COVID-19 Scientific Advisory Group Rapid Response Report

Key Research Question:

Besides home self-isolation, and use of centralized voluntary isolation centers, are there any other evidence based strategies (eg: wearing masks within the home; additional cleaning; testing, other) that have been used to successfully control focal COVID-19 outbreaks in other settings?

Context

- COVID-19 outbreaks have occurred in a variety of settings, including hospitals, long-term care facilities, cruise-ships, places of worship, and foreign-worker dormitories
- Any setting where physical distancing cannot be optimally maintained is a potential site for an outbreak—the risk for a COVID19 outbreak is further increased if those at the site have COVID19 risk factors such as advanced age or underlying co-morbidities
- Recently, in Alberta, there have been outbreaks associated with LTC facilities, meat packing plants, and homeless shelters.

Key Messages from the Evidence Summary

- Guidelines recommend increased disinfection with routine disinfecting products (as approved for the site (i.e., health care site vs not health care site). There is some early in-vitro data that suggest currently recommended disinfectants are effective against SARS-CoV-2. One review study also suggested other enhancements to the built environment, namely, increased ventilation and increased use of UV light.
- For outbreaks occurring in association with places of work, WHO, CDC, and federal and provincial guidelines recommend symptom screening for staff/employees and enhanced physical distancing measures (i.e., staggered lunch-time shifts or changes to production lines) for COVID-19 outbreak control.
- PPE is also routinely recommended for outbreaks, though the PPE recommended depends on the location of the outbreak. For instance, while HCW at a LTC may require gloves, gowns, eye protection and a medical mask, some N95 may also be required if aerosol generating procedures are performed there (i.e., tracheostomy care). By contrast, at a food business with an outbreak, the provision of medical masks would be sufficient.
- Accumulating case reports suggest that testing of all persons, including asymptomatic individuals, at the site of outbreaks has been used to control outbreaks at long-term care facilities, acute care hospitals, and homeless shelters. Prompt universal testing may allow identification of pre-symptomatic and asymptomatic cases who could have propagated transmission chains if they had not been identified and placed on isolation, versus symptom-dependent testing strategies.

Committee Discussion

Acknowledging the research gaps in this area, including around testing strategies in the context of an outbreak (which is discussed further in the asymptomatic testing report), there was consensus about the recommendations presented below. The committee acknowledged that the specific PPE worn by staff in the context of outbreaks would vary for LTC, vs other settings (homeless shelters, workplaces, communal living settings), and focused recommendation on where use of medical masks was recommended (and for whom). This was considered in situations where testing of all individuals involved in an outbreak, and also in situations where comprehensive testing had not occurred (or results were pending). It was also noted that this review should be considered alongside the voluntary quarantine / isolation centre review, which discussed in more detail strategies for self-isolation and quarantine.

Recommendations

1) Consistent with international guidelines, we recommend that all high-risk settings (as defined by public health, including long term care, large multi-employee businesses where workers are in close contacts, communal living settings, dormitories and ships) implement measures to minimize the risk of outbreaks. Such measures include: symptom-based screening, physical distancing, rigorous hand washing, and enhanced cleaning.
2) Consistent with international guidelines, we recommend provision of medical masks to staff members in settings where an outbreak is occurring (example long-term care facilities, homeless shelters, or food businesses) because of long term chronic exposure to multiple individuals.
3) In outbreak settings, in long-term care facilities, homeless shelters, in high-risk businesses or high-risk communal living settings (i.e., communal homes or dormitories), we recommend providing medical masks for residents/workers, dependent on COVID-19 status.
   a) If a person can self-isolate effectively, then no mask is required.
   b) If all individuals are tested, then a COVID-19 positive individual should wear a medical mask in a setting where self-isolation is not possible and COVID-19 negative persons are present. Similarly, COVID-19 negative contacts (or caregivers) should wear a medical mask when quarantine is not possible and COVID-19 positive persons are present.
   c) If all individuals are tested and are cohorted to isolate together, for COVID-19 test-concordant individuals (all known to be positive or all known to be negative), then no mask is needed. Daily assessment to identify new symptoms in exposed asymptomatic test negative people is recommended
   d) If there has not been mass testing in an outbreak (i.e., COVID-19 status is unknown) and self-isolation or quarantine is not possible, then all individuals should wear masks, even if asymptomatic. Optimally, medical masks should be used. If medical masks are not available, please refer to our review "Masks in the community" where the use of homemade masks is discussed.
   e) Acknowledging supply concerns for PPE, we recommend that wherever possible, AHS provide medical masks to individuals requiring masks who are involved in high-risk outbreak situations. These masks should be changed daily, and the mask should be worn as long as can be tolerated by the individual.
4) When public health has declared an outbreak or has high concern for the possibility of an outbreak, testing of all patients with symptoms consistent with COVID-19 should be promptly initiated. The overall testing strategy should be guided by laboratory resources, and the recommendations outlined in the document entitled COVID-19 Rapid Review – Priority Groups for Asymptomatic Testing.

Research Gaps

- Outside of practical and common recommendations around symptom-based screening, physical distancing, rigorous handwashing and enhanced cleaning, there is a lack of high quality evidence to determine the best methods of containing outbreaks.
- The utility of testing all individuals involved in an outbreak, including those who have no symptoms, is not yet clear.

Summary of Evidence

Evidence for this review was primarily derived from guidelines published by the World Health Organization, Public Health Agency of Canada, Center for Disease Control, European Center for Disease Prevention and Control, and various provincial guidelines. There was limited data in the primary literature and no systematic reviews. As the pandemic evolves and varied outbreak management strategies are explored, the body of literature will likely grow rapidly. Specifically, we anticipate more details to emerge regarding the utility of universal testing (i.e., including asymptomatic individuals) at outbreak sites. Numerous case reports and case series of this strategy were described at long-term care facilities, homeless shelters, and from an acute care hospital.

Evidence from the grey literature

While each outbreak setting will have unique challenges, for instance, long term care-facility and detention centers have population groups who may be difficult to relocate, and essential (or critical) workplaces may not be able to cease operations, this review will discuss strategies which were found to be common to most settings, with some specific focus on food businesses.

There are many similarities in the guidelines that have been established for food businesses[1], general workplace guidelines[2], long-term care facilities[3,4], prisons/detention centers, and homeless shelters[5].

There are several basic strategies that can be put in place to try to prevent COVID19 outbreaks in facilities:

Designation of a facility Infection prevention and control lead/focal point*:* For long-term care settings[4], the WHO recommends an infection, prevention and control (IPC) lead or focal point. This suggestion may be valuable for any large, high-risk facility—particularly ones where outbreaks have already occurred. The designation of such an individual may be a helpful proactive measure that could ensure accountability, enhance operations and communication, and facilitate interactions with public health.

Employee, resident, and visitor symptom and fever screens: First, employees require education on **symptom awareness**[1]**.** Employees must be provided education (including in written form, preferably in their first language) about potential symptoms of COVID19. Symptomatic employees and visitors (where relevant) should not be entering the facility. To facilitate this, employees should be provided with easy methods of informing their supervisors about their absence. To optimize compliance, paid leaves and/or other means of ensuring job security are beneficial[6]. In addition, a minimum of daily **risk factor** (contact with COVID-19 case or travel) and **symptoms screens**[1]**,** with the inclusion **of temperature checks**[3,4], are recommended (twice daily checks in Ontario).

Employee recommendations outside of workplace: Another strategy to reduce spread that has specifically been used in long-term care facilities has been **restricting staff members to just one site of** work (Ontario, British Columbia and considered in Alberta). Other workplaces could also require their employees to only be work at their facility, but the enforceability of such restrictions are unclear. Yet another suggestion has been to recommend **avoidance of public transportation**; however, the alternative would be carpooling or company vans, which may not necessarily have optimal social distancing in place either.

Physical distancing: While optimal physical distancing is 2 metres, The WHO recommends a minimum of 1metre (3 feet) between workers[1]. To maximize physical distancing, other measures can also be put into places, for instance: plexi-shields separating employees from patrons or other employees, staggered workstations on either side of processing lines (so that employees are not face-to-face), spacing out workstations (at the expense of slowing down production lines), staggering work shifts to limit the number of employees in the facility at a given time, staggered lunch breaks, and organizing employees into work groups so as to minimize interaction within the whole plant[1,6].

Hand hygiene and hand sanitizers: Employees should be educated on appropriate hand hygiene (with soap and water for at least 20 seconds) and hand washing stations and alcohol-based (at least 60%) hand sanitizers should be readily and easily available throughout the site.

PPE provision*:* The topic of mask use in the community has been reviewed in another SAG rapid review.

In addition to the general recommendations above, we identified the following recommendations specific to various sites that are vulnerable to outbreaks: homeless shelters, food or other businesses, and long-term care facilities.

Homeless Shelters: For homeless shelters[5], the CDC recommends that all residents cover their face with a cloth covering. They also recommend that staff who are not dealing directly with clients (who are not within 6 feet) cover their face with a cloth covering. Presumably if available medical masks would be preferred based on extant evidence (see Community mask use). This is in keeping with the guidance for the public. For staff who are doing client temperature screening at intake, a physical barrier (ie. plastic partition) is recommended. However, if that is not available, then they suggest use of a medical facemask (*not* a cloth mask), eye protection, and disposable gloves. For medical staff providing care, they recommend an N95 respirator (or facemask if N95 is not available or staff is not fit-tested), eye protection, gowns, and gloves. These recommendations vary from other jurisdictions, for example, in Alberta, N95 respirator use is only recommended for aerosol generating medical procedures and

these procedures are not be undertaken by homeless shelter staff. It is noted that these recommendations are not just for outbreak situations. PHAC also recommends PPE for staff when direct client care is being provided and refers to the community guidelines for cloth coverings for staff for the remainder of the time[7].

Food Production Facilities: For food businesses, the WHO states: “provide PPE such as face masks, hair nets, disposable gloves, clean overalls, and slip reduction work shoes for staff”[1]. They do not specifically comment on the use of masks to control outbreaks in these facilities.

Long Term Care/Assisted Living Facilities: For long term care facilities, the WHO recommends the use of medical masks as source control for suspected and confirmed COVID-19 patients[4]. They also recommend their use by staff when caring for suspected or confirmed patients. By contrast, the CDC recommends constant use of a facemask or, if there is a lack of resources, cloth masks, by staff[8]. For care of patients with suspected or confirmed COVID-19, they no longer recommend cloth or medical masks, but state that staff should use an N95 respirator (again, in many other settings including in Alberta, N95 respirators are only reserved for aerosol generating medical procedures). All residents are to wear a cloth masks when outside of their room. If medical facemasks are available, they can be supplied to the residents.

Home Isolation: Finally, the WHO recommends that when COVID-19 patients are not isolated in a health-care facility but instead are at home, they should “wear a medical mask as much as possible; the mask should be changed at least once daily[9].” Care-givers should also wear a medical mask when in the same room as the COVID-19 positive individual.

Additional cleaning and disinfection: If a COVID-19 infection is identified in someone at a high risk site, the site, all surfaces the infected person encountered must be cleaned[10,11]. This is in addition to routine cleaning of high-traffic areas. The products, timing, and processes for cleaning differ based on the outbreak site, with hospitals and LTC facilities have different requirements. Recommended products for use in Alberta are available through AHS, and additional resources available through PHAC, and CDC. ECDC has outlined their decontamination recommendations in the chart included below. This resource chart also provides information on the PPE that would be recommended for the cleaning staff. Of note, cleaning staff must be provided with adequate PPE (typically, medical mask, gloves and uniforms or gowns).

Table 1. Cleaning options for different settings. S: Suggested, O: Optional.

	Healthcare setting	Non-healthcare setting	General settings
Surfaces	• Neutral detergent AND • Virucidal disinfectant OR • 0.05% sodium hypochlorite OR • 70% ethanol **[S]**	• Neutral detergent AND • Virucidal disinfectant OR • 0.05% sodium hypochlorite OR • 70% ethanol **[S]**	• Neutral detergent **[S]**
Toilets	• Virucidal disinfectant OR • 0.1% sodium hypochlorite **[S]**	• Virucidal disinfectant OR • 0.1% sodium hypochlorite **[S]**	• Virucidal disinfectant OR • 0.1% Sodium hypochlorite **[O]**
Textiles	• Hot-water cycle (90°C) AND • regular laundry detergent • alternative: lower temperature cycle + bleach or other laundry products **[S]**	• Hot-water cycle (90°C) AND • regular laundry detergent • alternative: lower temperature cycle + bleach or other laundry products **[S]**	n/a

Cleaning equipment	• Single-use disposable OR
	• Non-disposable disinfected with:
	  • Virucidal disinfectant OR
	  • 0.1% sodium hypochlorite
	[S]
		• Single-use disposable OR
		• Non-disposable disinfected with:
		  • Virucidal disinfectant OR
		  • 0.1% sodium hypochlorite
		[O]
			• Single-use disposable OR
			• Non-disposable cleaned at the end of cleaning session
			[S]

PPE for cleaning staff	• Surgical mask • Disposable long-sleeved water-resistant gown • Gloves • FFP2 or 3 when cleaning facilities where AGP have been performed **[S]**	• Surgical mask • Uniform and plastic apron • Gloves **[S]**	• Uniform • Gloves **[S]**
Waste management	• Infectious clinical waste category B (UN3291) **[S]**	• In a separate bag in the unsorted garbage **[S]**	• Unsorted garbage **[S]**

Disinfection of environments in healthcare and non-healthcare settings potentially contaminated with SARS-CoV-2. Accessed on April 21, 2020: https://www.ecdc.europa.eu/en/publications-data/disinfection-environments-covid-19

Evidence from the primary literature

In one study, two hospital rooms of a COVID-19 patient were tested for PCR-positive samples of SARS-CoV-2 *after* they had been cleaned (one room was tested after 5 days, the other room was tested 30 minutes after cleaning). Hospital-grade disinfectant available in Japan was used (Rely+On Virkon, LANXESS, or RUBYSTA) and no viral RNA could be isolated[12]. Chin et al. 2020, examined the virucidal effects of various disinfectants at their recommended concentrations by adding 15 μL of SARS-CoV-2 culture (~7·8 log unit of TCID50 per mL) to 135 μL of various disinfectants at working concentration". With the exception of hand-soap, no infectious virus could be cultured from these disinfectants[13] (list of disinfectants provided in Appendix).

One speculative review on optimizing built environments to reduce COVID-19 transmission[14] provides other suggestions that could be explored and further studies. They suggest improving air-flow within facilities by employing proper filter installation (even though even the best HEPA filters are too large to filter viral particles) and increasing the outside air fraction—the easiest method of doing so would be opening windows. They also suggest that because higher humidity levels seem to reduce viral transmission (including coronaviruses), higher indoor humidity (between 40-60%) could be pursued. Finally, they propose increasing use of UV light. "While daylight's effect on indoor viruses and SARS-CoV-2 is still unexplored, spectrally tuned electric lighting is already implemented as engineering controls for disinfection indoors. UV light in the region of shorter wavelengths (254-nm UV C [UVC]) is particularly germicidal, and fixtures tuned to this part of the light spectrum are effectively

employed in clinical settings to inactivate infectious aerosols and can reduce the ability of some viruses to survive (84)."

Media reports confirm that many countries have been employing street-level disinfection (https://www.cbc.ca/news/health/disinfectant-sprays-1.5536516) to combat COVID-19 outbreaks. We did not find any evidence in the grey or primary literature about this strategy.

Universal testing strategies:

No sources of primary literature directly compare universal testing strategies vs more targeted (symptom-based screening) as a method of either preventing or managing COVID-19 outbreaks. However, the following case reports and case series illustrate uses of universal testing in a variety of settings where either an outbreak had occurred or where the study authors were trying to prevent outbreaks among vulnerable populations through pro-active surveillance by testing asymptomatic individuals in high-risk settings. Please see COVID-19 Rapid Review – Priority Groups for Asymptomatic Testing.

Long term care or assisted living facilities:

1. King County, Washington[15]: Almost 3 weeks after the first case of COVID-19 was identified at a long-term care facility, all residents of the facility were tested for COVID-19, regardless of symptoms. Staff were not routinely tested. 63% (48/76) of residents who participated in the study tested positive. 56% (27/48) of these individuals were asymptomatic at the time of testing. 3 remained asymptomatic while the remainder were pre-symptomatic. RTPCR Cycle threshold values for asymptomatic, pre-symptomatic, symptomatic with atypical symptoms individuals, and symptomatic with typical symptoms persons, were similar. Similarly, there was viral growth across all symptom groups, as 1/3 of asymptomatic, 17/24 of pre-symptomatic, ¾ of those with atypical symptoms, and 10/16 of those with typical symptoms had virus identified from viral culture (https://www.nejm.org/doi/full/10.1056/NEJMoa2008457?query=recirc_curatedRelated_article). In an accompany editorial, the authors argue that these findings suggest asymptomatic transmission is contributing to transmission of SARS-CoV-2 and that LTC facilities (and other congregate facilities) should begin testing of asymptomatic persons[16] (https://www.nejm.org/doi/full/10.1056/NEJMe2009758?query=recirc_curatedRelated_article).
2. King County, Washington[17]: After an outbreak was declared, facility-wide testing was undertaken. It identified a 30.3% prevalence of COVID19 among residents—approximately half of whom were asymptomatic at the time of testing. Investigators concluded that had these asymptomatic individuals not been tested, they could have contributed to further spread within the facility (https://www.cdc.gov/mmwr/volumes/69/wr/mm6913e1.htm?s_cid=mm6913e1_w).
3. King County, Washington[18]: After two residents were diagnosed at a senior's independent and assisted living facility, all residents and staff members of the facility were tested for COVID-19. 4/80 residents and 2/62 staff members tested positive. Residents were tested on day 1 and day 7. All residents who tested positive were asymptomatic at the time of testing (one patient had resolved cough and one loose stool). 42% of residents and 25% of staff who were COVID-19 negative reported symptoms. (https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e2.htm)
4. Ontario[3,19,20]: The Ontario public health LTC guidelines updated on April 15, 2020 state that routine testing of asymptomatic residents and staff is not generally recommended but may be considered during a confirmed outbreak. However, a memorandum dated April 21, 2020 (https://www.oha.com/Bulletins/DM%20Memo%20MOH%20LTC%20Testing%202020-04-21.pdf) outlines the province's intent to test all individuals in LTC facilities, including asymptomatic residents and staff, to serve as a means of determining point prevalence. Whether this will be an ongoing project is unclear. Fisman et al. 2020 examined risk factors for COVID-19 mortality in Ontario LTC residents (preprint: https://www.medrxiv.org/content/10.1101/2020.04.14.20065557v1.full.pdf). They found that COVID19 infection among the staff, but not infection among other residents, predicted mortality in the residents. Based on the temporal association (lag between staff being diagnosed and subsequent resident death), they posit that this relationship may be causal.

5. Alberta Health Services has been pursuing testing of all residents and staff at long-term care facilities where outbreaks have occurred as announced by the CMOH on April 23.

Acute care hospitals:

1. New York, NY[21]: From March 22 to April 4th, all 215 women delivering at a New York hospital were screened with PCR testing for SARS-CoV-2. Of the 210 women who were asymptomatic at the time of screening, 14% were positive for COVID-19 (https://www.nejm.org/doi/full/10.1056/NEJMc2009316).
2. London, UK[22]: University College London hospitals will soon begin testing of asymptomatic healthcare workers as a pilot project (https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30917-X/fulltext). Based on news reports, the lead investigators contend that once weekly screening of all healthcare workers should be implemented (https://www.theguardian.com/world/2020/apr/16/healthcare-workers-screened-covid-19-every-week-infectious-unethical). They argue that by testing all HCW they can reduce unnecessary quarantines and therefore avoid depleting the workforce, and that transmission via pauci-symptomatic, pre-symptomatic or asymptomatic individuals could be reduced or avoided.
3. California recently (April 19, 2020) changed its testing guidelines to include asymptomatic healthcare workers and asymptomatic residents of congregate living facilities in its "priority 2" (out of 4) category for testing. Residents and staff of any outbreak investigation identified by public health are among "priority 1". https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Expanding-Access-to-Testing-Updated-Guidance-on-Prioritization-for-COVID-19-Testing.aspx

Homeless shelters:

1. Boston, MA[23]: After an outbreak at a homeless shelter, Bagget et al conducted symptom screenings and PCR testing on all those residing at the shelter over 2 days. Out of 408 individuals tested, 36% were SARSCoV-2 positive – the majority did not have symptoms at the time of the PCR testing (preprint: https://www.medrxiv.org/content/10.1101/2020.04.12.20059618v1).
2. Boston, Seattle, San Francisco and Atlanta, United States[24]: Mosites et al. reported on the incidence of COVID19 at 19 different homeless shelters in 4 different cities, including the Boston shelter mentioned above. They conducted RT-PCR testing of all shelter residents and staff, regardless of symptoms, over 1-2 weeks from the end of March to mid-April. 1,192 residents and 313 staff members were tested. If testing was initiated after 2 or more cases had been diagnosed in the prior 2 week, between 17-66% of residents and 16-30% of staff were positive. If the testing was initiated after 1 case, 4% of residents and 1% of staff were positive. And if no cases had been diagnosed in the prior 2 weeks, 4% of residents and 2% of staff were positive. The limitation of this case series was that symptoms were not routinely recorded at all sites and that there was variable community-level COVID-19 incidence in the different cities. Nevertheless, the authors suggest that testing of residents/staff regardless of symptoms should follow identification of clusters and even suggest that pro-active surveillance testing (prior to the identification of cases) may be beneficial (https://www.cdc.gov/mmwr/volumes/69/wr/mm6917e1.htm)

Call center:

1. Seoul, South Korea[25]: After an outbreak was declared in a building housing a call-center, investigators closed the building and began testing all occupants of the building, regardless of symptoms, with RT-PCR (with a turn-around time of 12-14 hours). All positive-cases were isolated and all negative cases were quarantined. All contacts of the positive cases, regardless of symptoms, were also tested. Out of ~1100 people tested, 97 were positive. 4 were pre-symptomatic cases and 4 were asymptomatic. The secondary attack rate of household contacts of symptomatic patients was 16% whereas it was 0 for the pre-symptomatic and asymptomatic cases. The low secondary attack rate of household contacts of non-symptomatic patients could be due to early diagnosis and therefore early isolation from household contacts. An alternate hypothesis is that these findings suggest lack of infectiousness of non-symptomatic patients; however, the authors suggest that their findings may not reflect the true transmissibility potential of pre-symptomatic and asymptomatic individuals, due to the extent of isolation/self-quarantine that was in place even prior testing began.

Community-based vs symptom-based screening strategies:

1. **Veneto and Lombardy, Italy[26]:** In this study (pre-print), the authors compare the approaches taken by two different regions in Italy who initially had near simultaneous outbreaks. In Veneto, a community-based testing approach (including testing of asymptomatic individuals) was undertaken. By contrast, in Lombardy, testing was primarily based on presentation to care. At the time of analysis, there were ~2.3 times more cases in Lombardy and the mortality rate was ~7.5 times higher. While this study is not looking at one particular outbreak setting, it points to the possibility that identifying asymptomatic individuals may breaks transmission chains upstream (early on). The main limitation of this study is that in addition to differences in testing, there were other interventions that differed between the regions.

While the extent to which asymptomatic and pre-symptomatic cases are contributing to COVID-19 transmission is still unknown, several groups have found similar viral loads among asymptomatic and symptomatic patients[15,27,28], some have hypothesized that infectiousness could peak with the onset of symptoms (or just before)[29], and the latest findings confirm the presence of viable (culturable) virus from pre-symptomatic and asymptomatic individuals[15]. Taken together, these cases suggest that in an outbreak setting, reliance on symptom-guided testing is potentially inadequate and may result in cases with relevant transmission potential from going undetected.

Date question received by advisory group: April 19, 2020

Date report submitted to committee: April 24, 2020

Date of first assessment: April 29, 2020

(If applicable) Date of re-assessment:

Authorship and Committee Members

This report was written by Leyla Asadi and scientifically reviewed by Alexander Doroshenko, Albert De Villiers (external reviewer), Andrew McRae, and Ranjani Somayaji (external reviewer) with final review by Lynora Saxinger (co-chair), Braden Manns (co-chair). The full Scientific Advisory Group was involved in discussion and revision of the document: John Conly, Shelley Duggan, Nelson Lee, Elizabeth MacKay, Andrew McRae, Jeremy Slobodan, James Talbot, Brandie Walker, and Nathan Zelyas.

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Appendix

List of Abbreviations

AHS: Alberta Health Services

COVID-19: Coronavirus Disease-2019

SAG: Scientific Advisory Group

KRS: Knowledge Resource Services

HCW: Health care worker

LTC: Long term care facility

PPE: Personal protective equipment

Literature Search Details

A literature search was conducted by Rachel Zhao from the Knowledge Resource Services (KRS) within the Knowledge Management Department of Alberta Health Services. KRS searched databases for articles published from 1946 to April 20, 2020, and was conducted in OVID MEDLINE, LitCovid, PubMed, TRIP PRO, WHO COVID-19 Database, BMJ Best practice, Centre for Evidence Based Medicine (CEBM), National Collaborating Centre for Methods and Tools, European Centre for Disease Prevention and Control (ECDC), CADTH, Cambridge Coronavirus Free Access Collection, EBSCO COVID-19 Information Portal, National Institute for Health and Care Excellence, medRxiv, Google and Google Scholar. The citation tracking method was also applied in Google Scholar.

Briefly, the search strategy involved combinations of keywords and subject headings including:

(residential facilities[MeSH Terms] or assisted living facilities[MeSH Terms] or group homes[MeSH Terms] homes for the aged[MeSH Terms] or nursing homes[MeSH Terms] intermediate care facilities[MeSH Terms] or skilled nursing facilities[MeSH Terms] or residential facilit*[Title/Abstract] or assisted living facilit*[Title/Abstract] or group home*[Title/Abstract] or halfway house*[Title/Abstract] or home* for the aged[Title/Abstract] or old age home*[Title/Abstract] or nursing home*[Title/Abstract] or intermediate care facilit*[Title/Abstract] or cruise ship*[Title/Abstract]) AND (((wuhan[tw] AND (coronavirus[tw] OR corona virus[tw])) OR coronavirus*[ti] OR COVID*[tw] OR nCov[tw] OR 2019 ncov[tw] OR novel coronavirus[tw] OR novel corona virus[tw] OR covid-19[tw] OR SARS-COV-2[tw] OR Severe Acute Respiratory Syndrome Coronavirus 2[tw] OR coronavirus disease 2019[tw] OR corona virus disease 2019[tw] OR new coronavirus[tw] OR new corona virus[tw] OR new coronaviruses[all] OR novel coronaviruses[all] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[nm] OR 2019 ncov[tw] OR nCov 2019[tw] OR SARS Coronavirus 2[all]) AND (2019/12[dp]:2020[dp]))

Critical Appraisal

Critical appraisal was conducted using an adapted Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). References were evaluated on three criteria: 1) Peer reviewed or from a reputable source; 2) Clear research question or issue; 3) Whether the presented data/evidence is appropriate to address the research question. This modified MMAT method allows for a quick appraisal of the evidence and provides a yes/no decision for inclusion based on quality. However, it does not provide a ranking of the studies or detailed analysis of the aspects of quality. The table below summarizes the results of the critical appraisal and includes sources flagged by SAG members as receiving public attention or determined by the writer/reviewers to be relevant to the question.

Hong, Quan Nha et al. (2018). The Mixed Methods Appraisal Tool (MMAT) Version 2018 for Information Professionals and Researchers'. 1 Jan. 2018 : 285 – 291. Retrieved from: http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf

Table 2. Summary of quality assessment results for articles included in this review

	Reference	Quality Appraisal Criteria
1.	World Health Organization. COVID-19 and food safety: Guidance for food businesses. https://apps.who.int/iris/bitstream/handle/10665/331705/WHO-2019-nCoV-Food_Safety-2020.1-eng.pdf. Updated 2020.	1) ☐ Peer-reviewed: <specify study type> ☒ Not peer-reviewed ☐ Commentary, opinion, editorial, preprint ☒ Guideline:<WHO> (AHS, PHAC, WHO, Reputable research group, other) ☐ Other: <specify> 2a) Are there clear research questions or a clearly identified issue? ☒ Yes | ☐ No (discard) 2b) Is the collected data or presented evidence (incl. expert opinion) appropriate to address the research questions or issue? ☒ Yes | ☐ No (discard)
2.	World Health Organization. Infection prevention and control guidance for long-term care facilities in the context of COVID-19. 2020	1) ☐ Peer-reviewed: <specify study type> ☐ Not peer-reviewed ☐ Commentary, opinion, editorial, preprint ☒ Guideline: <WHO > (AHS, PHAC, WHO, Reputable research group, other) ☐ Other: <specify> 2a) Are there clear research questions or a clearly identified issue? ☒ Yes | ☐ No (discard) 2b) Is the collected data or presented evidence (incl. expert opinion) appropriate to address the research questions or issue?

		☒ Yes | ☐ No (discard)
3	7. European Center for Disease Prevention and Control. Disinfection of environments in healthcare and nonhealthcare settings potentially contaminated with SARS-CoV-2. 2020. https://www.ecdc.europa.eu/sites/default/files/documents/Environmental-persistence-of-SARS_CoV_2-virus-Options-for-cleaning2020-03-26_0.pdf.	1) ☐ Peer-reviewed: <specify study type> ☐ Not peer-reviewed ☐ Commentary, opinion, editorial, preprint ☒ Guideline: <ECDC > (AHS, PHAC, WHO, Reputable research group, other) ☐ Other: <specify> 2a) Are there clear research questions or a clearly identified issue? ☒ Yes | ☐ No (discard) 2b) Is the collected data or presented evidence (incl. expert opinion) appropriate to address the research questions or issue? ☒ Yes | ☐ No (discard)
4	Mosites E, Parker EM, Clarke KE, et al. Assessment of SARS-CoV-2 infection prevalence in homeless shelters — four U.S. cities, march 27–April 15, 2020. *MMWR Morb Mortal Wkly Rep.* 2020. http://dx.doi.org/10.15585/mmwr.mm6917e1.	) ☒ Peer-reviewed: <case series> ☐ Not peer-reviewed ☐ Commentary, opinion, editorial, preprint ☒ Guideline: <ECDC > (AHS, PHAC, WHO, Reputable research group, other) ☐ Other: <specify> 2a) Are there clear research questions or a clearly identified issue? ☒ Yes | ☐ No (discard) 2b) Is the collected data or presented evidence (incl. expert opinion) appropriate to address the research questions or issue? ☒ Yes | ☐ No (discard)
5	Dietz L, Horve PF, Coil DA, Fretz M, Eisen JA, Van Den Wymelenberg K. 2019 novel coronavirus (COVID-19) pandemic: Built environment considerations to reduce transmission. *mSystems*. 2020;5(2).	☒ Peer-reviewed: <review article> ☐ Not peer-reviewed

	https://www.ncbi.nlm.nih.gov/pubmed/32265315. doi: 10.1128/mSystems.00245-20.	☐ Commentary, opinion, editorial, preprint ☐ Guideline: <ECDC > (AHS, PHAC, WHO, Reputable research group, other) ☐ Other: <specify> 2a) Are there clear research questions or a clearly identified issue? ☒ Yes | ☐ No (discard) 2b) Is the collected data or presented evidence (incl. expert opinion) appropriate to address the research questions or issue? ☒ Yes | ☐ No (discard)
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APPENDIX

From: Stability of SARS-CoV-2 in different environmental conditions

https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(20)30003-3/fulltext#sec1

C) Disinfectants*

Disinfectant (Working concentration)	Virus titre (Log $TCID_{50}$/mL) 5 mins	15 mins	30 mins
Household bleach (1:49)	U	U	U
Household bleach (1:99)	U	U	U
Hand soap solution (1:49)	3.6#	U	U
Ethanol (70%)	U	U	U
Povidone-iodine (7.5%)	U	U	U
Chloroxylenol (0.05%)	U	U	U
Chlorhexidine (0.05%)	U	U	U
Benzalkonium chloride (0.1%)	U	U	U

D) pH*

pH (60 mins)	Virus titre (Log $TCID_{50}$/mL) Mean	±SD
3	5.55	0.25
4	5.67	0.36
5	5.73	0.04
6	5.75	0.08
7	5.58	0.22
8	5.70	0.14
9	5.54	0.44
10	5.51	0.11

* All the virus titres were titrated using Vero-E6 cells. All experimental studies were done in three independent triplicates. Detection limit of a typical $TCID_{50}$ assay is 100 $TCID_{50}$/mL, except reactions containing hand soap/chloroxylenol (detection limit: 10^3 $TCID_{50}$/mL) or reactions containing povidone-iodine/cholorhexidin/benzalkonium chloride; detection limit: 10^4 $TCID_{50}$/mL) because of their cytotoxic effects. N.D.: not done, U: undetectable.

Only one of the triplicate reactions was positive in the $TCID_{50}$ assay.