



May 10, 2020
8th Edition

COVID-19 Report

Finding the evidence for you

A weekly report to answer clinically relevant questions by summarizing the most recent evidence.

This information is intended for health care professionals.

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A letter to our readers:

Two months ago, our first case of COVID-19 was detected in Manitoba. Subsequently, life-altering societal and academic changes were instituted. Rotations were cancelled, many non-COVID-19 research projects were put on hold and people found themselves in quarantine. We wanted a way to contribute to the COVID-19 pandemic response in the province. This led to the genesis of the Manitoba COVID-19 Report; a way for medical students, residents and graduate students, with the essential assistance from the University of Manitoba Neil John Maclean Health Sciences librarians, to contribute. Our goal was to provide timely, concise and well done reviews of the literature in this rapidly evolving situation when practicing clinicians had limited time to do so for themselves. These past eight weeks have been eye-opening to how the world can come together and produce medical literature at such a rapid pace.

The impact of this report has surpassed our expectations. Not only do we have thousands of readers in Manitoba, but we have also shared our knowledge translation with the international community including the USA, Bahamas, Brazil, countries within Europe, and beyond. Thank you for reading and sharing our newsletter! We thank all of our volunteers for the countless hours spent producing this quality weekly report. At this time, Manitoba is reopening, meaning that our group of volunteers are being drawn back to their various responsibilities. As such, the Manitoba COVID-19 Report will be going on a hiatus after this week's edition. We will continue to keep our website (www.mbcovid19report.com) updated with a list of resources for clinicians as well as the list of local clinical trials as they open.

Keep safe and be well!
Manitoba COVID-19 Report Team

Clinical Description & Epidemiology

What are the demographic characteristics of Canada's COVID-19 outbreak?

- Data presented on April 28, 2020, reported that individuals aged ≥ 60 years account for 36% of COVID-19 cases in Canada, yet comprise the majority of hospitalizations (66%), ICU admissions (63%), and deaths (95%).¹ Those aged ≤ 19 make up 5% of overall COVID-19 cases and individuals aged 20-59 account for the remaining 59%. A slim majority (55%) of Canadian COVID-19 cases are female. Most cases have resulted from community spread (81%), with the remaining 19% travel-related.²
- There has been growing global concern that ethnicity may play a role in COVID-19 susceptibility and outcome. In the UK, observational data suggests ethnic minority groups make up a disproportionately high number of ICU admissions due to COVID-19.³ Preliminary data from Connecticut report Black Americans have higher rates of both COVID-19 infection and mortality compared to the general population.⁴ Further analysis is required to determine if there is an interplay between SARS-CoV-2 and ethnicity, but this is likely complicated by prevalence of comorbidities, socioeconomic status, or cultural practices.⁵
- Canada had not been reporting epidemiological data based on ethnicity, but in Manitoba, racial, ethnic, and Indigenous identifiers are being collected for all COVID-19 cases as of May 1, 2020.

How has the COVID-19 pandemic impacted Indigenous communities in Canada?

- As of May 6, 2020, there were 164 cases of COVID-19 on First Nations reserves including 17 hospitalizations and two deaths.¹ Recently, there has been an outbreak in the Dene village of La Loche, Saskatchewan, resulting in the death of two elders living in long-term care facilities.² The virus appears to have been introduced into the community by travel from an oilsands work camp in northern Alberta. Discrepancies between official reporting and community reports have been raised by the Yellowhead Institute.³
- Potential impacts and challenges to managing outbreaks in remote communities were discussed in the [April 17, 2020 newsletter](#). Due to these concerns, many communities have closed their borders, allowing only food and essential workers into the community, with precautions.⁴
- Although the mental health impacts of the COVID-19 pandemic are unknown, there have been concerns that it will further compound the already precarious pre-pandemic situations in some Indigenous communities.⁵ There continues to be a call for more permanent trauma support, in particular training of local trauma counsellors is needed in the context of a community lockdown. In an attempt to address some of

these concerns, there has been an increase in the number of counsellors available at the Hope for Wellness helpline, a telephone and online support for First Nations, Inuit, and Metis in a few different languages.

- In a statement, the United Nations Forum on Indigenous Issues urged that states take steps to ensure indigenous people are informed, protected, and prioritized during the COVID-19 pandemic.⁶ It is important that information sharing is community-driven, culturally appropriate and delivered in Indigenous languages to ensure accessibility.^{6,7}

What is the impact of the COVID-19 pandemic on the care of other health conditions and how can we mitigate this impact?

- Indirect health impacts of the COVID-19 pandemic will likely be seen in all areas of medicine. Although data is scarce at this point in time, current and anticipated impacts include negative mental health outcomes,¹ reduced access to abortion,² delayed cancer diagnoses and therapies,³ negative impacts on care of the elderly,⁴ and impacts on non-COVID-19 research.⁵ There is also the backlog of elective surgical procedures and patients not seeking timely medical care because of concern that they will become infected with SARS-CoV-2 by visiting a healthcare facility.
- The COVID-19 pandemic appears to be impacting access to cardiac care as the number of patients treated with cardiac catheterization for myocardial infarction (MI) has declined by up to 40% in the United States and Spain.⁶ Numerous theories have been postulated to explain the decline, but the overall impact is not clear because COVID-19 has made mortality data more difficult to interpret.^{7,8}
- Mitigation strategies to lessen the impact of COVID-19 on other health conditions should include encouragement of basic health maintenance practices such as exercise, structured activities and good sleep hygiene. Physicians are encouraged to practice preventive medicine and make an effort to maintain connections with vulnerable patients.^{4,5} Preparedness and planning for post-pandemic surges in healthcare demands are common themes in the literature. As well, advocacy for continuity of health services during the pandemic is important.
- Mitigation strategies to lessen the negative impact on mental health include information sharing, especially around the altruistic necessity of isolation, encouraging regular social interaction while respecting physical distancing, and keeping quarantine as short as possible.

What is the incidence of stroke in COVID-19?

- Based on the best available evidence, the rate of acute stroke in patients with COVID-19 appears to be low, between 2.5-2.8%.^{1,2} Of note, in Canada, the age-standardized occurrence of stroke was 2.6% in 2012-2013.³
- A retrospective case series of 214 hospitalized patients with COVID-19 from Wuhan, China observed acute stroke in six patients (2.8%) at presentation or during hospital admission (five ischemic and one hemorrhagic).¹ Five of these patients had severe COVID-19 disease upon admission.
- A retrospective case series of 362 hospitalized patients with COVID-19 from Milan, Italy observed acute ischemic stroke in nine patients (2.5%).² Two of these patients had atrial fibrillation, one had cancer, and another had both cancer and disseminated intravascular coagulation. Stroke was the reason for admission in six of these patients.
- Viral respiratory infections such as RSV and human metapneumovirus are associated with increased risk of stroke and myocardial infarction in the elderly.⁴ Cases of stroke were also seen with SARS. In a study of 206 patients with SARS in Singapore, five developed large artery ischemic stroke.⁵

Diagnostics & Surveillance

Is there any new data with regards to SARS-CoV-2 transmission between asymptomatic individuals? Previously discussed [April 10, 2020](#).

- Previously, mathematical modelling studies from the Diamond Princess cruise ship (February 2020) demonstrated that 51.7% of all cases were presymptomatic and only 17.9% would never develop symptoms.¹
- Similarly, a study of obstetric cases in New York City demonstrated 87.9% (29/33) of cases were presymptomatic or asymptomatic.² Outbreaks at a long-term care skilled nursing facility³ and a homeless shelter,⁴ as well as testing of international arrivals,⁵ have also demonstrated presymptomatic states accounting for a large proportion of positive cases.
- The preponderance of these cases expose possible limitations of symptom-based surveillance, as case series have described both presymptomatic^{6,7,8} and asymptomatic⁹ transmission. Evidence modelled from transmission pairs suggests that 44% of secondary cases were infected during the presymptomatic phase of

illnesses from index cases.¹⁰ As a result, substantial presymptomatic transmission might also mean that current estimates of R_0 are inaccurate.¹¹

- It has become clearer that transmission of SARS-CoV-2 does occur during the presymptomatic phase, but the extent of transmission by people who are never symptomatic remains unclear.

Do the national testing numbers reflect community surveillance?

- Nationally, the Public Health Agency of Canada tracks the number of tests, cases (probable and confirmed), the percent positivity, and deaths across all provinces daily. As of May 9th, Ontario has the highest gross number of tests performed at currently 402,761 with a percent positivity (PP) ~5%. In contrast, Quebec has run 276,787 tests, but has a PP of ~11%.¹ However, if you look at it from number of tests performed per 1,000,000 population, for Ontario that would be 27,650 and for Quebec 32,621. The province or territory that currently has the highest number of tests performed per 1,000,000 is Northwest Territories with 39,932.
- Across Canada, the testing criteria are focused on symptomatic patients. In order to predict community spread, asymptomatic testing is an important consideration given the evolving understanding of presymptomatic and asymptomatic transmission. However, the limitation of the RT-PCR test means that it is an imperfect candidate for a surveillance test in this population. Some provinces such as Alberta have started testing asymptomatic workers and residents at outbreak sites. As of May 9th, they have 166,327 total tests (including symptomatic and asymptomatic cases) performed to date with a PP ~3%.¹ They have completed 38,050 tests per 1,000,000.

When a patient's chest CT has ground glass opacities, what should be on your differential diagnosis, besides COVID-19?

- Ground-glass opacity (GGO) refers to an area of "haziness" on CT imaging of the lung that does not obscure underlying bronchial structures or pulmonary vessels.¹
- Although GGO has been associated with COVID-19, it is not pathognomonic. Broadly, the differential for GGO includes infection (including other viral pneumonia, bacteria, and fungi), chronic interstitial diseases, and acute alveolar disease (including pulmonary edema).¹
- However, GGO with bilateral lung involvement, multi-lobar involvement, and peripheral distribution increases specificity for COVID-19 pneumonia.²

What is the current status of point of care (POC) RT-PCT testing in Canada? Are there any alternative testing strategies currently under development?

- In Canada, the Cepheid Xpert Xpress SARS-CoV-2 has become mainstream for POC testing. Although several platforms have been approved for use during this pandemic, the Xpert has shown to have the lowest limit of detection.^{1,2} The Xpert has been mainly implemented into diagnostic hospitals rather than provincial public health labs, as it cannot perform the volume of tests necessary for centralized provincial laboratories.²
- The Spartan Cube from Spartan Biosciences Inc. has recently had its Health Canada licence modified to research only (from diagnostic) as a POC RT-PCR test. This is due primarily to suboptimal validation studies and issues with specimen collection, mainly inhibitory concerns when viral transport media is utilized.³
- The most recent platform to be approved by Health Canada for potential use as a rapid test is the BioFire® Respiratory 2.1 (RP2.1) Panel with SARS-CoV-2.⁴ This test is currently being validated in Canada laboratories, but has the potential to be as rapid as the Xpert.
- A recent study also discussed the potential of using a LAMP-Seq, a barcoded reverse-transcription loop-mediated isothermal amplification (RT-LAMP) protocol for testing.⁵ This testing algorithm would utilize barcoded amplicons that could be shipped to a testing center, pooled and analyzed in massive quantities, potentially millions of samples per day. Albeit promising, it must be noted that this study has not been validated with clinical specimens.

Therapeutics

What are possible viral targets for SARS-CoV-2 and how are novel antivirals identified?

- Novel drug development can generally take upwards of a decade. Given the urgency to have treatments for COVID-19, the first wave of drug discovery has focused on repurposing existing medications. This reduces time and cost to bring a drug to market as the safety and side-effect profiles are known, and production/distribution are already established.¹ Repurposing of existing therapies may be done using knowledge from existing coronaviruses (e.g.: remdesivir).²
- The development of novel agents against SARS-CoV-2 may take the form of monoclonal antibodies, peptides, interferon therapies, or small-molecule drugs.

- Several proteins in SARS-CoV-2 have been considered for development of novel small molecule drugs including spike, envelope, membrane, nucleocapsid, protease, hemagglutinin esterase, helicase, and other non-structural proteins.³
- Monoclonal antibodies for novel therapy development against SARS-CoV-2 is an attractive option as they may be produced more quickly.⁴ This strategy is being adopted by several groups, including Vancouver company AbCellera who has identified 500 antibodies as potential therapeutic candidates for COVID-19 and thus received \$175 million in funding from the Canadian Government for this purpose.⁵

What is the evidence for non-invasive ventilation strategies in COVID-19?

- There is currently no robust published evidence looking at the risks of non-invasive ventilation in patients with COVID-19 or their health care providers.
- There is conflicting published evidence regarding the safety of non-invasive positive pressure ventilation in terms of room air contamination and risk to staff.^{1,2} The current guidelines from the WHO recommend using high flow oxygen and non-invasive ventilation with airborne precautions.³
- Non-invasive ventilation has a role in the treatment of COVID-19 by reducing the need for intubation in certain patients. However, further research is needed to weigh the risks and benefits to healthcare workers and patients.^{4,5}

Infection Prevention & Control

Is there airborne spread of SARS-CoV-2? How is air ventilation relevant for the spread of SARS-CoV-2?

- The primary mechanisms of SARS-CoV-2 transmission are through respiratory droplets and close contact.¹ Although some studies have detected SARS-CoV-2 RNA in air samples from hospitals with COVID-19 patients,^{2,3,4} cell culture of SARS-CoV-2 (i.e.: ability to grow the virus) from those RNA-positive air samples has not been successful.² Collectively, current evidence does not support airborne transmission of SARS-CoV-2.
- While patients with diseases which are airborne, such as measles and tuberculosis, are ideally placed in airborne-infection isolation rooms (AIIRs), this precaution is not necessary for diseases spread by droplets and thus not needed for cases of COVID-19.⁵ The CDC recommends that ventilation systems be properly maintained and installed, and that COVID-19 suspected or positive patients requiring hospitalization be placed in single rooms with the door closed.
- [Shared Health Guidelines](#) state that AIIRs are not required for all aerosol-generating medical procedures (AGMPs), although they are preferred for high risk procedures.

In hospitalized patients with COVID-19, the risk of spreading infection during patient transfer to an AIIR must be weighed against the potential benefit.

Is Non-Invasive Ventilation (NIV – i.e.: CPAP and BiPAP) a risk for aerosolization of SARS-CoV-2 particles? How can this risk be mitigated?

- To date, no study has assessed aerosolization of SARS-CoV-2 by NIV. NIV is associated with the production of large droplets >10µm which, due to their size, mostly fall to surfaces within a one-meter radius.¹ Exposure to air exhaled during NIV is greatest within a 1m radius of a patient.² Multiple factors affect the degree of air dispersion with NIV such as mask type, mask seal, pressure settings, and the application of filters to inspiratory and expiratory ports. NIV via helmets with tight air cushions results in negligible dispersion of exhaled air from patients.³
- No study has shown that NIV causes dispersion of pathogens in the environment. Additionally, NIV has not been consistently found to be associated with increased risk for secondary infections in healthcare workers (HCW). However, a meta-analysis that included two studies from Toronto, identified caring for SARS patients on NIV was a risk factor for HCW infection.⁴
- [Local](#) and [international](#) infection prevention and control guidelines treat NIV as an aerosol generating procedure. Thus, in patients with COVID-19 on NIV, a N95 respirator should be worn when providing care. Measures to reduce air dispersion from NIV should be considered. Ideally, NIV should be administered via a full-face, non-vented mask with an expiratory viral filter and good mask seal to minimise droplet dispersion. As another option, CPAP helmets have less air dispersion than standard CPAP masks.⁵
- At home, both confirmed and suspected COVID-19 patients using NIV should be isolated in a separate room from other members of the household.⁶

Which non-health care related workplaces are at risk for SARS-CoV-2 transmission and why?

- The risk of SARS-CoV-2 transmission in the workplace is related to the current level of community spread. Workplaces that frequently come into contact with the public and/or have large numbers of employees are at higher risk. Early reported COVID-19 cases linked to occupational exposure in Singapore included employees in the retail and hospitality industry, construction workers and transport workers such as taxi and private hire drivers.¹
- To date, there have been seven SARS-CoV-2 outbreaks in meat processing plants across Canada. The outbreak at the Cargill meat packing plant in Alberta is the

largest single-site outbreak in Canada, with 921 confirmed cases as of May 1, 2020.²

- The Cargill COVID-19 outbreak highlights many of the challenges for workplace safety during the pandemic. Factors which are thought to have contributed to the outbreak include:²
 - Close workplace quarters and high worker density.
 - Delayed initiation of social distancing, physical barriers, and personal protective equipment (PPE).
 - A vulnerable employee population consisting of many temporary foreign workers and recent immigrants. A large proportion of these employees carpool to work or live in multi-family households.
 - Language barriers may have impacted communication of rapidly changing policies.

What infection prevention and control measure can be instituted at non-health care workplaces to reduce transmission of SARS-CoV-2?

- One key principle in occupational health is the hierarchy of controls.¹ The first priority is eliminating potential exposure to a hazard, followed by engineering controls (such as workplace structural design), administrative controls (such as workplace procedures), and lastly the use of PPE. The latter methods are less effective as they rely on many individuals' education and adherence.
- To avoid spreading SARS-CoV-2, it is recommended to work from home and to self-isolate if symptomatic. If working from home is not possible, other preventative measures should be implemented including the use of physical barriers, physical distancing measures, surface decontamination, and hand hygiene. In settings where physical distancing is challenging, the use of non-medical masks may be used. Studies have shown that cleaning high touch surfaces² and regular hand washing³ reduce the risk of spreading infections within the workplace.
- Unique measures now instituted at Cargill meat packing plant in Alberta include buses for transportation to the plant, access to translation services, and opening of an isolation centre to accommodate infected employees and close contacts.⁴
- For detailed guidelines on workplace precautions during the COVID-19 pandemic, see the [Government of Manitoba's guidelines](#).

Update on screening for SARS-CoV-2 in asymptomatic patients prior to surgeries.

Previously discussed on [April 10, 2020](#).

- In a study in New York, 210 asymptomatic pregnant women were screened with RT-PCR for SARS-CoV-2 and 29 (13.7%) were positive, of which only 10% developed

symptoms.¹ As discussed [March 27th](#), PCR positivity does not equate to infectivity, so the value of screening is still not clear from this data.

- Manitoba guidelines continue to recommend, with the exception of emergency surgeries, that all patients are to isolate for 14 days prior to surgery. If the patient develops symptoms within this period, they are screened for COVID-19 via RT-PCR. If symptoms do not develop, the patient is asked the COVID-19 screening questions and cleared for surgery if screening questions are negative.

Public Health Interventions

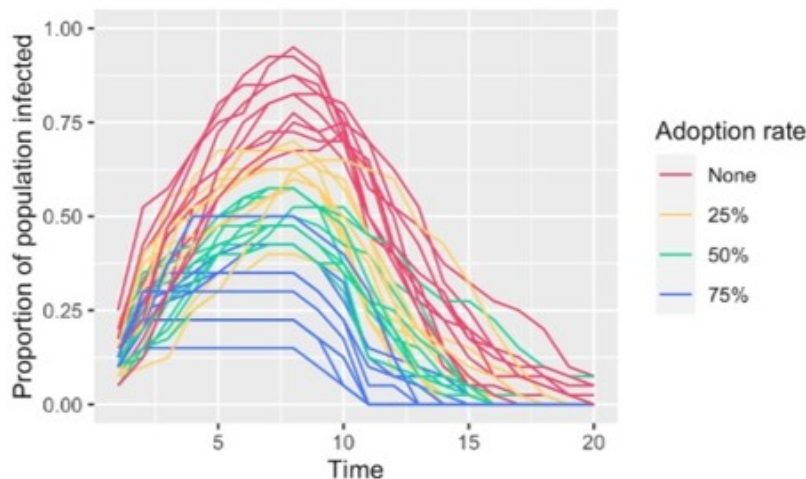
What is the evidence on transmission risk of SARS-CoV-2 in fitness centers and how can this risk be decreased?

- There is limited evidence available on the transmission of SARS-CoV-2, MERS-CoV, or SARS-CoV in fitness centers.
- One study analyzed the risk of infection of influenza and tuberculosis in a few different gyms by using the Wells-Riley model.¹ They demonstrated an increased risk of infection at all of the fitness centers. The study established that increased ventilation intensity, high occupancy concentration and poor ventilation in the infrastructure were key factors in increasing transmission risk, all of which are factors commonly present in fitness centers.
- The Wells-Riley model predicts infection risks in indoor environments depending on ventilation rate.² The equation assumes that individuals have the same ventilation rate, there is uniform distribution of air and infectious agent in the room, and that all individuals are susceptible to the infectious agent. Furthermore, it is important to note that the Wells-Riley equation was created for airborne pathogens and extrapolation of results to a non-airborne pathogen would be problematic. As discussed in this week's infection prevention and control section, SARS-CoV-2 is predominantly transmitted by droplets and close contact.
- As there is no specific evidence regarding transmission of SARS-CoV-2 in fitness centers, general considerations to decrease risk include proper cleaning of shared equipment and high touch surfaces, appropriate spacing of equipment to allow for physical distancing, setting a time limitation to visit, and ventilation consideration. In Manitoba, fitness centers reopening are currently part of post phase two of reopening public services.³

Contact tracing apps are a possible adjunct to conventional methods of contact tracing. What are the available options and what is the evidence that they can help?

- There are currently three types of mobile phone apps available:¹

- Bluetooth-based apps – These apps use Bluetooth Low Energy to detect and log other phones with the app that spend a pre-set amount of time in their close vicinity. If one of the users tests positive for SARS-CoV-2, the users that encountered them will be notified that they may have been exposed.
 - Location-monitoring apps – These apps can record an individual's location, which can then be cross-referenced with data from other devices in order to trace contacts. Due to privacy concerns, this has not been a popular option.
 - QR code scanning apps – These apps are used to scan QR codes located in public places as a “check in”. Similarly, the idea has been put forward of an app that can generate its own unique code that others can scan as a “check in”.² This could then be used for contact tracing of individuals meeting in groups at private residences as well as in public spaces.
- A key factor in the effectiveness of the app is how widely it would need to be adopted. There is currently no real-world data on this, but there have been modelling studies. A report from Oxford University for the National Health Service (NHS) in the UK determined that the app would need to be adopted by 80% of mobile phone users or 56% of the total population in order for the epidemic to be suppressed.³ This study used assumptions in their model that included an urban population of 1 million individuals, individuals over 70 years old continued to quarantine, assumed no app use in < 10 years old, and a higher R_0 was used to account for faster doubling time in Europe.
- Another modelling study found that an epidemic/outbreak may be better controlled with increasing adoption rate of a contact tracing app.² This information was presented in the following figure which compares infection curves from simulations of varying adoption rates of a peer-to-peer contact tracing app. The proportion of the population with active infection is plotted across time for the various app adoption rates and the results of 10 random simulations per adoption rate are shown.



- There is currently no data regarding effectiveness of contact tracing apps compared to traditional methods for the current COVID-19 pandemic. However, apps have been previously used for contact tracing in sexually transmitted diseases. In one study, investigators found that the use of an app to notify people of their test results reduced the time from testing to treatment on average from 12 to 10 days.⁴ Although the two settings are different enough to preclude direct comparison and extrapolation, there is a possibility that contact tracing apps could have a similar beneficial effect, among others.

What are some of the privacy concerns of contact tracing apps and how are they addressed?

- The main privacy concern with using contact tracing apps is the possibility of being monitored and having personal information exploited for ulterior motives.¹
- There are two general types of contact tracing apps:^{2,3}
 - Centralized apps: information collected (including personal and/or location depending on the type of app) are stored and processed in a central database held by a national authority (e.g. healthcare services). This type of approach appeals to the aforementioned privacy concerns. This type of app carries the above-mentioned concerns.
 - Decentralized apps: information collected is stored locally on the device and shared on if the user agrees following a confirmed COVID-19 diagnosis. This information is then disseminated anonymously in a peer-to-peer manner to inform close contacts about a possible risk of exposure. The concern with this model is that it relies on an honesty system where individuals can choose to conceal their COVID-19 diagnosis.
- There are apps currently in development that possess both centralized and decentralized features.⁴ For example, Privacy Kit, an app developed by MIT (Massachusetts Institute of Technology) and Harvard, can disseminate encrypted information about one's location and COVID-19 diagnosis between app users. The app also enables users to directly share their information with national authorities who can then store the data into a central database.
- There has been great interest in many countries, including Canada, with adopting a digital platform to assist with contact tracing. As healthcare in Canada is provincially regulated, each province is making their own considerations in terms of the type of contact tracing app they may adopt and with it, the type of information they want to collect.



Pediatric Corner

What is the evidence regarding the association between SARS-CoV-2 and an increased incidence of a serious inflammatory syndrome in pediatrics?

- Recently, there have been alerts from different countries of a small increase in children presenting with a more serious inflammatory syndrome, including features of toxic shock and/or Kawasaki disease (KD), possibly associated with SARS-CoV-2.^{1,2,3,4} Some of these children have tested positive by RT-PCR for SARS-CoV-2, but causality has not been established. A portion of these children have required treatment in an intensive care unit.
- It remains true that the majority of children infected with SARS-CoV-2 are either asymptomatic or mildly symptomatic with the rare case requiring hospitalization or resulting in death (see [March 21, 2020](#)).
- United Kingdom's Royal College of Paediatrics and Child Health have proposed the following case definition:⁵
 - *A child presenting with persistent fever, inflammation (neutrophilia, elevated CRP and lymphopenia) and evidence of single or multi-organ dysfunction (shock, cardiac, respiratory, renal, gastrointestinal or neurological disorder) with additional features (see [Appendix 1](#)). This may include children fulfilling full or partial criteria for Kawasaki disease.*
 - *Exclusion of any other microbial cause, including bacterial sepsis, staphylococcal or streptococcal shock syndromes, infections associated with myocarditis such as enterovirus.*
 - *SARS-CoV-2 PCR testing may be positive or negative*
- In Montreal, a small cluster of children with severe inflammatory syndromes is being investigated for possible association with SARS-CoV-2.³ All of the children have tested negative for SARS-CoV-2, but further investigation is ongoing. One hospital in Montreal has noted a slight increase in children with symptoms of KD. The hospital has treated approximately 20 children with symptoms of KD since the end of March, only one required treatment in the intensive care unit and there were no fatalities.
- With respect to KD, the underlying etiology is unclear. A viral etiology has been hypothesized, but remains uncertain despite investigations into specific viruses including coronaviruses.^{6,7} In studies prior to the COVID-19 pandemic, less than half of those with KD tested positive for respiratory viruses by PCR with rhinovirus being the most commonly identified.

Recent awareness of an increased incidence in dermatologic changes in toes have been temporarily associated with the COVID-19 pandemic. What are the findings and what is the evidence on their relationship to SARS-COV-2?

- Dermatologists and pediatricians have noticed a markedly increased prevalence of erythematous, edematous, and blistering, chilblain-like lesions to the fingers and toes of children. They have also been reported in adults. This was first reported in Spain and Italy. Physicians have associated the cutaneous changes with SARS-CoV-2 because of the temporal relationship with the pandemic, the exposure history of some of the patients, and the relatively unique appearance of the lesions.^{1,2} However, causality has not been established.



Piccolo, V *et al.* Figure 2 (top) and Figure 1 (bottom) showing different examples of chilblain-like lesions from [Chilblain-like lesions during COVID-19 epidemic: a preliminary study on 63 patients](#). *J Eur Acad Dermatol Venereol.* [Cited 7 May 2020]

- In a case series of 63 patients, the cutaneous findings were limited to the feet in 85.6%, limited to the hands in 6%, and affecting both hands and feet in 7% of patients.¹ Rarely, elbow lesions have been seen.^{2,3} Some patients reported pain

and/or pruritis associated with the lesions.¹ In most cases, lesions self-resolved in 2-4 week.²

- Other symptoms are occasionally reported. In the above-mentioned study of 63 patients, 11.1% of patients had GI symptoms, 7.9% had respiratory symptoms and 4.8% had fever, all of which typically preceded cutaneous findings.¹ In this study, 11 patients had a nasopharyngeal (NP) swab taken of which two were positive for SARS-CoV-2. 10 patients had exposure to confirmed or suspected familial cases of COVID-19. A larger study of children and adults with skin lesions (n=132) reported that 2/11 patients who had a NP swab were positive for SARS-CoV-2.³ They also reported that 40.9% of patients had exposure to a confirmed case. However, in a study of 11 patients, all of the three NP swabs and two rectal swabs were negative for SARS-CoV-2.² Additional case reports have described similar skin lesions, but did not perform testing for SARS-CoV-2.⁴
- Some physicians have suggested that the cutaneous findings are a late-stage manifestation or a post-viral phenomenon as the reason for negative RT-PCR tests.^{2,5}
- The Canadian Pediatric Surveillance Program has advised that if these cutaneous changes are seen, testing should be done for SARS-CoV-2 to allow for contact tracing and self-isolation, if indicated.

The information presented reflects the data that is currently available to us. In the context of a pandemic where rapid dissemination of information is essential, we have included information from evolving medical literature which may be awaiting peer-review.

This report was produced by a collaboration of fellows, residents, medical students, faculty leads, and librarians from the University of Manitoba and the Medical Microbiology and Infectious Diseases community.

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