Clinical Reference Group Recommendation:
Pediatric Clinical Guidance for COVID-19

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Major revisions since last publication on March 27, 2020:

- Discussion of newly recognized, rare, phenomena (COVID-19 rash, Multisystem inflammatory disease in children), pages 4-5
- Testing, pages 5-6
- Management, pages 6-9
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**Introduction**

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

*This document does not specifically address newborns born to mothers with suspected or confirmed COVID-19 as this will be provided in a separate document.*

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**Microbiology and Transmission**

COVID-19 (SARS-CoV-2) virus is a betacoronavirus and is related to the viruses that cause Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The infection mainly spreads from respiratory droplets or prolonged close contact. Airborne spread is not known to occur outside of aerosol-generating procedures. Fecal shedding has been identified up to several weeks after diagnosis but its role in transmission is unclear.

The spread of COVID-19 through vertical transmission is being closely monitored. At this time, there is no definite evidence of vertical transmission. Postnatal transmission from a caregiver is more likely to occur. Please refer to Perinatal Services BC-led COVID-19 Newborn guidance for more details on this topic.

**Transmission and infectivity**

The incubation period is a median of 3-5 days but ranges from 2 to 14 days.

The majority of children with COVID-19 have a positive household contact. Children 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 (up to 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.

There has been no documented evidence of child-to-adult transmission, which is different from other viruses such as influenza, where children have significant inter-generational transmission.

The contribution of children to community spread is unknown. The lack of evidence is likely due to early school and daycare closures. In contrast, adults were relatively less isolated and thus most family outbreaks had adult index cases.
Infection Prevention and Control (IPAC)

Please refer to the BC Centre For Disease Control’s (BCCDC) COVID-19 care webpage for up-to-date recommendations; http://www.bccdc.ca/health-professionals/clinical-resources/covid-19-care

BC Children’s Hospital-specific recommendations, policies and procedures are available at: http://policyandorders.cw.bc.ca/

Please also refer to local health authority’s IPAC guidelines for site-specific recommendations.

In brief, droplet and contact precautions should be used for all suspected or confirmed cases of COVID-19. Airborne precautions should be used for any aerosol generating medical procedures (AGMPs).

AGMPs include:
- Endotracheal tube insertion or removal
- Tracheotomy
- Bronchoscopy
- Nebulized therapy


IPAC guidelines for donning and doffing PPE should be followed. See BCCDC link: http://www.bccdc.ca/health-professionals/clinical-resources/covid-19-care/infection-control/personal-protective-equipment

Clinical Features and Diagnosis

Clinical presentation

Pediatric studies, most of which look at children from 0-18 years, are consistently reporting that most children have mild disease or asymptomatic infection. It is not known why children are significantly less affected compared to adults. Symptomatic children typically present with low-grade fever and a dry cough. Less common symptoms include sore throat, headache, productive cough, anosmia, diarrhea and other gastrointestinal symptoms. Rarely, severe cases may progress to respiratory distress or failure after one week. Co-infection of COVID-19 with other pathogens, e.g. Influenza, RSV and Mycoplasma has been described.

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

New data suggests that COVID-19 can present with skin changes, including acrocyanosis, pernio-like changes, and acral ischemia. Skin lesions may appear as acrally distributed red-purple papules or nodules and should prompt testing and referral to a pediatric dermatologists.
Recently, there have been reports of cases from Europe and North America describing children and adolescents presenting with acute multisystemic inflammatory symptoms that had overlapping features of toxic shock syndrome and Kawasaki disease. This syndrome has since been named Multisystem Inflammatory Syndrome in Children (MIS-C) and is thought to be a post infectious entity related to COVID-19. Many of these cases have known exposures to a case of COVID-19 or have tested positive for COVID-19 serology. Case definitions and the management of suspected MIS-C cases are discussed in a separate document, available at: [http://www.bccdc.ca/Health-Professionals-Site/Documents/COVID19_MIS-C_ClinicianGuidance.pdf](http://www.bccdc.ca/Health-Professionals-Site/Documents/COVID19_MIS-C_ClinicianGuidance.pdf)

**Disease severity**

The current literature estimates that children have made up 1-5% of the infected population. Approximately 1% of children with lab-confirmed COVID-19 have required hospitalization and a few children have required mechanical ventilation.

In the largest sample of pediatric patients which reviewed over 2000 children with confirmed or suspected COVID-19, 0.6% had critical illness. Patients under 1 year of age, preschool-aged children, and those who are immunocompromised or had preexisting pulmonary conditions are at higher risk of severe disease. While higher rates of disease have been documented in adolescents and young adults compared to school-aged children, they do not appear to present as severely as young infants.

**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.

In the adult population, progression to Acute Respiratory Distress Syndrome (ARDS) often occurs late in the disease course at a median of 8 days after symptom onset. There have been very few critical pediatric cases described so it is unclear whether this is the same for pediatrics; however, there are cases of severe multi-system organ failure in pediatric patients with COVID-19.

**Testing**

Microbiologic confirmation of COVID-19 is made by a positive Polymerase Chain Reaction (PCR) test for COVID-19 from a nasopharyngeal swab (preferable) or a lower respiratory tract sample (sputum or endotracheal secretions).

Stool PCR and serological testing has recently become available in the province. Consultation with Microbiology or Infectious Diseases must be done prior to ordering both tests.

**Who to test:**

• Testing is recommended for all individuals with symptoms of a respiratory infections / influenza-like illness.
• Consider testing in children with atypical symptoms, particularly if they have a household contact with COVID-19.

Nucleic acid amplification tests may be falsely negative. If there is strong clinical suspicion for COVID-19 in the setting of a negative test, consider repeat testing.

**Who not to test:**
• Asymptomatic individuals, regardless of travel history, unless recommended by public health in the context of an outbreak investigation.

**Testing procedures:**

*Nasopharyngeal (NP) swabs*
- Droplet and contact precautions are recommended during collection. N95 respirators are not required outside of aerosol generating procedures.
- For outpatients: 1 NP swab (preferred) OR 1 sputum sample.
- For inpatients: 1 NP Swab (preferred) OR sputum OR endotracheal aspirate.

*Stool:*
- Both formed and non-formed stools are accepted for testing.
- Please follow the same collection procedure for routine stool virus testing.

*Serology:*
- Please contact the Microbiologist or Infectious Diseases physician on call for collection details.

**Management and Treatment**

Therapeutic options for COVID-19 are actively being studied worldwide and are rapidly evolving. The majority of data available is from adult literature. Current literature suggests that most children will have mild disease and will recover at home 1-2 weeks after symptom onset with no medical intervention necessary. Suspected or confirmed cases should self-isolate at home for at least 10 days after onset of their symptoms. After 10 days, if their temperature is normal and they feel better, they can return to their routine 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.


**Supportive Care**

**Recommendation:** Supportive care is the only known 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 is occurring, or if the child is showing signs of multisystem inflammatory condition 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 outbreak, 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: [https://www.ti.ubc.ca/2020/03/18/acetaminophen-vs-nsaids-during-covid-19-pandemic/](https://www.ti.ubc.ca/2020/03/18/acetaminophen-vs-nsaids-during-covid-19-pandemic/)

There is no indication at this time to discontinue NSAIDs for those patients needing them for other diagnoses (i.e. juvenile idiopathic arthritis...etc.). Decisions should be made on a case-by-case basis in consultation with their doctor or sub-specialist and Pediatric Infectious Diseases.

**Corticosteroids**

**Recommendation:** Corticosteroids are not recommended as a treatment of COVID-19 but should be administered in situations with established indications.

Corticosteroids have not been shown to have benefit in SARS, MERS or Influenza pneumonia. Potential side effects that have been noted include increased viral replication, secondary infections and possibly, increased mortality.

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.
Patients who are regularly on steroids for other indications (i.e. underlying adrenal insufficiency, rheumatologic disease...etc.) should be discussed on a case-by-case basis with Pediatric Infectious Diseases and the relevant physicians involved in their care.

**Antibiotics**

**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 judgement.

For sepsis, children should be empirically treated with an IV third generation cephalosporin and IV vancomycin.
For pneumonia, children should be treated with IV ampicillin or oral amoxicillin based on their clinical severity, as per community acquired pneumonia guidelines.

**Intravenous Immune Globulin (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. IVIG is being investigated as a treatment of multisystem inflammatory syndrome in children, temporally related to COVID-19. Although the features of MIS-C overlap with those of Kawasaki Disease, cases that meet criteria for Kawasaki Disease should receive IVIG as per current guidelines.

**Antiviral medications**

**Recommendation:** *There are currently no approved therapies to treat COVID-19. Please contact Pediatric Infectious Diseases to discuss a specific case. As per the WHO guidelines, investigational anti-COVID-19 medications will only be used in approved, randomized controlled trials (RCT).*

The antivirals discussed below are not an exhaustive list of medications that have been studied against COVID-19. Please see the BC COVID-19 Therapeutics Committee’s summary for more details on unproven therapies against COVID-19: [http://www.bccdc.ca/Health-Professionals-Site/Documents/Guidelines_Unproven_Therapies_COVID-19.pdf](http://www.bccdc.ca/Health-Professionals-Site/Documents/Guidelines_Unproven_Therapies_COVID-19.pdf)

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

**Lopinavir/ritonavir** has been shown to inhibit the protease activity of coronavirus. The Canadian Treatment for COVID-19 (CATCO) is conducting an RCT under the direction of Dr. Srin Murthy, exploring the role of lopinavir-ritonavir for patients with COVID-19.
Remdesivir is currently being studied as a potential treatment option for severely ill patients with COVID-19. Its safety and efficacy in this disease is not yet established. In Canada, this drug is only available for Compassionate Use through the Special Access Program (SAP).

Chloroquine/hydroxychloroquine appears to decrease the COVID-19 virus’ ability to enter cells and exhibit immunomodulatory effects in cases of severe disease. Many of the trials studying these drugs have significant methodological limitations and there are weak signals of potential adverse effects. Therefore, there is currently insufficient evidence to recommend either drug as a treatment or post exposure prophylaxis for COVID-19.

References

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About the Clinical Reference Group
The Clinical Reference Group (CRG) is made up of senior individuals from relevant healthcare areas (including critical care, epidemiology, infectious disease, microbiology, public health, 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 BC Centre for Disease Control, the Provincial Health 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.