (i.e., cost per isolated patient environment is considerably less than traditional airborne infection isolation rooms); 3) Protective to personnel; 4) Easily accessible to patients; 5) Expandable for one or multiple units; 6) Adjustable to fit most sizes of bed, cot or gurney; 7) Quickly and easily installed; and 8) Easily broken down for storage. • Negative pressure room using a portable HEPA filtration system*:* With this strategy, space is negatively pressurized using an exhaust fan (either directly ventilated to the outside or connected to the existing exhaust system) with integrated HEPA filter to prevent contaminants from spreading outside the room. During an infectious disease event, it may be desirable to establish a negative pressure room in a residential care setting where traditional airborne isolation or negative pressure rooms are not available. ▪ *Permanent Airborne Infection Control*: The following airborne infection control categories represent the major strategies for reducing airborne infectious particles: 1) HEPA filtration; 2) Negative pressure and/or

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			airborne infection isolation units; 3) Humidification to 40-60% relative humidity levels; and 4) Air purification (i.e., ultraviolet germicidal irradiation light (UVGI) in the central air distribution system, bipolar ionization).[j] ○ General Mechanical Design Considerations to Limit Infection: Zoning that uses separate air systems for different resident clusters is important in designing a residential health care building to, for example, minimize recirculation between clusters. A zone serving a cluster of rooms with a common HVAC unit allows for better segregation of a portion of the facility when needed for use as an infectious disease isolation unit or to operate as a negative pressure or airborne isolation unit should the need arise. ○ Essential Electrical Systems: In the event of power outages, provision of generator sets to supply additional HVAC systems and equipment should be considered for renovation projects and new construction.

[j] According to FGI, evidence is inconclusive as to whether UV light from UVGI lamps placed inside central air-handling systems or local ducts effectively sanitizes the air. There are concerns about the exposure time needed and the air speed provided in typical mechanical systems. Bipolar ionization uses low-voltage (24V) units to inject ions into the supply air stream and the occupied space without producing byproducts such as ozone. This system can be added effectively to old buildings where there are no significant air changes. It was noted that bipolar ionization system is likely to have the lowest first cost and operating cost of all airborne infection control systems, and is effective at deactivating 99.4% of COVID-19 within 30 minutes of the start of operation (FGI, 2021, p.403).

Methods

Individual peer-reviewed articles were identified through PubMed and Google Scholar. The search was limited to English sources and therefore may not capture the full extent of initiatives in non-English speaking countries. Full-text results extracted were limited to those available through Open Access or studies made available to the Ministry by our partners. Jurisdictional information was identified using Google and on relevant government websites.

The Medical Subject Heading term "Design, Facilities" was used in combination with keywords to identify relevant articles for this review including: "long-term care", "residential care", "aged care", "congregate living", and "respiratory infection".

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. The following members of the Network developed this Evidence Synthesis Briefing Note:

- Evidence Synthesis Unit, Research Analysis and Evaluation Branch, Ministry of Health. June 10, 2021.
- Waddell KA, DeMaio P, Wilson MG, Bain T, Wang Q, Al-Khateeb S, Alam S, Sharma K, Whitelaw S, Gauvin FP, Lavis JN. COVID-19 living evidence profile #2 (version 2.3): What is known about preventing and managing COVID-19, outbreaks of COVID-19, and about supporting renewal in long-term care homes? Hamilton: McMaster Health Forum, 26 April 2021

For more information, please contact the Research, Analysis and Evaluation Branch (Ministry of Health).