

# Coronavirus COVID-19

BC Centre for Disease Control | BC Ministry of Health



## Pediatric Clinical Guidance for COVID-19

Updated: September 27, 2021

**This guidance is intended for general pediatricians, family physicians and other primary care providers. It is based on known evidence as of September 27, 2021.**

### Summary of Key Changes in this Update

Summary of Changes
Updated indications for testing
Updated description of common clinical features of COVID-19 in children.
Added tocilizumab and passive immunotherapies to the treatment section.
Added three references.



Ministry of Health



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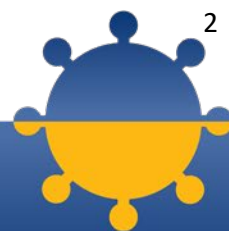
**If you have fever, a new cough, or are having difficulty breathing, call 8-1-1.**



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## Introduction

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Knowledge is changing rapidly and information below may be modified in response.

This document addresses issues relating to pediatric patients and COVID-19 and is intended for health-care professionals. **This document does not specifically address babies born to mothers/individuals with suspected or confirmed COVID-19. That information is provided in a [separate document](#).**

## Microbiology and Transmission

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The SARS-CoV-2 virus is a betacoronavirus that causes the clinical disease of COVID-19 and is related to the viruses that cause severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS). The incubation period is a median of three to five days but can range from two to 14 days.

The infection mainly spreads from respiratory droplets or prolonged close contact. Airborne spread is possible during aerosol-generating procedures.

The spread of COVID-19 through vertical transmission (mother/individual to child) is being closely studied. Intrauterine transmission may occur but is rare. Postnatal transmission from a caregiver is more likely to occur. Please refer to Perinatal Services BC's [COVID-19 newborn guidance](#) for more details on this topic.

Children do not appear to be a major source of SARS-CoV-2 transmission in households or schools, a finding which has been consistent globally. The majority of children with COVID-19 were in contact with a household member who was positive for COVID-19. Children with COVID-19 have been found to have high viral loads despite milder symptoms, with prolonged shedding in nasal secretions (up to 22 days) and in fecal samples (over 30 days). Asymptomatic children have tested positive on nasopharyngeal and fecal specimens. Children appear to shed the virus for longer than adults but the evidence for the infectivity of shed virus remains limited.

## Infection Prevention and Control (IPC)

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Please refer to the B.C. Centre For Disease Control's (BCCDC) webpage for [up-to-date IPC recommendations](#).

Each health authority has site-specific IPC guidelines and the B.C. Children's Hospital has [specific recommendations, policies and procedures](#).

Droplet and contact precautions should be used for all suspected or confirmed cases of COVID-19 with the addition of airborne precautions for any aerosol generating medical procedures (AGMPs).

AGMPs include, but are not limited to:

- Endotracheal tube insertion or removal
- Tracheotomy or tracheostomy care
- Bronchoscopy
- Nebulized therapy
- High-flow nasal cannulae therapy or continuous positive airway pressure therapy



Refer to the BCCDC website for a [full list of current AGMPs](#).

IPC guidelines for donning and doffing personal protective equipment (PPE) should be followed. See BCCDC's [personal protective equipment webpage](#) for more information.

## Clinical Features and Diagnosis

### Clinical Presentation

Pediatric studies continue to report that most children with COVID-19 will have mild disease or asymptomatic infection. It is not known why children have been significantly less affected compared to adults. Symptomatic children typically present with fever and cough. Other common symptoms include sore throat, nasal congestion and rhinorrhea. Less common symptoms in children are myalgia, fatigue, diarrhea, nausea, vomiting, headache and dizziness. Rarely, severe cases may progress to respiratory distress or failure after one week. Co-infection of COVID-19 with other pathogens like influenza, respiratory syncytial virus (RSV) and mycoplasma has been reported.

Compared to adults, children report more gastrointestinal symptoms, including abdominal discomfort, nausea, vomiting and diarrhea. These symptoms may be the sole presentation, without any accompanying respiratory symptoms.

Children with COVID-19 can present with skin changes, including acrocyanosis, pernio-like changes and acral ischemia. Skin lesions may appear as red-purple papules or nodules on extremities such as limbs, fingers or toes and should be tested and referred to a pediatric dermatologist.

After a COVID-19 infection, children and adolescents very rarely present with multisystem inflammatory syndrome in children (MIS-C) – an acute multisystemic inflammatory disease with overlapping features of toxic shock syndrome and Kawasaki disease. This syndrome is thought to be a post-infectious entity that occurs two to six weeks following infection with COVID-19. Most of these cases have known exposures to a case of COVID-19 or have tested positive on COVID-19 polymerase chain reaction (PCR)/serology. A separate document discusses [case definitions and the management of suspected MIS-C cases](#).

### Disease Severity

The latest Canadian data shows that up to 16% of the confirmed COVID-19 cases have been reported in those  $\leq 19$  years old. An umbrella review found 10-19% of children with COVID-19 had asymptomatic infection but there is evidence to suggest the percentage may be as high as 45%. In B.C., the true proportion of asymptomatic children is unknown because testing is not routinely performed in asymptomatic individuals unless advised by public health.

Severe and critical illness from COVID-19 infection in children is still rare. Approximately 1% of children with lab-confirmed COVID-19 have required hospitalization and a similar percentage have required intensive care unit admission. There is evidence that infants (under one year old) might be at increased risk for severe infection. Similarly, children with underlying medical conditions/comorbidities are at a higher risk for severe manifestations of COVID-19 and have more associated mortality compared to healthy children. There is also evidence that childhood obesity is likely associated with a worse prognosis. Otherwise, it is unclear what underlying conditions place a child with COVID-19 at



increased risk. Like adults, infants and children with severe COVID-19 infection can progress to respiratory failure, shock and multisystem organ failure. These symptoms may develop days after symptom onset.

## Chest Imaging

Chest imaging should be done if clinically indicated but should not be used as a screening or diagnostic tool.

Chest imaging often shows consolidation, ground-glass opacities or bilateral infiltrates. Radiographic abnormalities have been reported in asymptomatic children.

## Testing

Microbiologic confirmation of COVID-19 is made by a positive PCR test for SARS-CoV-2 (the virus which causes COVID-19) from a nasopharyngeal swab (preferable) or a lower respiratory tract sample (e.g., sputum or endotracheal secretions). In the outpatient setting, a saline gargle and swish test is available.

Stool PCR and serological testing are not routinely performed to diagnose acute COVID-19. Consultation with microbiology must be done prior to ordering either test. As children may shed SARS-CoV-2 in their stools even after their illness has resolved, stool testing is restricted to those with no alternative diagnosis and a high suspicion of COVID-19 disease. In B.C., serologic testing is currently performed in children with suspected MIS-C or another post-viral inflammatory complication, to help diagnose patients who are SARS-CoV-2 ribonucleic acid negative but have a compatible syndrome, or who present later during their disease course.

For further details, refer to the [BCCDC antibody testing webpage](#).

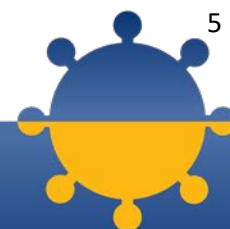
### Who to test:

**Unlike adults, there are no specific signs or symptoms that are highly predictive of COVID-19 in children.** Some present with mild upper respiratory tract infection symptoms while **up to one-third may be asymptomatic**. Importantly, the majority of children diagnosed with COVID-19 in B.C. have been a close contact with another known case. Health-care providers should refer to [BCCDC's testing guidelines](#) for information on provincial public health testing criteria and instructions. However, testing for clinical care needs to use a lower threshold, particularly for testing children with a known COVID-19 contact and any possible symptoms, even if the child does not meet provincial testing criteria.

For a child who will be hospitalized, testing should be done for any symptom that could be consistent with COVID-19 regardless of contacts (see clinical presentation, above). Testing asymptomatic children should only be done at the request of public health.

Children requiring urgent/elective surgery may require pre-operative testing. Testing guidance for this population can be found in the [IPC protocol for surgical procedures during COVID-19: pediatrics](#).

Like any test, nucleic acid amplification tests may result in false negative results. If there is strong clinical suspicion for COVID-19 in the event of a negative test result, consider repeat testing at least 24 hours apart.



## Management and Treatment

Therapeutic options for COVID-19 are actively being studied worldwide and are rapidly evolving. The majority of data available is from literature on adults. Current literature suggests that most children will have mild disease and will recover at home one to two weeks after symptom onset with no medical intervention necessary.

Immunocompromised children with suspected or confirmed COVID-19 should self-isolate at home for 10 days from symptom onset and at least 24 hours of fever resolution. Caregivers of children with COVID-19 should provide similar support to children as other viral infections, including regular fluids and antipyretics (fever-reducing medicine) if needed for comfort. After 10 days, if the child's temperature is normal and they feel better, they can return to their regular activities. Coughing may persist for several weeks, so a cough alone does not mean they need to continue to self-isolate for more than 10 days. The duration of isolation of immunocompromised children with COVID-19 is at least 20 days as directed by public health.

Families of children and adolescents who have recovered from the acute phase of COVID-19 should be counselled about the possibility of developing MIS-C. Providers should seek specialist advice from B.C. Children's Hospital if their patient develops features such as fever, mucocutaneous inflammation, gastrointestinal symptoms or other systemic symptoms, particularly if symptoms occur within two to six weeks from the initial COVID-19 illness.

### Hospitalization

Hospitalization of a child with suspected or confirmed COVID-19 disease is indicated for those with moderate to critical disease. Definitions of clinical severity of COVID-19 in pediatric patients are outlined in the [Canadian Paediatric Society's practice point](#).

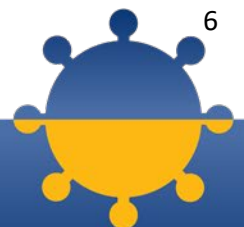
**Children with medical complexity or co-morbidities should be considered at higher risk for severe COVID-19 disease. However, being at a higher risk does not necessitate automatic hospitalization in the absence of moderate to critical disease. The decision to hospitalize such children should factor in the family's ability to care for the child and accessibility to health-care in case their condition deteriorates.**

Refer to the BCCDC website for more information on the [management of MIS-C](#).

### Supportive Care

**Recommendation: Supportive care is still an effective therapy for COVID-19. Use conservative fluid management when there is no evidence of shock.**

Advanced organ support including hemodynamic support, mechanical ventilation and renal replacement may be necessary if severe respiratory deterioration occurs or if the child is showing signs of MIS-C possibly associated with COVID-19. In such instances, arrangements for transfer to a higher level of care and consultation with a pediatric intensive care unit (PICU) is required.





## Fever Management

**Recommendation: Acetaminophen and ibuprofen at routine doses can be safely administered for fever and symptom relief in children with suspected or confirmed COVID-19.**

Early in the pandemic, there were concerns that the use of nonsteroidal anti-inflammatory drugs (NSAIDs) may worsen the severity of COVID-19 infection. However, the evidence has [not demonstrated a link](#).

There is no indication at this time to discontinue NSAIDs for those patients needing them for other diagnoses (e.g., juvenile idiopathic arthritis, etc.). Decisions should be made on a case-by-case basis in consultation with the child's doctor, nurse practitioner or sub-specialist in pediatric infectious diseases.

## Immunomodulatory Therapies

### Corticosteroids

**Recommendation: Dexamethasone may be beneficial in pediatric patients with COVID-19 respiratory disease who require mechanical ventilation. However, the safety and efficacy of dexamethasone or other corticosteroids for COVID-19 treatment in children has not been sufficiently evaluated. Decisions regarding the initiation of corticosteroids for the treatment of hospitalized children with COVID-19 should be made on a case-by-case basis in consultation with the PICU physician on call at B.C. Children's Hospital through B.C. Emergency Health Services' [Patient Transfer Network](#) line.**

Dexamethasone is strongly recommended in critically and severely ill COVID-19 **adult** patients. Patients with severe COVID-19 can develop a systemic inflammatory response that can lead to lung injury and multi-system organ dysfunction. It has been proposed that the potent anti-inflammatory effects of corticosteroids might prevent or mitigate these harmful effects. The use of corticosteroids for COVID-19 is mainly based on the RECOVERY trial conducted in the United Kingdom. Mortality at 28 days was lower among patients who were randomized to receive up to 10 days of dexamethasone than among those who received the standard of care. No benefit of dexamethasone was seen in patients who did not require supplemental oxygen at enrollment. The trial did not include a significant number of pediatric patients.

Corticosteroids are not indicated in mild illness outside of clinical trials. As mentioned previously, several epidemiologic studies suggest that acute disease manifestations are substantially less severe in children than in adults, although there are reports of children with COVID-19 requiring PICU-level care.

Patients who are regularly on corticosteroids for other indications (e.g., underlying adrenal insufficiency, rheumatologic disease, etc.) should be discussed on a case-by-case basis with pediatric infectious diseases and the physicians or nurse practitioners involved in their care.

Children with asthma exacerbations and suspected/confirmed COVID-19 should receive inhaled or systemic corticosteroids according to current asthma guidelines.

Similarly, children with moderate to severe croup should be given corticosteroids as per current guidelines. Consider avoiding corticosteroids in cases of milder croup with no respiratory distress.



## Tocilizumab

**Recommendation: Tocilizumab is not recommended as a treatment of acute COVID-19 in children.**

Tocilizumab is an interleukin-6 (IL-6) inhibitor. It is thought that modulating the levels of pro-inflammatory IL-6 or its effects may improve the course of COVID-19. Tocilizumab is currently recommended for adult patients requiring life support as a result of COVID-19. There are no trials that have evaluated the use of this drug for children with COVID-19.

For children who receive tocilizumab for another diagnosis (e.g., juvenile idiopathic arthritis), consultation with their subspecialist is recommended.

## Intravenous Immunoglobulin (IVIG)

**Recommendation: IVIG is not recommended as a treatment of acute COVID-19.**

IVIG has been used in some pediatric cases of COVID-19, but there is no clear evidence of benefit in COVID-19 disease in children.

However, IVIG is now considered standard treatment for MIS-C in children. It is important to note that the features of MIS-C overlap with those of Kawasaki disease and toxic shock syndrome. The decision to administer IVIG when the diagnosis is unclear should be made in consultation with pediatric rheumatology and pediatric infectious diseases. Please refer to MIS-C specific guidance document regarding evaluation, recommended consultations and management of this condition.

## Passive Immunotherapies

**Recommendation: Passive immunotherapies are not recommended outside of approved clinical trials.**

These therapies include convalescent plasma/monoclonal antibodies/antibody cocktail therapies/REGN-COV2/bamlanivimab or colchicine. These therapies are not recommended outside of approved clinical trials.

## Antibacterial Therapy

**Recommendation: Empiric antibiotics should be given for sepsis or other suspected bacterial co-infection based on clinical assessment of the patient.**

Antibiotics have no effect against the COVID-19 virus. Please collect relevant cultures (blood, urine, etc.) before initiating antibiotics. Empiric antibiotics should be de-escalated on the basis of microbiology results and clinical judgment.

For sepsis, children should be empirically treated with an intravenous (IV) third generation cephalosporin +/- IV vancomycin, depending on methicillin-resistant staphylococcus aureus risk factors. Empiric therapy for sepsis in children who are immunocompromised (e.g., febrile neutropenia) or have history of infections with drug resistant organisms should be discussed with the infectious disease service at B.C. Children's Hospital.





For pneumonia, children should be treated with intravenous ampicillin or oral amoxicillin based on their clinical severity, as per community acquired pneumonia guidelines.

## Antiviral Medications

**Recommendation: There are currently no approved antiviral therapies to treat COVID-19. Please contact pediatric infectious diseases to discuss a specific case. As per the World Health Organization guidelines, investigational anti-COVID-19 medications will only be used in approved, randomized controlled trials.**

The antivirals discussed below are not an exhaustive list of medications that have been studied against COVID-19. Please see the [B.C. COVID-19 Therapeutics Committee's summary](#) for more details on unproven therapies against COVID-19.

### Chloroquine/Hydroxychloroquine

Chloroquine/hydroxychloroquine is not a recognized treatment of adult outpatients and adult hospitalized patients with COVID-19.

### Lopinavir/Ritonavir

Lopinavir/ritonavir has been shown to inhibit the protease activity of coronavirus but has been shown to have no benefit for patients with COVID-19.

### Remdesivir

Remdesivir has not demonstrated benefit in survival, progression to ventilation, length of hospital stay or shortening recovery time. The use of remdesivir is not considered a standard of care. The safety and effectiveness against COVID-19 in children has not yet been evaluated.

### Oseltamivir

Oseltamivir is not recommended for COVID-19 as it is highly specific to the influenza virus. Empiric therapy for children with symptoms compatible with influenza is reasonable during influenza season.



## References

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- B.C. Centre for Disease Control. "COVID-19 Care." BCCDC, 2020, [www.bccdc.ca/health-professionals/clinical-resources/covid-19-care](http://www.bccdc.ca/health-professionals/clinical-resources/covid-19-care).
- Boulware, David R., et al. "A Randomized Trial of Hydroxychloroquine as Postexposure Prophylaxis for Covid-19." *New England Journal of Medicine*, vol. 383, no. 6, 2020, pp. 517–25, [doi:10.1056/nejmoa2016638](https://doi.org/10.1056/nejmoa2016638).
- Carlotti, Ana Paula de Carvalho Panzeri, et al. "COVID-19 Diagnostic and Management Protocol for Pediatric Patients." *Clinics*, vol. 75, 2020, [doi:10.6061/clinics/2020/e1894](https://doi.org/10.6061/clinics/2020/e1894).
- Cavalcanti, Alexandre B., et al. "Hydroxychloroquine with or without Azithromycin in Mild-to-Moderate Covid-19." *New England Journal of Medicine*, vol. 383, no. 21, 2020, pp. 2041–52, [doi:10.1056/nejmoa2019014](https://doi.org/10.1056/nejmoa2019014).
- Centers for Disease Control and Prevention. "Information for Pediatric Healthcare Providers." CDC, 30 Dec. 2020, [www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html](http://www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html).
- Centers for Disease Control and Prevention. "Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (COVID-19)." CDC., Updated 16 Feb. 2021, <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html>.
- CDC Weekly, China. "The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020." *China CDC Weekly*, vol. 2, no. 8, 2020, pp. 113–22, [doi:10.46234/ccdcw2020.032](https://doi.org/10.46234/ccdcw2020.032).
- Chen, Huijun, et al. "Clinical Characteristics and Intrauterine Vertical Transmission Potential of COVID-19 Infection in Nine Pregnant Women: A Retrospective Review of Medical Records." *The Lancet*, vol. 395, no. 10226, 2020, pp. 809–15, [doi:10.1016/s0140-6736\(20\)30360-3](https://doi.org/10.1016/s0140-6736(20)30360-3).
- Chen, Nanshan, et al. "Epidemiological and Clinical Characteristics of 99 Cases of 2019 Novel Coronavirus Pneumonia in Wuhan, China: A Descriptive Study." *The Lancet*, vol. 395, no. 10223, 2020, pp. 507–13, [doi:10.1016/s0140-6736\(20\)30211-7](https://doi.org/10.1016/s0140-6736(20)30211-7).
- Chen, Yan, et al. "Infants Born to Mothers with a New Coronavirus (COVID-19)." *Frontiers in Pediatrics*, vol. 8, 2020, p. 104, [doi:10.3389/fped.2020.00104](https://doi.org/10.3389/fped.2020.00104).
- Dong, Yuanyuan, et al. "Epidemiology of COVID-19 Among Children in China." *Pediatrics*, vol. 145, no. 6, 2020, p. e20200702, [doi:10.1542/peds.2020-0702](https://doi.org/10.1542/peds.2020-0702).
- Elwood, Chelsea, et al. "Updated SOGC Committee Opinion-COVID-19 in Pregnancy." SOGC, 2020, <https://sogc.org/common/Uploaded%20files/SOGC%20Committee%20Opinion200514may2020Final.pdf>.
- Gatta, Anna Nunzia Della, et al. "Coronavirus Disease 2019 During Pregnancy: A Systematic Review of Reported Cases." *Obstetrical & Gynecological Survey*, vol. 75, no. 12, 2020, pp. 720–22, [doi:10.1097/01.ogx.0000723856.99244.b0](https://doi.org/10.1097/01.ogx.0000723856.99244.b0).



Guan, Wei-jie, et al. "Clinical Characteristics of Coronavirus Disease 2019 in China." *New England Journal of Medicine*, vol. 382, 2020, pp. 1708-1722, [doi:10.1056/NEJMoa2002032](https://doi.org/10.1056/NEJMoa2002032).

Huang, Chaolin, et al. "Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China." *The Lancet*, vol. 395, no. 10223, 2020, pp. 497-506, [doi:10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5).

Jiehao, Cai, et al. "A Case Series of Children With 2019 Novel Coronavirus Infection: Clinical and Epidemiological Features." *Clinical Infectious Diseases*, vol. 71, no. 6, 2020, pp. 1547-51, [doi:10.1093/cid/ciaa198](https://doi.org/10.1093/cid/ciaa198).

Jones, Veena G., et al. "COVID-19 and Kawasaki Disease: Novel Virus and Novel Case." *Hospital Pediatrics*, vol. 10, no. 6, 2020, pp. 537-40, [doi:10.1542/hpeds.2020-0123](https://doi.org/10.1542/hpeds.2020-0123).

Kam, Kai-Qian, et al. "A Well Infant With Coronavirus Disease 2019 With High Viral Load." *Clinical Infectious Diseases*, vol. 71, no. 15, 2020, pp. 847-49, [doi:10.1093/cid/ciaa201](https://doi.org/10.1093/cid/ciaa201).

Li, Yuanzhe, et al. "Insight into COVID-2019 for Pediatricians." *Pediatric Pulmonology*, vol. 55, no. 5, 2020, [doi:10.1002/ppul.24734](https://doi.org/10.1002/ppul.24734).

Liu, Weiyong, et al. "Detection of COVID-19 in Children in Early January 2020 in Wuhan China." *New England Journal of Medicine*, vol. 382, 2020, [doi:10.1056/NEJMc2003717](https://doi.org/10.1056/NEJMc2003717).

Lu, Xiaoxia, et al. "SARS-CoV-2 Infection in Children." *New England Journal of Medicine*, vol. 382, no. 17, 2020, pp. 1663-65, [doi:10.1056/nejmc2005073](https://doi.org/10.1056/nejmc2005073).

Ma, Xiang, et al. "Do Children Need a Longer Time to Shed SARS-CoV-2 in Stool than Adults?" *Journal of Microbiology, Immunology and Infection*, vol. 53, no. 3, 2020, pp. 373-76, [doi:10.1016/j.jmii.2020.03.010](https://doi.org/10.1016/j.jmii.2020.03.010).

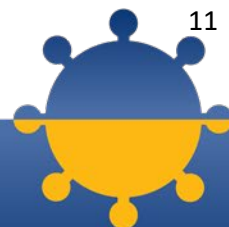
Mitjà, Oriol, et al. "Hydroxychloroquine for Early Treatment of Adults with Mild Covid-19: A Randomized-Controlled Trial." *Clinical Infectious Diseases*, 2020, [doi:10.1093/cid/ciaa1009/5872589](https://doi.org/10.1093/cid/ciaa1009/5872589).

Pediatric Intensive Care Society. "PICS Statement: Increased Number of Reported Cases of Novel Presentation of Multi-System Inflammatory Disease." *Paediatric Intensive Care Society*, 27 Apr. 2020, [picsociety.uk/wp-content/uploads/2020/04/PICS-statement-re-novel-KD-C19-presentation-v2-27042020.pdf](https://picsociety.uk/wp-content/uploads/2020/04/PICS-statement-re-novel-KD-C19-presentation-v2-27042020.pdf).

Public Health Ontario. "Coronavirus Disease 2019 and the Pediatric Population: An Umbrella Review." *Public Health Ontario*, Queen's Printer for Ontario, 4 Nov. 2020. <https://www.publichealthontario.ca/-/media/documents/ncov/ipac/2020/10/covid-19-pediatric-population-umbrella-review-appendices.pdf?la=en>.

Qiu, Haiyan, et al. "Clinical and Epidemiological Features of 36 Children with Coronavirus Disease 2019 (COVID-19) in Zhejiang, China: An Observational Cohort Study." *The Lancet Infectious Diseases*, vol. 20, no. 6, 2020, pp. 689-96, [doi:10.1016/s1473-3099\(20\)30198-5](https://doi.org/10.1016/s1473-3099(20)30198-5).

Recalcati, Sebastiano. "Cutaneous Manifestations in COVID-19: A First Perspective." *Journal of the European Academy of Dermatology and Venereology*, vol. 34, no. 5, 2020, [doi:10.1111/jdv.16387](https://doi.org/10.1111/jdv.16387).



Safadi, Marco A. P. “The Intriguing Features of COVID-19 in Children and Its Impact on the Pandemic.” *Journal of Pediatrics (Rio J)*, vol. 96, no. 3, 2020, pp. 265–68, [doi:10.1016/j.jpeds.2020.04.001](https://doi.org/10.1016/j.jpeds.2020.04.001).

Skipper, Caleb P., et al. “Hydroxychloroquine in Nonhospitalized Adults With Early COVID-19.” *Annals of Internal Medicine*, vol. 173, no. 8, 2020, pp. 623–31, [doi:10.7326/m20-4207](https://doi.org/10.7326/m20-4207).

Sterne, Jonathan A. C., et al. “Association Between Administration of Systemic Corticosteroids and Mortality Among Critically Ill Patients With COVID-19.” *The Journal of the American Medical Association*, vol. 324, no. 13, 2020, p. 1330-41, [doi:10.1001/jama.2020.17023](https://doi.org/10.1001/jama.2020.17023).

Tang, Wei, et al. “Hydroxychloroquine in Patients with Mainly Mild to Moderate Coronavirus Disease 2019: Open Label, Randomised Controlled Trial.” *The British Medical Journal*, vol. 369, 2020, 369:m1849, [doi:10.1136/bmj.m1849](https://doi.org/10.1136/bmj.m1849).

The RECOVERY Collaborative Group. “Dexamethasone in Hospitalized Patients with Covid-19.” *New England Journal of Medicine*, vol. 384, no. 8, 2021, pp. 693–704, [doi:10.1056/nejmoa2021436](https://doi.org/10.1056/nejmoa2021436).

The WHO Rapid Evidence Appraisal for COVID-19 Therapies (REACT) Working Group. “Association between administration of systemic corticosteroids and mortality among critically ill patients with COVID-19: A meta-analysis.” *The Journal of the American Medical Association*, vol. 326, no.13, 2020, pp. 1330-41, [doi: 10.1001/jama.2020.17023](https://doi.org/10.1001/jama.2020.17023).

Therapeutics Initiative. “NSAIDs vs Acetaminophen during COVID-19 Pandemic.” UBC, 2020, [www.ti.ubc.ca/2020/03/18/acetaminophen-vs-nsaids-during-covid-19-pandemic](http://www.ti.ubc.ca/2020/03/18/acetaminophen-vs-nsaids-during-covid-19-pandemic).

Tian, Yuan, et al. “Review Article: Gastrointestinal Features in COVID-19 and the Possibility of Faecal Transmission.” *Alimentary Pharmacology & Therapeutics*, vol. 51, no. 9, 2020, pp. 843–51, [doi:10.1111/apt.15731](https://doi.org/10.1111/apt.15731).

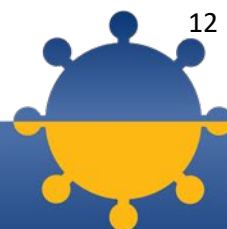
Tsankov, Boyan K., et al. “Severe COVID-19 Infection and Pediatric Comorbidities: A Systematic Review and Meta-Analysis.” *International Journal of Infectious Diseases*, vol. 103, 2021, pp. 246–56, [doi:10.1016/j.ijid.2020.11.163](https://doi.org/10.1016/j.ijid.2020.11.163).

Wang, Dawei, et al. “Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China.” *The Journal of the American Medical Association*, vol. 323, no. 11, 2020, p. 1061, [doi:10.1001/jama.2020.1585](https://doi.org/10.1001/jama.2020.1585).

World Health Organization. “Clinical Management of Severe Acute Respiratory Infection When COVID -19 Disease Is Suspected. Interim Guidance.” WHO, 2020. [https://www.who.int/csr/disease/coronavirus\\_infections/InterimGuidance\\_ClinicalManagement\\_NovelCoronavirus\\_11Feb13u.pdf](https://www.who.int/csr/disease/coronavirus_infections/InterimGuidance_ClinicalManagement_NovelCoronavirus_11Feb13u.pdf).

World Health Organization. “Report of the WHO – China Joint Mission on Coronavirus Diseases.” WHO, Feb. 2020, [www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf](http://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf).

Xia, Wei, et al. “Clinical and CT Features in Pediatric Patients with COVID-19 Infection: Different Points from Adults.” *Pediatric Pulmonology*, vol. 55, no. 5, 2020, pp. 1169–74, [doi:10.1002/ppul.24718](https://doi.org/10.1002/ppul.24718).



Xing, Yuhan, et al. "Prolonged Presence of SARS-CoV-2 in Feces of Pediatric Patients during the Convalescent Phase." *MedRxiv*, 2020, [doi:10.1101/2020.03.11.20033159](https://doi.org/10.1101/2020.03.11.20033159).

Xu, Xiao-Wei, et al. "Clinical Findings in a Group of Patients Infected with the 2019 Novel Coronavirus (SARS-Cov-2) Outside of Wuhan, China: Retrospective Case Series." *The British Medical Journal*, vol. 386, 2020, p. m606, [doi:10.1136/bmj.m606](https://doi.org/10.1136/bmj.m606).

Xu, Yi, et al. "Characteristics of Pediatric SARS-CoV-2 Infection and Potential Evidence for Persistent Fecal Viral Shedding." *Nature Medicine*, vol. 26, no. 4, 2020, pp. 502–05, [doi:10.1038/s41591-020-0817-4](https://doi.org/10.1038/s41591-020-0817-4).

Zhou, Fei, et al. "Clinical Course and Risk Factors for Mortality of Adult Inpatients with COVID-19 in Wuhan, China: A Retrospective Cohort Study." *The Lancet*, vol. 395, no. 10229, 2020, pp. 1054–62, [doi:10.1016/s0140-6736\(20\)30566-3](https://doi.org/10.1016/s0140-6736(20)30566-3).

Zhu, Huaping, et al. "Clinical Analysis of 10 Neonates Born to Mothers with 2019-NCoV Pneumonia." *Translational Pediatrics*, vol. 9, no. 1, 2020, pp. 51–60, [doi:10.21037/tp.2020.02.06](https://doi.org/10.21037/tp.2020.02.06).

Zimmermann, Petra, and Nigel Curtis. "Coronavirus Infections in Children Including COVID-19." *Pediatric Infectious Disease Journal*, vol. 39, no. 5, 2020, pp. 355–68, [doi:10.1097/inf.0000000000002660](https://doi.org/10.1097/inf.0000000000002660).



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- The clinical reference group\* pediatric sub-committee

**\*About the clinical reference group**

The clinical reference group (CRG) is made up of senior individuals from relevant health-care areas (including critical care, epidemiology, infectious disease, microbiology, emergency medicine, public health, primary care and clinical specialties) acting as a collective resource for current COVID-19 knowledge. They provide clinical advice and guidance to support the overall work being done by the B.C. Centre for Disease Control, the Office of the Provincial Health Officer Office and the Ministry of Health. The CRG includes representation from the provincial health authorities and works with the other ministry areas in order to provide cross-input on all COVID-19 content.

The pediatric sub-committee of the CRG is made up of pediatricians with expertise in the following areas: Complex care, general pediatrics, infectious diseases, intensive care, social pediatrics, rheumatology and immunology. The sub-committee also includes a representative from Child Health B.C. who facilitates, as regional coordinator at Interior Health, the review and gathering of feedback from all B.C. health authorities and ensuring inclusiveness of CRG documents as well as representatives from B.C.’s MIS-C working group.

Pediatric subcommittee members include: Dr. Hana Mitchell (co-chair), Dr. Laura Sauvé (co-chair), Dr. Catherine Briggs, Dr. Matthew Carwana, Dr. Tommy Gerschman, Dr. Esther Lee, Dr. Alison Lopez, Dr. Srinivas Murthy, Dr. Ashley Roberts, Dr. Peter Skippen, Trisha Thomson and Dr. Tom Warshawski.

