

COVID-19 Scientific Advisory Group Rapid Response Report

Key Research Questions:

In the context of an established site based COVID19 outbreak:

Is there evidence that centralized voluntary isolation/quarantine centers (CVICs) reduce transmission and spread?

1. Which individuals affected by the outbreak should receive laboratory testing for COVID-19, and should be recommended for voluntary centralized quarantine if isolation centres (hotels, student housing or boarding school sites, other public buildings) were available,?
 - a. Lab-confirmed cases
 - b. Symptomatic household contacts with COVID test pending or negative
 - c. Asymptomatic household contacts
2. When can affected workers (including those who tested positive, household contacts to cases, and those who were never affected) safely return to work? Is there a role for testing in these groups?

Context

- Large outbreaks have occurred in Alberta associated with situations of high vulnerability in closed settings, for example beef and poultry processing plants, oil sands worker camps, as well as long-term care homes
- Outbreaks in specific locations are often multifactorial in nature, with contributing factors from outside of the workplace, and require a One Health approach for investigation and control.
- WHO indicates that one of the critical pieces that must be in place before community wide restrictions can be modified is that outbreak risks are minimized in special settings like health facilities and nursing homes' (World Health Organization, 2020a)
- Quarantine refers to the restriction of activities of a person who is not ill but had possible exposure to a disease, allowing early and rapid detection of disease.
- Isolation refers to restriction of activities of an ill person, to prevent transmission of disease.
- All of these recommendations must also be applied in conjunction with other outbreak management strategies such as symptom-based screening, physical distancing, rigor; as well as recommendations on PPE and cleaning and disinfection. Please see the SAG Rapid Review on the outbreak strategies.

Key Messages from the Evidence Summary

- Recommendations and practical guidelines can be set for use of centralized, voluntary quarantine/isolation centres and diagnostic testing and quarantine/isolation strategies needed for these centres based on indirect evidence. Strategies have to be balanced with costs, and resource availability.
- There are limited high quality studies on the effect of voluntary quarantine/isolation centers in localized outbreak situations, however, there are a number of high quality peer-reviewed studies that investigate the effect of quarantine/isolation along with other public health interventions at the population level. A cohort study by Pan et al. (2020) found that effect of a suite of public health interventions, including home quarantine, centralized quarantine/isolation, and social distancing, were temporally associated with improved control of the COVID-19 outbreak in Wuhan.
- The scientific rationale for testing, quarantine and isolation of individuals associated within outbreaks, their contacts and household members is based on the risk of transmission from symptomatic or asymptomatic individuals and within- and between- household transmission dynamics.

- There are some significant gaps in our knowledge that make it difficult to make definitive recommendations, including gaps related to our understanding of asymptomatic transmission, shedding of cultivatable virus, role of serologic testing and likelihood of protective immunity, and the duration of immunity post infection.
- Practical guidelines for return to work (RTW) can also be developed recognizing again that there are key gaps in our knowledge with respect to infectious period and non-viable virus shedding.

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](#)), and the lack of high quality studies examining the impact of the independent effect of quarantine/isolation, there was consensus about the pragmatic recommendations presented below. There was general consensus that for patients who are unable to effectively isolate in their current living situation, that the use of a voluntary quarantine / isolation centers should be considered. 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 recommendations on where use of medical masks was recommended (and for whom). It was noted that a comprehensive testing strategy could be used to guide placement within a voluntary quarantine / isolation center, but there may be testing constraints based on procurement of laboratory supplies. Therefore, some priorities for who should be tested are provided. The committee highlighted two relevant documents addressing additional strategies to consider in the context of an outbreak including [medical mask use](#) and a review on [testing strategies for people without symptoms](#) in the context of an outbreak.

Recommendations

1. Based on limited evidence, centralized voluntary quarantine centres are recommended for use in Alberta as an outbreak control measure for specific groups of cases and contacts where home isolation or quarantine is likely to be suboptimal and AHS recommendations for self-isolation are not feasible.
2. If there are no constraints on laboratory testing capacity, we recommend that all individuals associated with an outbreak of COVID-19 should be tested regardless of symptoms to inform how individuals are placed within voluntary centralized isolation/quarantine centres. Further information on testing strategies within an outbreak can be found [here](#).
3. If laboratory testing is constrained, then we recommend prioritizing individuals involved in an outbreak for testing as follows: close contacts with symptoms, and close contacts who are at high risk for developing complications if they develop COVID-19 (eg: >70 years old, heart disease, hypertension, lung disease, diabetes, cancer, or people with weakened immune systems from a medical condition or treatment, such as chemotherapy). Individuals will still be identified for isolation and quarantine, and daily clinical followup in CVIC or household settings based on their individual risk assessment regardless of testing.
4. It is recommended that return to work (RTW) guidelines for persons involved in workplace outbreaks align with the AHS guidelines for RTW for HCW (Alberta Health Services, 2020).

Practical Guidance regarding Question 1: Quarantine Centers

1. Centralized voluntary isolation/quarantine centers should be used in Alberta for specific groups of cases and contacts where home isolation or quarantine is likely to be suboptimal and AHS recommendations for self-isolation is not feasible. An example of this would be people who live in large, crowded households where adequate space is not available to follow isolation or quarantine guidelines (Government of Alberta, 2020).
2. Based on a study during the H1N1 pandemic, positive cases should be isolated in private rooms with private bathrooms in an isolation building or area, separate from the quarantine area. Quarantine rooms could cohort more than one known negative contact in the room if necessary or desired (e.g. family members). If one of the individuals becomes positive, that person would need to move into isolation and the other person's quarantine period would restart at 14 days from their last exposure to the positive person (Chen et al, 2010).

Practical Guidance regarding Question 2: Lab Testing and Quarantine

1. If people cannot appropriately isolate/quarantine at home, they should be encouraged to move into the centralized, voluntary quarantine facility. Families should not be split up and children and/or elderly family members may need to cohort with parents/support people.
2. Symptomatic cases should be placed into isolation while awaiting results.
3. All test positive cases need to be isolated as they represent the highest transmission risk, while transmission from asymptomatic test positive cases is likely but cannot be precisely quantified (Arons et al 2020).
4. It is reasonable to use an isolation period during outbreaks of 14 days (or until symptom resolution, whichever is longest) rather than 10 days (or until symptom resolution, whichever is longest) as usually recommended in Alberta (Government of Alberta, 2020). As the exact length of the infectious period (live virus is shedding) with SARS-CoV-2 is not clear, but reported to exceed 7-8 days (Wölfel et al, 2020, Arons et al 2020), extending the duration of isolation period or transmission-based precautions if a non-test based strategy is used would be prudent. This 14-day isolation period will align with the RTW strategy for HCW (Alberta Health Services, 2020).
5. Symptomatic test-negative cases should be isolated, in a different area of the facility from the COVID-19 positive cases, based on low but unknown false negative rate (APL memo, 2020) and repeat testing can be considered based on the assessed likelihood of COVID-19.
6. Quarantine of exposed contacts must include active daily monitoring (including monitoring of those within the CVIC) for symptom development.
7. The recommended quarantine period for close contacts is 14 days. This is based on a typical incubation period for COVID-19 of 5 days, with 99% of infected contacts developing symptoms by 14 days.
8. Evidence suggests that household contacts of positive COVID-19 cases are potentially the highest priority for quarantine, because the incidence rate among household contacts, in most studies is around 10%.

Practical Guidance regarding Question 3: RTW, specifically in the setting of work-associated outbreaks

1. Return to work (RTW) guidelines for all workers should be aligned with the AHS Health Care Worker recommendations requiring workers to wait 14 days after their symptom onset or until symptoms resolve whichever is longest. For asymptomatic individuals who test positive (and who remain asymptomatic), the 14 day period will start from the date of positive test. There is no testing protocol required before RTW (Alberta Health Services, 2020).
2. Testing protocols for RTW are not recommended because the RT-PCR positive test does not equate with live virus; this test may be identifying non-viable virus or viral fragments. Moreover, a negative test in someone who might have (knowingly or unknowingly) been in contact with a case does not mean the person will not develop symptoms over the coming days.

Research Gaps

- While the impact of self-isolation and quarantine on reducing transmission is clear, the effectiveness of CVICs specifically in reducing disease transmission, and improving outbreak control is not clear.
- The willingness of people to use centralized isolation/quarantine centers, when they are voluntary, is not clear.
- The impact of testing all individuals associated with an outbreak of COVID-19 regardless of symptoms on outbreak control is not established, but stands to improve our understanding of the epidemiology of an outbreak (specifically a better understanding of the role of transmission from symptomatic and asymptomatic source cases) and can guide management of current and future outbreaks. It is hypothesized that broad-based testing of all individuals during outbreaks including asymptomatic individuals would identify those who may be infectious without knowing it and break chains of transmission upstream thus reducing future hospitalization and deaths

Summary of Evidence

Peer-reviewed and published literature was used whenever available. Guidelines were found in the grey literature, associated with country and organizational websites. There are limited references looking at specific outbreaks of COVID-19, although many publications investigate quarantine along with other public health mitigations at the population level. There is an overall lack of adequate high-quality evidence with respect to live virus shedding and testing of asymptomatic people. Much of the evidence is available as preprint, which has not been subject to peer review, is published as correspondence not subject to peer review, or are observational studies, with lower rigor than formal epidemiological studies.

Evidence from the literature

Research Question 1: Quarantine Centres

Review of the primary literature:

There is some indirect evidence suggesting quarantine and/or quarantine centers contribute to the slowing of outbreaks. In a cohort study looking at over 32,000 laboratory confirmed cases covid-19 in Wuhan, public health interventions (including home confinement, centralized quarantine, traffic control, social distancing, universal symptom survey, and cordon sanitaire) were temporally associated with improving control of the outbreak as assessed by a decreasing effective reproductive number, decreasing numbers of new cases, across different age, sex and geographic regions, with the authors noting that centralized quarantine of patients and close contacts appears to have been associated with a reduction in in-hospital, household, and community transmission. (Pan et al, 2020). In addition, a Cochrane Review by Nussbaumer-Streit et al. (2020) of 29 diverse studies on the effects of quarantine alone or in combination with other measures to control COVID-19 was completed as a narrative synthesis. Meta-analysis was impossible due to the type of evidence available. The certainty of evidence is described as low to very low, but this is the only review of its type on this subject and is worth examining. The authors concluded that the current evidence indicates a consistent benefit of quarantine measures. Limitations include the quality of the evidence and the methodology used. The strongest evidence was from 10 modelling papers. Most of the papers in the review involved some modeling, and assumptions varied greatly between them. However, quarantine of contacts that were exposed to confirmed or probable cases consistently prevented 44-81% of new cases and 31-51% of deaths, compared to no measures. Implementing effective quarantine early and in conjunction with other strategies like school closure and social distancing was beneficial. Results were similar between the SARS or MERS papers and the COVID-19 papers (Nussbaumer-Streit et al, 2020). A recently posted preprint, Binkin et al. (2020) compared two approaches in controlling COVID-19 outbreaks and early outcomes in Lombardy and Veneto regions of Italy, 2020. The community-based approach in Veneto was associated with substantially reduced rates of cases, hospitalizations, and deaths compared with the patient-centered approach in Lombardy. The cumulative case rate was 445/100,000 for Lombardy and 196/100,000 for Veneto, a 2.3-fold difference. Mortality rates were 75/100,000 and 10/100,000, respectively, a 7.5-fold difference. The death-to-case ratio was 3.3 times higher in Lombardy than in Veneto (17% versus 5%). Key elements of the community-based strategy employed in Veneto included extensive contact tracing, rapid testing of both cases and an extended network of contacts and supervised quarantine and isolation among other interventions (Binkin et al., 2020).

Understanding patterns of disease transmission and effective contact tracing are other important part of outbreak management and helps drive quarantine effectiveness. Contact tracing was a critical part of outbreak management in Singapore, where cases were rapidly identified and isolated. Their close contacts, defined in various degrees, were quarantined and actively monitored. This aggressive approach is thought to have helped suppress their outbreak (Ng, 2020). This level of interaction, the non-voluntary nature of it, and cost of the interventions maybe difficult to carry out in Alberta. Kucharski et al. (2020) model contact tracing data within and between households involving 40,000 individuals in the UK. Parameters are calculated from the data and used to investigate individual level transmission in four settings with a range of interventions. The authors suggest, in the

preprint, that the model suggests high levels of case isolation, effective contact tracing will be required and that when combined with physical distancing these measures can suppress secondary transmission and the effective reproduction number below one to control the outbreak. The authors acknowledge that these scenarios do not consider super spreader events or the effect of mass gatherings, however, results are still within the upper range of other empirical models (Kucharski et al, 2020). Further calculation of secondary attack rates is discussed in correspondence in *The Lancet*, where data from nine localized outbreaks is used to estimate secondary infections occur among 35% (95% CI: 74-44) of the close contacts of the 137 cases. The relationship between the basic reproductive number (R_0) and the secondary attack rates (SAR) within the household and within the community is described. It is hypothesized that calculating within and between household SARs and R_0 could be used to better understand where the transmission risk lies (Liu et al., 2020). More work is needed in this area.

The built environment of proposed quarantine centres is also important. There will be cases in isolation during their recovery as well as contacts in quarantine being actively monitored for symptoms of disease. These groups (known infected and monitored contacts) should be physically separated perhaps in different wings or areas of the building. From the H1N1 literature, H1N1 virus-negative contacts that were quarantined during the pandemic, were more likely to become infected if they shared a room or bathroom with a virus positive case. There was no increased risk of disease if the H1N1 negative contact was quarantined alone in a room or cohorted with a virus-negative contact in one room (Chen et al., 2010). Lastly, detailed description of the centralized quarantine facilities in China are available if desired (Zhi, 2020). These may be of interest but of less relevance in the Canadian situation.

Review of the grey literature:

Alberta guidelines indicate that a person who is in isolation should ideally have their own room and toilet so they can stay isolated from other household members (Government of Alberta, 2020). Good hygiene, cleaning of shared surfaces and the ability to remain physically distance from other people in the household are other key requirements (Government of Alberta, 2020). In comparison, quarantine/isolation facilities in Iceland are available through the health authority for people who cannot isolate themselves (Embaetti landlaeknis Directorate of Health, 2020). The Red Cross in Iceland will deliver supplies to isolated/quarantined households if they are otherwise unable to attain these (Embaetti landlaeknis Directorate of Health, 2020). The WHO has also made recommendations about quarantine facilities (World Health Organization, 2020b).

Research Question 2: Lab Testing and Quarantine

From the primary literature:

The context of this question is that there appears to be community spread of SARS-Cov-2 arising from large workplace outbreaks, potentially exacerbated by crowded housing situations which make it difficult to adhere to recommended self-isolation practices. The scientific rationale for testing individuals associated with outbreaks, their contacts and household members is based on how likely transmission occurs from symptomatic or asymptomatic individuals and within- and outside- of household transmission dynamics. Existing data on household transmission risk, particularly from asymptomatic persons, was reviewed. In a preprint by Luo et al (2020), 2950 contacts of 347 cases were placed in 14 days of quarantine in an observational study, with RTPCR monitoring every 2 days. There were 129 secondary cases within the contacts. Of the contacts, 0.2% developed asymptomatic infection, and 2.4% developed symptomatic infection. In this paper, older contacts had increased risk of infection (1.8% in <18y through 4.2% in 60+ years.) Seventy percent of the contacts were in household setting and 10.2% acquired COVID-19, with healthcare contact risk of 1.0% and public transport risk at 0.1%. Source case severity of infection also affected risk (0.03% risk to contacts of asymptomatic through 6.2% from severe.). However, there were inconsistencies reported in the numbers of source cases and contacts based on which these numbers were calculated. In an accepted study by Li et al. (2020) assessing 392 household contacts of 105 index cases, secondary transmission of COVID-19 occurred to 16% of household contacts who had

contact between onset of symptoms and hospitalization of the index case. In these circumstances, there was higher transmission to spouse contacts (28%). Importantly there was no secondary transmission to contacts if the index case was isolated alone from the time on symptom onset (Li et al, 2020). The Korean CDC reported the contact tracing of 2370 contacts of the first 30 symptomatic cases: 9 of 119 (7,56%) of household contacts were infected, and transmission from asymptomatic cases was not studied. Transmission in a non-household setting was also described. Hodcroft et al. (2020), described the setting in a ski resort where an asymptomatic or nearly asymptomatic index case may have transmitted the infection to 13 people. This cluster raised concerns about the feasibility of containing the spread of SARS-CoV-2 using infection control measures associated with identification of symptoms. In recent paper published in the NEJM, Arons et al. (2020), reported an outbreak of COVID-19 in a long term care facility where 65% of resident tested positive and 56% of them were asymptomatic at the time of testing with approximately half being re-classified as pre-symptomatic in the next 4 days. In addition to positive RT PCR among 24 presymptomatic residents, 17 residents had viable virus recovered by culture. The authors concluded that infection control strategies focused on symptomatic residents failed to prevent transmission during this outbreak. In the recently posted pre-print, Binkin et al. (2020), compared two approaches in controlling COVID-19 outbreaks and early outcomes in Lombardy and Veneto regions of Italy, 2020. The community-based approach in Veneto was associated with substantially reduced rates of cases, hospitalizations, deaths compared with the patient-centered approach in Lombardy. Community-based interventions employed in Veneto region included extensive testing of symptomatic and asymptomatic cases with rapid laboratory turnaround and broad contact tracing around test-positive cases, including extended family, work, and more casual contacts (e.g., at meetings >15 minutes). There is a growing number of research publications identifying substantial percentage of asymptomatic individuals who tested positive for COVID-19 in many settings where outbreaks could occur (e.g., LTCF, homeless shelters, battleship). Please refer to SAG review on asymptomatic testing and managing outbreaks for full list of references. It is plausible that SARS-CoV-2 can be transmitted when patients are asymptomatic, pre-symptomatic, or mildly symptomatic (potentially from 2.5 days prior to onset of symptoms), based on the finding that RT-PCR levels are high early in infection. This is the basis for recommendations of contact tracing to go back 48 hours prior to symptom onset (Government of Alberta, 2020). Asymptomatic people who test positive are not necessarily infectious as it is unknown where they are in the course of disease; they can be treated as if the test date is Day 1 of the infectious period. Virus isolation to confirm live virus shedding is neither rapid nor practical in this situation (Wölfel et al, 2020). Also, modeling studies indicated that the effectiveness of case isolation can be reduced if there was presymptomatic transmission (Hellewell et al 2020).

Live virus shedding/infectiousness period: There is limited information on the period of infectiousness, but live virus shedding was found during the first 8 days of infection. This is the basis for the recommendation of a 10 day isolation period after a person becomes symptomatic, or until symptoms disappear, whichever is longer. RT-PCR can be positive long after 8 days and should not be considered a proxy for shedding of live virus. Wölfel et al. (2020) is the strongest evidence, with the rest being case studies, in a small number of symptomatic, young, healthy professionals with no other comorbidities. Wölfel et al (2020) indicate that “based on the present findings, early discharge with ensuing home isolation could be chosen for patients who are beyond day 10 of symptoms with less than 100,000 viral RNA copies per ml of sputum. Both criteria predict that there is little residual risk of infectivity, based on cell culture.” A recent published case series looked at 12 cases which had virus isolation performed inconsistently. There was one case where the test was performed on Day 9 and it was positive. No virus isolation was done later in the course of disease (Kujawski et al, 2020). Based on these data a longer isolation period can be considered (14 days) in people returning to higher risk settings.

Incubation Period and quarantine: The typical incubation period for COVID-19 is 5 days with 99% of persons who will develop symptoms becoming symptomatic by 14 days. The quarantine period for contacts is based on this 14 day incubation period. The most conclusive article is by Lauer et al. (2020), which estimates the median incubation period at 5.1 days (95% CI, 4.5 to 5.8 days), and indicates that 97.5% of those who develop symptoms will do so within 11.5 days (CI, 8.2 to 15.6 days) of infection. This suggests that 99% will develop symptoms by 14

days post exposure (Lauer et al., 2020). This does mean that a very small proportion of cases may have an incubation period longer than the 14 day quarantine period.

From the grey literature

In Alberta, persons who have returned from travel outside of Canada, or have been in close contact with a COVID-19 case must be quarantined for 14 days following return/exposure and monitor for symptoms (Government of Alberta, 2020). In Alberta, persons with symptoms of fever $>38^{\circ}\text{C}$, new onset (or exacerbation of chronic) cough, shortness of breath, difficulty breathing, sore throat or runny nose must isolate for 10 days from onset of symptoms or until symptoms resolve, whichever takes longer (Government of Alberta, 2020). These current Alberta guidelines document also indicate that cases who were in an isolation centre (not hospitalized) must be isolated at least 10 days from symptom onset or until symptoms have resolved, whichever is longer, before returning to a group setting like long-term care home or shelter (Government of Alberta, 2020). If discharged to long-term care facilities/continuing care/group homes/shelters after hospitalization before the isolation period is complete, the patient must continue isolation for 14 days from onset of symptoms or until symptoms have resolved, whichever is longer. The extended duration is an extra precaution because the person was ill enough to require hospitalization, and is returning to a setting with vulnerable people (Government of Alberta, 2020). BCCDC (2020) has similar guidelines to Alberta with a 10 day isolation from symptom onset or until symptoms are resolved but also has further qualifications for release from isolation, to ensure that symptoms have resolved, specifying that fever must have resolved without use of fever-reducing medication, and respiratory, gastrointestinal, and systemic symptoms have improved. If using a test based strategy, the resolution of fever and improvement in symptoms as described above is assessed in combination with 2 negative RT-PCR tests on nasopharyngeal swabs collected at least 24h apart (British Columbia Centre for Disease Control, 2020).

In addition, the period of communicability used for contact tracing is 48 hours prior to onset of symptoms in the case or while the confirmed/probable case was symptomatic. When managing asymptomatic cases, the period of communicability is defined as 48 hours prior to specimen collection to 10 days after specimen collection (Government of Alberta, 2020). Close contacts are defined as someone who did not have appropriate PPE and who live with the case or who had close contact with the case within two metres for over 15 minutes, or who had contact with infectious body fluids, or is a caregiver or health care worker for the case (Government of Alberta, 2020). The BCCDC further divides these close contacts by risk group. High risk are close contacts that lived in the household had face-to-face contact within 2 metres for over 15 minutes or provided care or had contact with infectious bodily fluids without use of PPE. Medium-risk are defined as contacts not within 2 metre or wore PPE or returning international travellers. Lastly low/no risk are those who were briefly in the same room walked by an infectious person (British Columbia Centre for Disease Control, 2020). CDC also discusses that HCW are considered essential staff and they may be able to continue to work after a low-risk exposure in some situations while self-monitoring and using proper PPE. High risk exposure would include close contact with a SARS-CoV-2 positive person in the community during care (without PPE), or contacting bodily fluids with PPE (Center for Disease Prevention and Control, 2020),

In Iceland, the isolation period is maintained for fourteen days after a positive test result and seven days with no symptoms. A telephone interview with a member of the centralized physician team is required to lift the isolation (Embaetti landlaeknis Directorate of Health, 2020). For household members in quarantine, the quarantine can't be lifted until 14 days has passed since the last exposure. If the case, including direct touch, close proximity within 2 metres for at least 15 minutes, or sharing a bathroom, Individuals ideally are separately released from quarantine or all must stay in quarantine until 14 days after the last possible transmission. Iceland is also using a mobile tracing app, with double consent (double opt-in by both data collection and data sharing stages), to help with contact tracing (Embaetti landlaeknis Directorate of Health, 2020).

The UK guidelines has separate recommendations for ending isolation based on whether the symptomatic person lives alone or with others in the household. If living alone, isolation can be ended seven days after symptom onset

if the person does not have a high fever and is feeling better. A cough alone is not considered enough concern to continue isolation; however, if a fever persists, they are asked to continue isolation until it resolves. If the case lives with others, a 14 day household-isolation protocol starts at the day of symptom onset in the first person to become ill. That person can end their isolation after 7 days based on the above guidelines, but the remaining household members should continue in isolation for an additional 7 days (14 days total). If another family member becomes ill during the 14-day household isolation period, they should also isolate for 7 days after the onset of their symptoms as above. The 14 day household isolation does not need to be extended for those who are still asymptomatic (Public Health England, 2020). WHO guidelines also recommend that contacts be quarantined and monitored for at least 14 days from the last exposure (World Health Organization, 2020b)

Research Question 3: Return to Work (RTW)

Evidence from the Primary Literature:

To understand if RT-PCR testing strategies should be used in RTW decisions, it is important to the duration of viral RNA shedding detectable by RTPCR. An RT-PCR positive test does not equate with live virus; this test may be identifying non-viable virus or viral fragments. There are a number of peer-reviewed, mostly retrospective, studies as well as a number of case studies describing viral shedding identified by RT-PCR. For example, in two peer reviewed retrospective studies of 113 and 301 hospitalized Chinese patients the median duration of shedding was 17 days from symptom onset (IQR 13-22) (Xu et al., 2020); and 20 days (IQR, 17-24) respectively (Zhou et al, 2020) . In 191 hospitalized Chinese patients, the median length of the period from symptoms onset to negative RT-PCR test was also 20 days (IQR, 17-24) (Xiao et al., 2020). All three studies used archived serial samples for their analysis. Xiao et al (2020) describe all their cases as mild to moderate, while the other studies had cases with a range of disease severity. Hospitalized patients are likely more severely affected than non-hospitalized patients and Xu et al (2020) suggest that more severe disease was associated with longer viral shedding. Other potential limitations of both studies are confounders associated with, case identification, treatments received, and other testing and case management differences.

Relevant grey literature:

Alberta Health Services testing policy includes any HCW presenting with the main symptoms of COVID-19 - fever, cough, shortness of breath, difficulty breathing, sore throat, or a runny nose, but not those feeling unwell but not demonstrating these symptoms (Alberta Health Services, 2020). The HCW must isolate for 10 days after symptoms onset or until symptoms resolve (whichever is longer), but the HCW must not return to work until 14 days after symptom onset and symptoms are resolved, whichever is longer. If the HCW has close contact with a COVID-positive or a person with acute respiratory illness (without appropriate PPE) they must quarantine for 14 days while monitoring for symptoms. They must also quarantine and monitor for symptoms after return from travel outside Canada or following laboratory exposure to COVID-19 virus (AHS, 2020). If an HCW was tested but the test is negative and they have no travel exposure in the last 2 weeks, they can stop their isolation when symptoms resolve. There is no provision for testing of HCW prior to RTW (Alberta Health Services, 2020).

The CDC guidelines are similar in terms of length of self-isolation but differ from the AHS recommendations in several ways. From their website, CDC recommends RTW decisions based on a test-based strategy, in which HCW are excluded from work until there is fever resolution (without using fever-reducing medications), and improvement in respiratory symptoms (cough, shortness of breath), and the individual demonstrate negative results on at least two consecutive COVID-19 swab specimens collected more than 24 hours apart (Centre for Disease Control and Prevention, 2020). CDC recommends this test-based strategy for HCWs who have prolonged symptoms or have underlying medical conditions that could contribute to prolonged viral shedding (Centre for Disease Control and Prevention, 2020). If testing is unavailable, CDC recommends a non-test based strategy where at least 72 hours have passed since fever resolution (without using fever-reducing medications) and respiratory symptoms improvement as above, and at least 7 days have passed since symptom onset. Unlike AHS, the CDC outlines that an asymptomatic HCW who tests positive for COVID-19 can return to work when repeat testing is negative or after 10 days since the last known positive test, assuming no symptoms develop during the isolation period. Also, HCW who were a suspect case but were not tested should be managed according to the non-test-based strategy (Centre for Disease Control and Prevention, 2020). Individualized risk

assessment could also be done based on contact risk levels described above (Centre for Disease Control and Prevention, 2020).

WHO guidelines for RTW to food businesses suggest that workers' symptoms should have resolved and that they have tested negative on two consecutive PCR tests at least 24 hours apart. If this testing is not feasible, WHO recommends waiting two weeks after symptoms have resolved before RTW. WHO recommends that an RT-PCR test is completed at the end of the quarantine period (World Health Organization, 2020c).

Evolving Evidence

The evidence for this topic is changing very rapidly. Further evidence the efficacy of using CVICs and their associated quarantine, isolation and testing strategies in localized outbreaks is needed to guide long term strategy. It is necessary to monitor the literature for information about validated serological tests combined with knowledge about protective immunity, and duration of immunity following SARS-CoV-2 infection which is currently not available but would help inform decisions around vulnerable populations in specific settings. The literature on asymptomatic transmission is also changing rapidly. This review should be re-visited regularly to stay up to date with new evidence.

Date question received by advisory group: April 20, 2020

Date report submitted to committee: April 23, 2020

Date of first assessment: April 29, 2020

(If applicable) Date of re-assessment:

Authorship and Committee Members

This review was written by Sylvia Checkley, Lindsay Rogers, Niamh Caffrey, Kayla Strong, and Alyssa Butters, and scientifically reviewed by Alexander Doroshenko, Andrew Johnson (external reviewer), Deirdre Church (external reviewer), and Gabriel Fabreau (external reviewer). The full Scientific Advisory Group was involved in discussion and revision of the document: Lynora Saxinger (co-chair), Braden Manns (co-chair) who both offered significant revisions John Conly, Shelley Duggan, Nelson Lee, Elizabeth MacKay, Andrew McRae, Jeremy Slobodan, James Talbot, Brandie Walker, and Nathan Zelyas.

© 2020, Alberta Health Services, COVID-19 Scientific Advisory Group



This copyright work is licensed under the [Creative Commons Attribution-NonCommercial-NoDerivative 4.0 International license](https://creativecommons.org/licenses/by-nc-nd/4.0/). You are free to copy and distribute the work including in other media and formats for non-commercial purposes, as long as you attribute the work to Alberta Health Services, do not adapt the work, and abide by the other licence terms. To view a copy of this licence, see <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

The licence does not apply to AHS trademarks, logos or content for which Alberta Health Services is not the copyright owner.

Disclaimer: This material is intended for general information only and is provided on an "as is", "where is" basis. Although reasonable efforts were made to confirm the accuracy of the information, Alberta Health Services does not make any representation or warranty, express, implied or statutory, as to the accuracy, reliability, completeness, applicability or fitness for a particular purpose of such information. This material is not a substitute for the advice of a qualified health professional. Alberta Health Services expressly disclaims all liability for the use of these materials, and for any claims, actions, demands or suits arising from such use.

1 Appendix

1.1 List of Abbreviations

AHS: Alberta Health Services
 COVID-19: Coronavirus Disease-2019
 HCW: Health care worker
 KRS: Knowledge Resource Services
 LTCF: Long-Term Care Facility
 MERS: Middle East Respiratory Syndrome
 PPE: Personal protective equipment
 RR: Rapid Review
 RT-PCR: Reverse Transcriptase Polymerase Chain Reaction
 RTW: Return to Work
 SAG: Scientific Advisory Group
 SARS: Severe Acute Respiratory Syndrome
 SARS-CoV-2: Severe Acute Respiratory Syndrome – Coronavirus – 2
 WHO: World Health Organization

Literature Search Details

The literature searches were conducted by Lauren Seal and Nicole Loroff from the Knowledge Resource Service (KRS) within the Knowledge Management Department of Alberta Health Services. KRS searched databases for articles on concepts related to quarantine, COVID-19 or SARS/MERS/Influenza, disease outbreaks, disease transmission, return to work +/- modelling, modelling localized outbreak transmission. COVID-19 related articles were identified from Dec 2019 to present. SARS, MERS and Influenza related articles were identified within the last 15 years. Databases searched included: TRIP Pro/Google Scholar/Google/LitCovid/Oxford, CEBM/CDC/NICE/WHO/National Institute of Health/BMJ Best Practice/Lancet Journal/Elsevier Journals/Medrxiv Preprints/Cochrane/covidevidence.org/Ebsco COVID Portal. Please see search details below. Articles identified by KRS in their search were initially screened by title for relevance by KRS using the concepts identified above. The RR team searched the databases listed in the COVID-19 Resource Checklist and performed the initial title screen based on the concepts listed above during this initial search due to time constraints. The RR Team then performed a secondary review on articles identified through the first screen, using a rapid review of the entire article. If the article met the inclusion/exclusion criteria listed below it went forward to the critical appraisal stage. The RR team also performed this secondary review on articles provided by SAG and a few articles identified through a previous review. In summary, 191 articles were identified by KRS and the RR team for secondary review, 48 were included for critical appraisal and 143 were excluded.

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 attached QA 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. As the highest quality of evidence was not always available other references were included with their limitations stated. The summary of quality assessment results for articles included in this review can be found in the attached document.

Table 1. Inclusion and exclusion criteria for results of the literature search

Inclusion Criteria	Exclusion Criteria
1.COVID related articles from Dec 2019 to present, grey and peer-reviewed literature 2. Question 1: <ul style="list-style-type: none"> • Group quarantine, quarantine sites or centers, outbreaks, clusters • and • Needs to contribute to evidence about reducing transmission • Models of primary and secondary transmission in localized outbreak • Social benefits of centres – domestic abuse etc 3. Question 2: <ul style="list-style-type: none"> • RT-PCR at different stages • Serology if it was validated test – to see who has already been infected and immune (immune response, protective immunity) • Quarantine/isolation centre info 4. Question 3: <ul style="list-style-type: none"> • Return to work recommendations elsewhere in the world for COVID • Other pandemic recommendations if peer-reviewed • Modelling of return to work 	1. Individual home isolation 2. General restrictions on society 3. Other pandemic article in last 15 years, only peer –reviewed literature

Search Strategy for Research Questions 1 and 2

Medline

- 1 exp Disease Transmission, Infectious/ (67420)
- 2 transmit*.mp. (175606)
- 3 transmission.mp. (508714)
- 4 spread.mp. (156965)
- 5 1 or 2 or 3 or 4 (782630)
- 6 exp Coronavirus/ or exp Coronavirus Infections/ or coronaviru*.mp. or "corona virus*".mp. or ncov*.mp. or n-cov*.mp. or "novel cov".mp. or COVID-19.mp. or COVID19.mp. or COVID-2019.mp. or COVID2019.mp. or SARS-COV-2.mp. or SARSCOV-2.mp. or SARSCOV2.mp. or SARSCOV19.mp. or Sars-Cov-19.mp. or SarsCov-19.mp. or SARSCOV2019.mp. or Sars-Cov-2019.mp. or SarsCov-2019.mp. or "severe acute respiratory syndrome cov 2".mp. or "2019 ncov".mp. or "2019ncov".mp. (20305)
- 7 exp Disease Outbreaks/ (94537)
- 8 "disease outbreak".mp. (2174)
- 9 6 or 7 or 8 (112797)
- 10 exp Quarantine/ (2133)
- 11 (quarantine adj3 centre).mp. (5)

- 12 (quarantine adj3 center).mp. (11)
 13 (quarantine adj3 facilit*).mp. (97)
 14 (quarantine adj3 station*).mp. (127)
 15 (isolation adj3 centre).mp. (16)
 16 (isolation adj3 center).mp. (58)
 17 (isolation adj3 facilit*).mp. (1342)
 18 (isolation adj3 station*).mp. (29)
 19 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (3740)
 20 5 and 9 and 19 (354)
 21 limit 20 to last 10 years (169)
 1 exp Coronavirus/ or exp Coronavirus Infections/ or coronaviru*.mp. or "corona virus*".mp. or ncov*.mp. or n-cov*.mp. or "novel cov".mp. or COVID-19.mp. or COVID19.mp. or COVID-2019.mp. or COVID2019.mp. or SARS-COV-2.mp. or SARSCOV-2.mp. or SARSCOV2.mp. or SARSCOV19.mp. or Sars-Cov-19.mp. or SarsCov-19.mp. or SARSCOV2019.mp. or Sars-Cov-2019.mp. or SarsCov-2019.mp. or "severe acute respiratory syndrome cov 2".mp. or "2019 ncov".mp. or "2019ncov".mp. (20305)
 2 exp Disease Outbreaks/ (94537)
 3 "disease outbreak".mp. (2174)
 4 1 or 2 or 3 (112797)
 5 (quarantine adj3 centre).mp. (5)
 6 (quarantine adj3 center).mp. (11)
 7 (quarantine adj3 facilit*).mp. (97)
 8 (quarantine adj3 station*).mp. (127)
 9 (isolation adj3 centre).mp. (16)
 10 (isolation adj3 center).mp. (58)
 11 (isolation adj3 facilit*).mp. (1342)
 12 (isolation adj3 station*).mp. (29)
 13 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 (1672)
 14 4 and 13 (105)
 15 limit 14 to last 10 years (46)
-
- 1 exp Disease Transmission, Infectious/ (67420)
 2 transmit*.mp. (175606)
 3 transmission.mp. (508714)
 4 spread.mp. (156965)
 5 1 or 2 or 3 or 4 (782630)
 6 exp Coronavirus/ or exp Coronavirus Infections/ or coronaviru*.mp. or "corona virus*".mp. or ncov*.mp. or n-cov*.mp. or "novel cov".mp. or COVID-19.mp. or COVID19.mp. or COVID-2019.mp. or COVID2019.mp. or SARS-COV-2.mp. or SARSCOV-2.mp. or SARSCOV2.mp. or SARSCOV19.mp. or Sars-Cov-19.mp. or SarsCov-19.mp. or SARSCOV2019.mp. or Sars-Cov-2019.mp. or SarsCov-2019.mp. or "severe acute respiratory syndrome cov 2".mp. or "2019 ncov".mp. or "2019ncov".mp. (20305)
 7 exp Disease Outbreaks/ (94537)
 8 "disease outbreak".mp. (2174)
 9 6 or 7 or 8 (112797)
 10 (quarantine adj2 facilit*).mp. (87)
 11 (quarantine adj2 centre*).mp. (4)
 12 (quarantine adj2 center*).mp. (20)
 13 (quarantine adj2 station*).mp. (127)
 14 (isolation adj2 centre*).mp. (14)
 15 (isolation adj2 center*).mp. (54)
 16 (isolation adj2 facilit*).mp. (1113)
 17 (isolation adj2 station*).mp. (17)
 18 housing for the elderly/ or public housing/ or refugee camps/ (3116)
 19 exp Schools/ (116836)

- 20 "boarding school*.mp. (706)
- 21 hotel*.mp. (3989)
- 22 exp Fitness Centers/ (549)
- 23 "public building*.mp. (370)
- 24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 (126592)
- 25 5 and 9 and 24 (657)
- 26 limit 25 to last 5 years (139)

CINAHL

- S1 (MH "Coronavirus+")
- S2 (MH "Coronavirus Infections+")
- S3 coronaviru*
- S4 "corona virus"
- S5 ncov*
- Database - CINAHL Plus with Full Text Display
- S6 n-cov*
- S7 COVID-19 OR COVID19 OR COVID-2019 OR COVID2019
- S8 SARS-COV-2 OR SARSCOV-2 OR SARSCOV2 OR SARSCOV19 OR SARS-COV-19 OR SARSCOV-19 OR SARSCOV2019 OR SARS-COV-2019 OR SARSCOV-2019
- S9 "severe acute respiratory syndrome cov 2" OR "severe acute respiratory syndrome coronavirus"
- S10 "2019 ncov" OR 2019ncov OR Hcov*
- S11 (MH "Disease Outbreaks") 28,193
- S12 (MH "Quarantine") 530
- S13 voluntary N2 quarantine OR quarantine N2 centre OR quarantine N2 center OR quarantine N2 facilit* OR quarantine N2 station* OR voluntary N2 isolat* OR isolation N2 centre* OR isolation N2 center* OR isolation N2 facilit* OR isolation N2 station* 220
- S14 central* N2 quarantine OR central* N2 isolation OR centralized N2 quarantine OR centralized N2 isolation 21
- S15 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 31,010
- S16 S12 OR S13 OR S14 763
- S17 S15 AND S16333

PubMed

5 #3 AND #4 (((((((((((((((((((("exp"[All Fields] AND (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields]) OR "coronaviruses"[All Fields])) OR ("exp"[All Fields] AND (("coronavirus infections"[MeSH Terms] OR "coronavirus"[All Fields] AND "infections"[All Fields])) OR "coronavirus infections"[All Fields])))) OR "coronaviru*"[All Fields]) OR "corona virus*"[All Fields]) OR "ncov*"[All Fields]) OR "n cov*"[All Fields]) OR (((((((("covid 19"[All Fields] OR "COVID-2019"[All Fields]) OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) OR "severe acute respiratory syndrome coronavirus 2"[All Fields]) OR "2019 ncov"[All Fields]) OR "sars cov 2"[All Fields]) OR "2019ncov"[All Fields]) OR (("wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12/1:2019/12/31[Date - Publication] OR 2020/1/1:2020/12/31[Date - Publication]))) OR (("covid 19"[Supplementary Concept] OR "covid 19"[All Fields]) OR "covid19"[All Fields])) OR "COVID-2019"[All Fields]) OR "COVID2019"[All Fields]) OR (("severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields]) OR "sars cov 2"[All Fields])) OR "SARSCOV-2"[All Fields]) OR "SARSCOV2"[All Fields]) OR "SARSCOV19"[All Fields]) OR "Sars-Cov-19"[All Fields]) OR "severe acute respiratory syndrome cov 2"[All Fields]) OR "2019 ncov"[All Fields]) OR "2019ncov"[All Fields]) OR ("disease outbreaks"[MeSH Terms] OR "disease outbreak*"[Title/Abstract])) AND (((((((("quarantine centre*"[Title/Abstract] OR "quarantine center*"[Title/Abstract]) OR "quarantine facilit*"[Title/Abstract]) OR "quarantine station*"[Title/Abstract]) OR

"central quarantine"[Title/Abstract] OR "centralized quarantine"[Title/Abstract] OR "central isolation"[Title/Abstract] OR "centralized isolation"[Title/Abstract] OR "isolation centre"[Title/Abstract] OR "isolation center"[Title/Abstract] OR "isolation facilit"[Title/Abstract] OR "isolation station"[Title/Abstract]

80

4 (((((((((((("quarantine centre"[Title/Abstract] OR ("quarantine center"[Title/Abstract])) OR ("quarantine facilit"[Title/Abstract])) OR ("quarantine station"[Title/Abstract])) OR ("central* quarantine"[Title/Abstract])) OR ("centralized quarantine"[Title/Abstract])) OR ("central* isolation"[Title/Abstract])) OR ("centralized isolation"[Title/Abstract])) OR ("isolation centre"[Title/Abstract])) OR ("isolation center"[Title/Abstract])) OR ("isolation facilit"[Title/Abstract])) OR ("isolation station"[Title/Abstract] "quarantine centre"[Title/Abstract] OR "quarantine center"[Title/Abstract] OR "quarantine facilit"[Title/Abstract] OR "quarantine station"[Title/Abstract] OR "central quarantine"[Title/Abstract] OR "centralized quarantine"[Title/Abstract] OR "central isolation"[Title/Abstract] OR "centralized isolation"[Title/Abstract] OR "isolation centre"[Title/Abstract] OR "isolation center"[Title/Abstract] OR "isolation facilit"[Title/Abstract] OR "isolation station"[Title/Abstract] 437

3 #1 OR #2 (((((((((((((((("exp"[All Fields] AND (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields]) OR "coronaviruses"[All Fields])) OR ("exp"[All Fields] AND (("coronavirus infections"[MeSH Terms] OR ("coronavirus"[All Fields] AND "infections"[All Fields])) OR "coronavirus infections"[All Fields])) OR "coronaviru"[All Fields] OR "corona virus"[All Fields] OR "ncov"[All Fields] OR "n cov"[All Fields] OR (((((((("covid 19"[All Fields] OR "COVID-2019"[All Fields]) OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019 ncov"[All Fields] OR "sars cov 2"[All Fields] OR "2019ncov"[All Fields] OR (("wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12/1:2019/12/31[Date - Publication] OR 2020/1/1:2020/12/31[Date - Publication]))) OR (("covid 19"[Supplementary Concept] OR "covid 19"[All Fields] OR "covid19"[All Fields]) OR "COVID-2019"[All Fields] OR "COVID2019"[All Fields] OR (("severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "sars cov 2"[All Fields])) OR "SARSCOV-2"[All Fields] OR "SARSCOV2"[All Fields] OR "SARSCOV19"[All Fields] OR "Sars-Cov-19"[All Fields] OR "severe acute respiratory syndrome cov 2"[All Fields] OR "2019 ncov"[All Fields] OR "2019ncov"[All Fields] OR ("disease outbreaks"[MeSH Terms] OR "disease outbreak"[Title/Abstract]) 115,887

2 (disease outbreak[MeSH Terms] OR ("disease outbreak"[Title/Abstract]) "disease outbreaks"[MeSH Terms] OR "disease outbreak"[Title/Abstract] 98,301

1 (((((((((((((((("exp"[All Fields] AND (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields]) OR "coronaviruses"[All Fields])) OR ("exp"[All Fields] AND (("coronavirus infections"[MeSH Terms] OR ("coronavirus"[All Fields] AND "infections"[All Fields])) OR "coronavirus infections"[All Fields])) OR "coronaviru"[All Fields] OR "corona virus"[All Fields] OR "ncov"[All Fields] OR "n cov"[All Fields] OR (((((((("covid 19"[All Fields] OR "COVID-2019"[All Fields]) OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019 ncov"[All Fields] OR "sars cov 2"[All Fields] OR "2019ncov"[All Fields] OR (("wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12/1:2019/12/31[Date - Publication] OR 2020/1/1:2020/12/31[Date - Publication]))) OR (("covid 19"[Supplementary Concept] OR "covid 19"[All Fields] OR "covid19"[All Fields]) OR "COVID-2019"[All Fields] OR "COVID2019"[All Fields] OR (("severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "sars cov 2"[All Fields])) OR "SARSCOV-2"[All Fields] OR "SARSCOV2"[All Fields] OR "SARSCOV19"[All Fields] OR "Sars-Cov-19"[All Fields] OR "severe acute respiratory syndrome cov 2"[All Fields] OR "2019 ncov"[All Fields] OR "2019ncov"[All Fields] 19,563

TRIP Pro/Google Scholar/Google/LitCovid/Oxford CEBM/CDC/NICE/WHO/National Institute of Health/BMJ Best Practice/Lancet Journal/Elsevier Journals/Medrxiv Preprints/Cochrane/covidevidence.org/Ebsco COVID Portal

("covid-19" OR coronavirus OR "corona virus" OR "SARS-COV-2" OR pandemic OR "disease outbreak") AND ("quarantine centre" or "quarantine center" OR "quarantine facility" OR "quarantine station" OR "centralized quarantine" Or "isolation centre" OR "isolation facility" OR "isolation center" OR "isolation station" or "centralized isolation")

("quarantine centre" or "quarantine center" OR "quarantine facility" OR "Quarantine facilities" OR "quarantine station" OR "centralized quarantine" Or "isolation centre" OR "isolation facility" OR "isolation facilities" OR "isolation center" OR "isolation station" or "centralized isolation")

(COVID-19 OR sars-cov-2 OR coronavirus OR "corona virus" OR SARS OR H1N1 OR pandemic OR "disease outbreak") AND (centre OR facility OR center OR station OR centralized OR building) AND (quarantine OR isolation)

(COVID-19 OR sars-cov-2 OR coronavirus OR "corona virus" OR SARS OR H1N1 OR pandemic OR "disease outbreak") AND ("quarantine centre" or "quarantine center" OR "quarantine facility" OR "Quarantine facilities" OR "quarantine station" OR "centralized quarantine" Or "isolation centre" OR "isolation facility" OR "isolation facilities" OR "isolation center" OR "isolation station" or "centralized isolation")

Search Strategy for Research Question 3

Search Terms

Return to Work

Return to Work [MeSH]; "return* to work" [Keyword]; return-to-work [Keyword]; return* adj2 work* [Keyword]; "back to work" [Keyword]; back-to-work [Keyword]; resum* work [Keyword]

Related terms: Occupational Health [MeSH]; Employment [MeSH]; Unemployment [MeSH]; Workplace [MeSH]; Work [MeSH]

COVID-19

Use prepared search filters

Pandemic (general) Concept

Pandemics [MeSH]; Disease Outbreaks [MeSH]; Epidemics [MeSH]; Communicable Diseases [MeSH]; Communicable Disease Control [MeSH]; Influenza A Virus, H1N1 Subtype [MeSH]; Pneumococcal Infections [MeSH]; Middle East Respiratory Syndrome Coronavirus [MeSH]; Severe Acute Respiratory Syndrome [MeSH]; SARS Virus [MeSH]; "severe acute respiratory syndrome" [Keyword]; pandemic*[Keyword]; outbreak* [Keyword]; epidemic* [Keyword]; communicable disease* [Keyword]; transmissible disease* [Keyword]; SARS [Keyword]; influenza

[Keyword]; contagious [Keyword]; MERS [Keyword]; MERS-Cov [Keyword]; SARS-Cov [Keyword]

Related terms: infect* [Keyword]

Databases: MEDLINE (via OVID), PubMed, Trip Pro, Google Scholar, Google, select curated literature collections

Database(s): Ovid MEDLINE(R) and In-Process & Other Non-Indexed Citations and Daily 1946 to April 20, 2020

Searches and Results

- | | | |
|---|---|-------|
| 1 | exp Coronavirus/ or exp Coronavirus Infections/ or (coronaviru* or "corona virus*" or ncov* or n-cov* or "novel cov" or COVID-19 or COVID19 or COVID-2019 or COVID2019 or SARS-CoV-2 or SARSCoV-2 or SARSCoV2 or SARSCoV19 or SARS-CoV-19 or SARSCoV-19 or SARSCoV2019 or SARS-Cov-2019 or SARSCov-2019 or "severe acute respiratory syndrome cornoaviru*" or "severe acute respiratory syndrome cov 2" or "2019 ncov" or "2019ncov").mp. | 20577 |
| 2 | Return to Work/ | 2425 |
| 3 | ("return* to work" or "return-to-work").mp. | 11715 |
| 4 | (return* adj2 work*).mp. | 12098 |
| 5 | ("back to work" or back-to-work).mp. | 744 |
| 6 | (resume* adj2 work).mp. | 468 |

7	2 or 3 or 4 or 5 or 6	12927
8	1 and 7	7
9	limit 8 to yr="2019 -Current"	2
10	Work/ or Workplace/ or Employment/ or Unemployment/ or Occupational Health/	116411
11	1 and 10	51
12	limit 11 to yr="2019 -Current"	2
13	exp Disease Outbreaks/ or exp Communicable Diseases/ or exp Communicable Disease Control/	442871
14	(pandemic* or outbreak* or epidemic* or communicable disease* or transmissible disease*).ab,ti.	202402
15	13 or 14	566114
16	7 and 15	112
17	limit 16 to english language	107
18	limit 17 to "reviews (best balance of sensitivity and specificity)"	13
19	limit 17 to yr="2010 -Current"	55
20	Middle East Respiratory Syndrome Coronavirus/ or SARS Virus/ or Influenza A Virus, H1N1 Subtype/ or Pneumococcal Infections/ or Severe Acute Respiratory Syndrome/	34774
21	7 and 20	3
22	(MERS or MERS-Cov or SARS or SARS-Cov or H1N1 or influenza or contagious).ab,ti.	112873
23	7 and 22	26
24	infectious.ab,ti.	209985
25	7 and 24	49
26	limit 25 to english language	41

Database(s): PubMed

Search Strategy: # Searches Results

1	(coronavirus [MeSH]) OR ("coronavirus infections"[MeSH Terms]) OR (coronavirus [All Fields]) OR ("covid 2019") OR ("SARS2") OR ("SARS-CoV-2") OR ("SARS-CoV-19") OR ("severe acute respiratory syndrome coronavirus 2" [supplementary concept]) OR (coronavirus infection) OR ("severe acute respiratory" pneumonia outbreak) OR ("novel cov") OR (2019ncov) OR (sars cov2) OR (cov2) OR (ncov) OR (covid-19) OR (covid19) OR (coronaviridae) OR ("corona virus")	25188
2	(Return to Work[MeSH Terms]) OR (return-to-work or return-to-work or resum* work or back to work or back-to-work)	34625
3	1 and 2	20
4	limit 3 to yr="2019 -Current"	13
5	(Work or Workplace or Employment or Unemployment or Occupational Health[MeSH Terms])	1283493
6	1 and 5	947
7	limit 6 to yr="2019 -Current"	359
8	limit 7 to english language	333
9	(Disease Outbreaks or Communicable Diseases or Communicable Disease Control[MeSH Terms]) OR (pandemic* or outbreak* or epidemic* or communicable disease* or transmissible disease)	752189
10	2 and 9	657
13	Return to Work[MESH Terms]	2433
14	9 and 13	3
15	((Middle East Respiratory Syndrome Coronavirus or SARS Virus or Influenza A Virus, H1N1 Subtype or Pneumococcal Infections or Severe Acute Respiratory Syndrome[MeSH Terms])) OR (MERS or MERS-Cov or SARS or SARS-Cov or H1N1 or influenza or contagious)	180630
16	2 and 15	93
17	limit 16 to english language	83

Trip Pro/Google Scholar/Google Advanced

(COVID-19 OR coronavirus OR COVID19 OR "corona virus" OR ncov OR n-cov OR covid-2019 OR covid2019 OR SARS-CoV-2 OR SARS-CoV-19 OR SARS-CoV-2019 OR "severe acute respiratory syndrome) AND ("return to work" OR return* to work OR return-to-work OR "back to work" OR back-to-work OR resum* work)

LitCOVID/WHO Global Research on COVID-19/CEBM/Elsevier/CDC/covid-evidence.org/Evidence Aid/Wolters Kluwer Coronavirus/Cochrane Library/NICE guidelines/BMJ COVID-19

"return to work OR return-to-work OR returning to work OR "back to work" OR back-to-work OR resume work OR resuming work

Supplementary Search Strategy for Disease Transmission Models related to ongoing transmission within localized outbreaks or related to return to work

Search Strategy

MEDLINE (via OVID)/PubMed

Searches Results

1 exp Coronavirus/ or exp Coronavirus Infections/ or (coronaviru* or "corona virus*" or ncov* or n-cov* or "novel cov" or COVID-19 or COVID19 or COVID-2019 or COVID2019 or SARS-CoV-2 or SARSCoV-2 or SARSCoV2 or SARSCoV19 or SARS-CoV-19 or SARSCoV-19 or SARSCoV2019

or SARS-Cov-2019 or SARSCov-2019 or "severe acute respiratory syndrome cornoaviru*" or "severe acute respiratory syndrome cov 2" or "2019 ncov" or "2019ncov").mp. 20745

2 exp Disease Transmission, Infectious/ or (transmission or transmit* or infectivity or infectious* or spread*).mp. 1077008

3 Models, Immunological/ or (model* or project*).mp. 4073168

4 1 and 2 and 3 1088

5 limit 4 to english language 1060

6 limit 5 to yr="2020 -Current" 123

7 work*.mp. 1578897

8 6 and 7 8

9 local*.mp. 1409311

10 6 and 9 9

11 1 and 3 and 7 208

12 limit 11 to english language 200

13 limit 12 to yr="2020 -Current" 18

14 1 and 3 and 9 170

15 limit 14 to english language 166

16 limit 15 to yr="2020 -Current" 11

17 localize outbreak*.mp. 142

18 1 and 3 and 17 0

TRIP Pro/Google Scholar/Google/ LitCovid/CEBM/WHO/CochraneLibrary/CDC

(COVID-19 OR coronavirus OR COVID19 OR "corona virus" OR ncov OR n-cov OR covid-2019 OR covid2019 OR SARS-CoV-2 OR SARS-CoV-19 OR SARS-CoV-2019 OR "severe acute respiratory syndrome)

(transmission OR transmit OR transmitting OR infectivity OR infectiousness) AND (model* or project*) AND (local* OR work* OR "localized outbreak*)

Reference List

Alberta Health Services. (2020, April 21). COVID-19 return to work guide for healthcare workers. <https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-return-to-work-guide-ahs-healthcare-worker.pdf>.

Alberta Precision Laboratories. (2020, April 10). COVID-19 test performance – laboratory bulletin.

Arons, M. M., Hatfield, K. M., Reddy, M. D., Kimball, A., James, A., Jacobs, J. R., Taylor, J., Spicer, K., Bardossy, A. C., Oakley, L. P., Tanwar, S., Dyal, J. W., Harney, J., Chisty, Z., Bell, J. M., Methner, M., Paul, P., Carlson, C. M., McLaughlin, H. P., ... Jernigan, J. A. (2020). Presymptomatic SARS-CoV-2 infections and transmission in a skilled nursing facility. *The New England Journal of Medicine*. doi: 10.1056/NEJMoa2008457.

Binkin, N., Salmaso, S., Michieletto, F., Russo, F. (2020). Protecting our health care workers while protecting our communities during the COVID-19 pandemic: a comparison of approaches and early outcomes in two Italian regions, 2020. medRxiv 2020.04.10.20060707; doi: <https://doi.org/10.1101/2020.04.10.20060707>.

British Columbia Centre for Disease Control Interim Guidance. (2020, April 17) Public health management of cases and contacts associated with novel coronavirus (COVID-19) in the community. http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/2019-nCoV-Interim_Guidelines.pdf.

Centers for Disease Control and Prevention (2020, April 13). Return to work for healthcare personnel with confirmed or suspected COVID-19. https://www.cdc.gov/coronavirus/2019-ncov/hcp/return-to-work.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhealthcare-facilities%2Fhcp-return-work.html

Chen, D., Li, Y., Deng, X., Huang, H., Ou, X., Lin, Y., Pan, X. & Lei, C. (2020). Four cases from a family cluster were diagnosed as COVID-19 after 14-day of quarantine period. *Journal of Medical Virology*. <https://doi.org/10.1002/jmv.25849>

Embaetti landlaeknis Directorate of Health (2020). <https://www.landlaeknir.is/um-empaettid/greinar/grein/item38808/questions-and-answers-regarding-nove>

Government of Alberta (2020, April 11). Public health disease management guidelines: coronavirus – COVID-19. <https://open.alberta.ca/publications/coronavirus-covid-19>

Government of Canada. (2020, April 17). Risk-informed decision-making guidelines for workplaces and businesses during the COVID-19 pandemic. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/risk-informed-decision-making-workplaces-businesses-covid-19-pandemic.html>

Ho, J., Fox, G.J., Marais BJ. (2016). Passive case finding for tuberculosis is not enough. *Int J Mycobacteriol*. 2016;5(4):374–378. doi:10.1016/j.ijmyco.2016.09.023

Hodcroft, E. B. Preliminary case report on the SARS-CoV-2 cluster in the UK, France, and Spain. *Swiss Med Wkly*. 2020;150(9-10):10.4414/smw.2020.20212. Published 2020 Feb 27. doi:10.4414/smw.2020.20212

Hong, Q.N., Pluye, P., Fabregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M-P, Griffiths, F., Niciolau, B., O’Cathain, A., Rousseau, M-C, & Vedel, I. (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/attach/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf.

Kavanagh, A. M., Bentley, R. J., Mason, K. E., McVernon, J., Petrony, S., Fielding, J., LaMontagne, A. D., & Studdert, D. M. (2011). Sources, perceived usefulness and understanding of information disseminated to families who entered home quarantine during the H1N1 pandemic in Victoria, Australia: a cross-sectional study. *Bio Med Central: Infectious Diseases*, 11(2). <http://www.biomedcentral.com/1471-2334/11/2>.

- Kimball, A., Hatfield, K.M., Arons, M., James, A., Taylor, J., Spicer, K., Bardossy, A. C., Oakley, L. P., Tanwar, S., Chisty, Z., Bell, J. M., Methner, M., Harney, J., Jacobs, J. R., Carlson, C. M., McLaughlin, H. P., Stone, N., Clark, S., Brostrom-Smith, C., ... Jernigan, J. A. (2020). Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility — King County, Washington. *Morbidity and Mortality Weekly Report*, 69(13) 377-381.
https://www.cdc.gov/mmwr/volumes/69/wr/mm6913e1.htm?s_cid=mm6913e1_w.
- Kucharski, A. J., Klepac, P., Conlan, A. J. K., Kissler, S. M., Tang, M., Fry, H., Gog, J. R. & Edmunds, W. J. (2020). Effectiveness of isolation, testing, contact tracing and physical distancing on reducing transmission of SARS-CoV-2 in different settings. Center for Mathematical Modelling of Infectious Diseases.
https://cmmid.github.io/topics/covid19/reports/bbc_contact_tracing.pdf.
- Kujawski, S.A., Wong, K.K., Collins, J.P., Epstein, L., Killerby, M. E., Midgley, C. M., Abedi, N., Ahmed, S., Almendares, O., Alvarez, F. N., Anderson, K. N., Balter, S., Barry, V., Bartlett, K., Beer, K., Ben-Aderet, M. A., Benowitz, I., Biggs, H. M., ... Zhang, J. (2020). Clinical and virologic characteristics of the first 12 patients with coronavirus disease 2019 (COVID-19) in the United States. *Nature Medicine*. <https://doi.org/10.1038/s41591-020-0877-5>.
- Lan, F. Y., Wei, C. F., Hsu, Y. T., Christiani, D. C., & Kales, S. N. (2020). Work-related Covid-19 transmission. *MedRxiv*. <https://doi.org/10.1101/2020.04.08.20058297>.
- Lauer, S. A., Grantz, K. H., Bi, Q., Jones, F. K., Zheng, Q., Meredith, H. R., Azman, A. S. & Reich, N. G. (2020, March 10) The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application . *Annals of Internal Medicine*. doi: 10.7326/M20-0504.
- Li, W., Zhang, B., Lu, J., Liu, S., Chang, Z., Cao, P., Liu, X., Zhang, P., Ling, Y., Tao, K. & Chen, J. (2020). The characteristics of household transmission of COVID-19. *Clinical Infectious Diseases*.
<https://doi.org/10.1093/cid/ciaa450>
- Liu, Y., Eggo, R. M. & Kucharski, A. J. (2020). Secondary attack rate and superspreading events for SARS-CoV-2. *The Lancet: Infectious Disease*, 395(10227), 47.
- Luo, L., Liu, D., Liao, X. L., Wu, X. B., Jing, Q. L., Zheng, J. Z., Liu, F. H., Yang, S. G., Bi, B., Li, Z. H., Liu, J. P., Song, W. Q., Zhu, W., Wang, A. H., Zhang, X. R., Chen, P. L., Liu, H. M., Cheng, X., Cai, M. C., ...Mao, C. (2020). Modes of contact and risk of transmission in COVID-19 among close contacts. *MedRxiv*. doi: <https://doi.org/10.1101/2020.03.24.20042606>.
- Ng, Y., Li, Z., Chua, Y. X., Chaw, W. L., Zhao, Z., Er, B., Pung, R., Lye, D. C., Heng, D. & Lee, V. J. (2020). Evaluation of the effectiveness of surveillance and containment measures for the first 100 patients with COVID-19 in Singapore - January 2 - February 29, 2020. *Centers for Disease Control and Prevention: Morbidity and Mortality Weekly Report*, 69, 1-5.
- Nussbaumer-Streit, B., Mayr, V., Dobrescu, A. I., Chapman, A., Persad, E., Klerings, I., Wagner, G., Siebert, U., Christof, C., Zachariah, C. & Gartlehner, G. (2020). Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *Cochrane Database of Systematic Review*. doi: 10.1002/14651858.CD013574.
- Pan, A., Liu, L. & Wang, C. (2020). Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China. *The Journal of the American Medical Association*. doi: 10.1001/jama.2020.6130.
- Public Health England (2020). COVID-19: guidance for households with possible coronavirus infection. <https://www.gov.uk/government/publications/covid-19-stay-at-home-guidance/stay-at-home-guidance-for-households-with-possible-coronavirus-covid-19-infection>

- Ran, L., Chen, X., Wang, Y., Wu, W., Zhang L., Tan, X. (2020). Risk factors of healthcare workers with corona virus disease 2019: a retrospective cohort study in a designated hospital of Wuhan in China. *Clinical Infectious Diseases*. <https://doi.org/10.1093/cid/ciaa287>.
- Wang, C., Liu, L., Hao, X., Guo, H., Wang, Q., Huang, J., Yu, H., Lin, X., Pan, A., Wei, S. & Wu, T. (2020). Evolving epidemiology and impact of non-pharmaceutical interventions on the outbreak of coronavirus disease 2019 in Wuhan, China. *MedRxiv*. <https://doi.org/10.1101/2020.03.03.2003059>.
- Wölfel, R., Corman, V.M, Guggemos, W. Seilmaier, M.K Zange, S., Muller, M.A., Niemeyer, D., & Wendtner, C. (2020) Virological assessment of hospitalized patients with COVID-2019. *Nature*. <https://doi.org/10.1038/s41586-020-2196-x>.
- World Health Organization. (2020a, April 13). WHO Director-General's opening remarks at the media briefing on COVID-19 - 13 April 2020. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19--13-april-2020>
- World Health Organization. (2020b, March 19). Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19). <https://apps.who.int/iris/rest/bitstreams/1272428/retrieve>.
- World Health Organization. (2020c, April 7). COVID-19 and food safety: guidance for food businesses: interim guide. <https://www.who.int/publications-detail/covid-19-and-food-safety-guidance-for-food-businesses>.
- Xiao, A. T., Tong, Y. X., Gao, C., Zhu, L., Zhang, Y. J. & Zhang, S. (2020). Dynamic profile of RT-PCR findings from 301 COVID-19 patients in Wuhan, China: a descriptive study. *Journal of Clinical Virology*. <https://doi.org/10.1016/j.jcv.2020.104346>
- Xu, K., Chen, Y., Yuan, J., Yi, P., Ding, C., Wu, W., Li, Y., Ni, Q., Zou, R., Li, X., Xu, M., Zhang, Y., Zhao, H., Zhang, X., Yu, L., Su, J., Lang, G., Liu, J., Wu, X., ... Li, L. (2020) Factors associated with prolonged viral RNA shedding in patients with COVID-19. *Clinical Infectious Diseases*. <https://doi.org/10.1093/cid/ciaa351>.
- Young, C. J. (2020). Coronavirus disease-19: summary of 2,370 contact investigations of the first 30 cases in the republic of Korea. *Osong Public Health and Research Perspectives*, 11(2), 81–84. <https://doi.org/10.24171/j.phrp.2020.11.2.04>.
- Zhi, Z. Y. F. Y. X. Z. (2020). Health protection guideline of hotels reconstructed as isolation places for close contacts during COVID-19 outbreak. COVID-19 Emergency Response Key Places Protection and Disinfection Technology Team, Chinese Center for Disease Control and Prevention. doi: 10.3760/cma.j.cn112150-20200217-00124.
- Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., Xiang, J., Wang, Y., Song, B., Gu, X., Guan, L., Wei, Y., Li, H., Wu, X., Xu, J., Tu, S., Zhang, Y., Chen, H. & Cao, B. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Clinical Infectious Disease*. <https://doi.org/10.1093/cid/ciaa398>.
- Zou, L., Ruan, F., Huang, M., Liang, L., Huang, H., Long, Z., Yu, J., Kang, M., Song, Y., Xia, J., Guo, Q., Song, T., He, J., Yen, H. L., Peiris, M. & Wu, J. (2020). SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. *New England Journal of Medicine*, 382, 1177-1179. doi: 10.1056/NEJMc2001737.