

Infection prevention and control in long-term care: Lessons learned from COVID-19 outbreaks and future perspectives

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EDITORIAL

Long-term care homes (LTCHs) have experienced the brunt of the COVID-19 pandemic [1]. The impact of the disease in LTCHs could be attributed to several factors. Namely, gaps in facility design, inadequate infection prevention and control (IPAC) systems and overall operational challenges. Also, long-term care operators have struggled to balance key aspects of the Resident Bill of Rights and the implementation of appropriate IPAC measures. For example, resident cohorting, restriction of outdoor activities, restriction of visitation, cancellation of group activities and communal dining. These, and other imposed isolation measures on one hand have been salient in mitigating the risk of infection transmission within the home, but on the other hand, have had significant implications in residents' rights and freedom as well as their mental wellbeing. Beside these psychosocial and operational issues, the COVID-19 pandemic has also exposed gaps in critical aspects of long-term care, which require attention in order for LTCHs to be able to appropriately manage future pandemic threats [2]. The shared accommodation settings in many LTCHs facilitate the transmission of infections among residents who are vulnerable owing to their advanced age and with often underlying medical conditions such as diabetes, chronic respiratory, cardiovascular and cerebrovascular diseases, malignancy, and functional decline (dementia). Also, people living with dementia have high risks of contracting an infection during an outbreak due to reduced cognitive ability to adhere to IPAC measures [3]. In this editorial, I will discuss some of these challenges, and provide a focus for future control efforts, based on evidence and experience from the response of several outbreaks.

First, most LTCHs are not designed to deal with outbreaks of pandemic potential. Adequate ventilation is important to reduce the transmission of infections in LTCHs especially those transmitted by airborne and droplet means [4]. A well-ventilated system can reduce the risk of airborne

infection transmission in indoor spaces by diluting the concentration of potentially infectious aerosols through ventilation with outside air. Ideally, the HVAC system in LTCHs should be inspected, maintained and regularly cleaned [5]. According to the World Health Organization (WHO), in the absence of aerosol-generating medical procedures (AGMPs), adequate ventilation is considered to be 60 litres/second per resident (L/s/resident) for naturally ventilated areas or six air changes per hour (ACH). In rooms where AGMPs are performed, specific requirements should be met. Homes 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 [5]. In facilities where a mechanical ventilation system is available, negative pressure should be created to control the direction of airflow.

The ventilation rate should be between 6-12 ACH with a negative pressure differential of ≥ 2.5 Pa (0.01-inch water gauge) to ensure that air flows from the corridor into the resident room [6]. Beside the negative air pressure system, temperature/humidity controls and the use of UV-C light disinfection systems are attractive interventions to improve the overall environment of care for residents. Also, considering the fact that most infections are transmitted by contact means, emphasis should be placed on reducing the number of touch points in LTCHs. For example, touchless faucets, touchless bathroom doors, touchless wall-mounted alcohol-based hand rub or soap dispensers, touchless paper towel dispensers, touchless foot-operated waste bins, etc.

Additionally, breaking the chain of transmission of infection between residents, will require the provision of more single rooms with dedicated bathrooms against double or ward rooms. Each end of the resident home area (RHA) should have a separate entrance and a separate dining room, activity room, lounge, shower/tub room and bathroom to support cohorting by home area. Corridors in RHAs should

have a minimum width of 2.4 metres to facilitate the easy transfer of beds during resident movement (cohorting). An increased corridor space may also support physical distancing and ease the movement of carts within the unit [7]. There should be additional vacant rooms to support isolation of cases and space to create quarantine zones.

Second, a significant challenge in managing COVID-19 outbreaks in LTCHs is the ability to restrict or isolate residents with cognitive impairment, or those who wander throughout the home. Residents who, because of cognitive decline, are unable to adhere to self-isolation measures and other IPAC precautions contribute significantly to the spread of the virus within the home. During wave one, an increase in the prescription of psychoactive medications to residents occurred as a means to prevent wandering and support self-isolation. Later on, non-pharmacological interventions were increasingly seen to be valuable and helpful to distract residents with dementia and keep them in their rooms. Examples include:

- (1) engaging the residents in meaningful activities based on the resident's interest, e.g., playing favourite music, television show, or a movie in their own room;
- (2) creating an activity kit based on the resident's interests (e.g. photo album, magazines, picture books, puzzles, math sheets, etc.);
- (3) facilitating phone/video calls with family and friends, or playing pre-recorded messages;
- (4) making the resident's room as comfortable and appealing as possible, e.g., displaying pictures of family on the walls and/or pieces of their life story (e.g. pictures of places or items of significance);
- (5) establishing and promoting a daily routine and exercise;
- (6) regularly attending to their demands and physical needs [8].

Although essential in outbreak control, there were significant challenges in achieving this. Homes are, therefore encouraged to train more activity aides on behavioural knowledge and skills to engage residents in a meaningful way in their rooms. An effective implementation of these strategies may eliminate the need for unnecessary pharmacological intervention. However, during periods when the resident is unwilling to stay in his or her room, other strategies such as staffing for one-to-one care, encouraging frequent hand hygiene, and encouraging the resident to wear a mask, if tolerated, may reduce the risk of transmission.

Third, is the consideration for paid sick leave for LTCH employees. Although all employees are routinely screened for symptoms of COVID-19, it has been suggested that because of fear of work exclusion and unpaid sick days, some LTCH employees have failed to declare mild symptoms during entry screening. In some cases, these

employees have been deemed to have worked while positive as was determined by subsequent surveillance testing and contact tracing by the local public health units. It is essential, therefore, for all LTCHs to implement sick leave policies that are non-punitive, flexible, and consistent with public health policies that encourage employees to stay home when ill [9]. Providing paid sick leave will increase the rate of staff presenting voluntarily for testing and isolating if they have symptoms, ultimately reducing the risk of transmission to residents and staff within the home [5].

Fourth, essential visitors to LTCHs have also been implicated in some cases as the source of outbreaks within the home. Efforts should be made to protect residents in LTCHs by implementing a controlled visitation policy. Beside active screening of visitors and regular testing, a standard operating procedure allowing visits to LTCHs should build on the existence and continuous reinforcement of a strong IPAC policy in the home [5]. Visitors should be required to demonstrate full understanding of basic IPAC expectations especially related to hand hygiene compliance, the appropriate use of personal protective equipment (PPE) and the requirement of physical distancing. As a matter of fact, essential visitors need to be held at a comparable standard of infection prevention and control as employees as the risk of infection is the same. They should take a mandatory IPAC training prior to being designated as an essential caregiver or essential visitor.

Fifth and most important is an infection prevention and control program. Each LTCH should have an IPAC program and assign an individual with the required training in IPAC to be the lead [10]. This individual will be responsible for a wide range of activities, including developing IPAC policies and procedures, performing healthcare-associated infection surveillance, providing IPAC training to employees, and coordinating IPAC audits. Ideally, each LTCH that has more than 100 residents should have an IPAC specialist certified in infection control (CIC®). The IPAC focal person in the LTCH should work closely with relevant provincial and local public health authorities to facilitate the roll out of directives. Some long-term care operators have gone the extra mile to hire epidemiologists and this has really made a difference in their COVID-19 outbreak response efforts. Typically, healthcare epidemiologists will look at the distribution (frequency, pattern) and determinants (causes, risk factors) of the disease within the home, community, or the general population and search for transmission routes, trends, and identify people who are at risk, as well as determine how to control or stop the spread, or prevent it from happening again.

It is essential that all long-term care employees complete a mandatory IPAC education on hire and annually thereafter. Once an outbreak is declared, there should be a mandatory IPAC education refresher for all employees on core IPAC expectations such as transmission-based precautions, hand

hygiene, proper techniques of PPE donning and doffing, and environmental cleaning and disinfection. Also, facility IPAC assessments by a regulatory or qualified independent agency should occur at least twice a year and immediately after a home goes into outbreak to ensure that appropriate containment mechanisms are in place. The home must develop a corrective action plan after each assessment, and be accountable to ensure that all deficiencies are addressed in a timely manner.

Also, it should be mentioned that infection prevention and control audits are a key component of the IPAC program and this should include auditing of critical practice areas such as hand hygiene compliance, effective PPE donning and doffing practices, and environmental cleaning and disinfection efficiency and effectiveness. Additionally, to protect residents from infections that are potentially transmitted by droplet means, it is essential to introduce both breakroom and smoking areas audits in order to ensure physical distancing, as these are the areas where staff are most likely to be without the required PPE (e.g. masks). The target for these audits has to be set by each LTCH and the home must be accountable to meet the target. During the course of the COVID-19 pandemic, some homes in Ontario, Canada, have set a daily target by using the formula: resident census divided by 3. For example, if the number of residents in the home is 90, the daily hand hygiene target is 30 observations. A good strategy to meet this audit target is the implementation of IPAC champions (employees within the home who have a knack for infection prevention and control) who will be responsible to audit, educate and serve as change agents in order to overcome resistance and improve IPAC compliance among staff. Ideally, the composition of the IPAC champions should be 8% of staff census and should consist of employees from any department who can serve as role models to their colleagues.

It is also essential to encourage and support residents and visitors to perform hand hygiene as required, in particular when hands are soiled, before and after meals, or after coming into contact with high-touch surfaces. The implementation of both the Fluorescent gel assessment (Glo Germ) and the ATP (Adenosine Triphosphate) cleaning and disinfection audit may also ensure a safer environment for residents and staff. The fluorescent markers are designed to assess environmental cleanliness, i.e. the physical removal of debris from surfaces. On the other hand, the quantitative ATP bioluminescence enables measurement of bioburden and provides an assessment of the disinfection efficiency [11]. Combining the two audit tools will undoubtedly improve the overall environmental cleaning and disinfection quality initiative of the home.

Finally, the way in which an outbreak response is conducted will reflect the outcome. A system that has been shown to produce favourable results is a multisectoral integrated outbreak management team where partners from

across different agencies come together to coordinate outbreak management in a LTCH. This multisectoral outbreak management system has been shown to improve accountability by the licensee leading to better outcomes. For example, in Ontario, Canada, the multisectoral outbreak management team consists of Public Health Ontario (PHO), the local Health Unit (HU), the Local Health Integration Network (LHIN), the Ministry of Long-Term Care (MLTC), the Ministry of Health (MOH), a local hospital partner and the LTCH. Each of these agencies comes to the table with a unique perspective and accountability requirement. PHO, e.g., offers laboratory support (i.e., testing and typing of specimens during an outbreak) and creates guidance and best-practice resources; the HU takes the lead on enforcing actions that protect and promote the health of the population and contribute to reducing health inequities. The LHIN, following its mandate as a Crown Agency ensures access to high-quality health services, coordination of effective and efficient management and mobilization of resources to support the home. The hospital partner provides support with the management of high-acuity residents and facilitating the turnaround time of laboratory results [12]. The MLTC takes the lead in setting priorities to protect the health of the residents through the application of legislation, regulations, standards, policies and directives to support strategic goals to improve care of the residents, and strengthening overall healthcare delivery. The LTCH, as the licensee, is accountable to all these agencies and ensures resident safety and quality of care is a priority that should be met.

CONCLUSION

Together, a lot has been learned with regards to the COVID-19 pandemic that has lasted for over a year (and counting). The time to change the paradigm of care in long-term care is now. Each nation owes its residents in LTCHs the right to protect them against current and future pandemic threats and the first level of change must start with the environment of care followed by the care itself, and all parties need to be accountable in their responsibility in meeting these two essential aspects of resident well-being.

REFERENCES

1. Kim G, Wang M, Pan H, et al (2020). A health system response to COVID-19 in long term care and post-acute care: a three-phase approach. *J Am Geriatr Soc*. <https://doi.org/10.1111/jgs.16513>.
2. Werner RM, Hoffman AK, and Coe NB (2020). Long-Term Care Policy after Covid-19 — Solving the Nursing Home Crisis. *N Engl J Med*, 383:903-905. DOI: 10.1056/NEJMp2014811.

3. Jihye Hwang, Ho-Sung Ryu, Hyun Ah Kim, Miri Hyun, Ji Yeon Lee, Hyon-Ah Yi (2020). Prognostic Factors of COVID-19 Infection in Elderly Patients: A Multicenter Study. *Journal of Clinical Medicine*, 9:12, 3932.
4. World Health Organization (2020). Preventing and managing the COVID-19 pandemic across long-term care services in the WHO European Region: strengthening the health systems response to COVID-19. Technical Working Guidance No. 6. WHO Regional Office for Europe; 2020.
5. World Health Organization. Infection prevention and control guidance for long-term care facilities in the context of COVID-19. Interim guidance. 8 January 2021.
6. Bartley J and Olmsted RN. Heating, ventilation, and air conditioning. APIC Text of Infection Control and Epidemiology, vol 3, 4th Ed., Washington, DC: Association for Professional in Infection Control and Epidemiology, 2014.
7. Brown KA, Jones A, Daneman N, et al (2020). Association between nursing home crowding and COVID-19 infection and mortality in Ontario, Canada. medRxiv. doi: 10.1101/2020.06.23.20137729.
8. Siders C, Nelson A, Brown LM, Joseph I, Algase D, Beattie E, and Verbosky-Candena S (2004). Evidence for implementing non-pharmacological interventions for wandering. *Rehabilitation Nursing*, 29(6), 195-206.
9. Stall NM, Brown KA, Maltsev A, et al (2021). COVID-19 and Ontario's long-term care homes. Science Briefs of the Ontario COVID19 Science Advisory Table, 1(7).
10. Ayuкеkbong J (2020) COVID-19 Saga; Lessons for the Future. *Canadian Journal of Infection Control*, 35(4):157-158.
11. Boyce JM, Havill NL, Dumigan DG, et al (2009). Monitoring the effectiveness of hospital cleaning practices by use of an adenosine triphosphate bioluminescence assay. *Infect Control Hosp Epidemiol*, 30(7):678-84.
12. Liu M, Maxwell CJ, Armstrong P, Schwandt M, Moser A, McGregor MJ, Bronskill SE and Dhalla IA (2020). COVID-19 in long-term care homes in Ontario and British Columbia CMAJ:192 (47) E1540-E1546; DOI: <https://doi.org/10.1503/cmaj.201860>. 🌸