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Pediatric COVID-19 (novel coronavirus)

What we know so far

Clinical symptoms of COVID-19 in children appear to be milder than adults and most children recover within 1-2 weeks. Testing in children has shown that up to 21% may be asymptomatic with COVID-19 infection¹. Lower case numbers of COVID-19 in children than adults have been reported in multiple settings including China, US, Italy and Iceland^{2,3,4}; the secondary attack rate for household contacts of COVID-19 patients has been reported as 4% in children compared to 17% in adults². It has been difficult to interpret whether there are differences in susceptibility to COVID-19 infection across the lifespan.

About half of children with COVID-19 will present with fever^{5,1}. Cough, sore throat, stuffy nose, rhinorrhea and fatigue are also common. Pediatric patients with COVID-19 may also present with gastrointestinal symptoms including abdominal discomfort, nausea, vomiting, and diarrhea.

The mean time of exposure to illness presentation (incubation period) is 6 days but can range from 1 to 14 days². Positive viral cultures are common from oropharyngeal, nasopharyngeal and sputum swabs during the first week of the illness. No viral isolate has been grown beyond day 8 of illness despite ongoing viral RNA shedding from the oropharynx, sputum and stool for much longer periods⁶.

Bloodwork is unlikely to be helpful in making the diagnosis. In the early stages, chest imaging may show an interstitial pattern (similar to common viral infections like RSV and influenza) and as the disease progresses there may be patchy shadowing and multiple ground-glass opacities^{5,1}. Lung consolidation is uncommon in the initial phase, but secondary bacterial pneumonia can occur and should be considered with worsening or prolonged symptoms.

Children with co-morbidities accounted for 80% of admissions to North American Pediatric Intensive Care Units with medically complex children (technology dependent with either developmental delay or genetic anomalies) accounting for the largest cohort⁷. Children who are immune suppressed, or who have underlying cardiac and lung disease have may also be at increased risk of intensive care unit admission³.

There has been a temporal association of increased incidence of rashes such as morbilliform, urticarial, vesiculobullous and livido during COVID-19 circulation in the community⁸. Specifically, a chilblains or pernio-like rash involving the feet (86%), feet and hands (7%) and hands alone (6%) seems to have peak incidence in previously healthy teenagers and has been reported during the COVID-19 surge, although not confirmed with testing. The rash may be asymptomatic (25%), painful (27%) or itchy (27%) and is expected to resolve without treatment within 1-2 weeks. The rash has been reported either as an isolated finding or after mild viral symptoms have resolved^{9,10}.

There are reports of much higher than expected rates of a Multisystem Inflammatory Syndrome with some similarities to Kawasaki Syndrome in areas with a high incidence of COVID-19. Some of these children had positive PCR and/or serologic evidence of COVID-19 infection. These children have significant myocardial dysfunction and tend to be older than typical Kawasaki¹¹.

Quick Facts

- » In a series of 2,143 pediatric patients from China¹²:
 - ~4% were asymptomatic
 - 51% had mild illness
 - 39% had moderate illness.
 - 5% had severe illness needing admission
 - less than 1% had critical illness (needing PICU support)
 - Only 1/3 of patients in this study had a confirmatory test for COVID-19.
- » Adult patients present with severe/critical illness in 18.5% of cases.
- » Critical illness in children is rare:
 - 1.8% of infants
 - 0.3% of children 1-18yrs
- » There are case reports of pediatric deaths but this is extremely uncommon.
- » Clinicians need to be vigilant in using PPE and assessing children as mild symptoms could easily be overlooked by their caregivers and overlap with other common respiratory illnesses.
- » **Screening** guidelines change frequently in response to local transmission patterns. Check with your local Public Health Unit algorithm for the most up to date recommendations.



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Treatment

Supportive management of complications including oxygen, intravenous hydration, high flow oxygen, non-invasive ventilator support and tracheal intubation may be required.

There are no completed trials on the safety and efficacy of antivirals and immunomodulatory agents in patients with COVID-19. Lopinavir/ritonavir (Kaletra) and hydroxychloroquine (Plaquenil) are being investigated in clinical trials (canada-covid.idtrials.com) for the treatment of COVID-19, but should not be used outside a trial setting.

Some patients in the original cohorts in China were empirically treated with antibiotics but the rate of secondary bacterial infection appears to be low¹³. Empiric antibiotics are not recommended unless there is clear evidence of a secondary bacterial process.

There is no evidence to suggest that ibuprofen worsens COVID-19 illness despite initial press coverage of anecdotal data. Recommendations from Health Canada and the [Canadian Paediatric Society](http://www.pediatriconline.org) suggest that ibuprofen and acetaminophen can be used to treat discomfort in children more than 6 months of age with COVID-19¹⁴.

Transmission of this respiratory virus occurs via the droplet and contact routes. Patients must be cared for under droplet/contact precautions using a mask with eye protection, gown and gloves¹⁵. Any aerosol generating medical procedure (AGMP) risks generation of small droplet nuclei and requires the use of an N95 respirator mask in addition to eye protection, gown and gloves. AGMP should be completed in an airborne infection isolation room (AIIR, otherwise known as negative pressure room). If an AIIR is not available, a room with a closed door with limited entry is required¹⁶.

AGMPs should be minimized. Delivery of nebulized medications via simple facemask (salbutamol, epinephrine) should be minimized. Every effort should be made to deliver these medications via MDI instead (not an AGMP). Other AGMPs that may be performed in the ED and would require airborne precautions include:

- » High Flow Nasal Cannula (Optiflow or Airvo)
- » Positive pressure ventilation with inadequate seal
- » Tracheal intubation and extubation
- » Tracheal suction without a closed system
- » Cardiopulmonary resuscitation (before tracheal intubation)

Criteria for contacting Pediatric Referral Centre

Consider early referral to your Pediatric Referral Centre for patients with:

Underlying cardiac or pulmonary diseases, neuromuscular disease or immunocompromised status, rapid progression of symptoms, severe respiratory distress, altered level of consciousness

Discharge Resource for Families:

Aim camera at QR code or:



- English: <https://youtu.be/CcnT2q4locU>
- French: <https://youtu.be/CE-d4xxolxl>

The purpose of this document is to provide healthcare professionals with key facts and recommendations for caring for children with COVID-19 in the ED. This document uses the best available knowledge at the time of publication. However, healthcare professionals should continue to use their own judgement and take into consideration context, resources and other relevant factors. The TREKK Network is not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document, including loss or damages arising from any claims made by a third party. The TREKK Network also assumes no responsibility or liability for changes made to this document without its consent.

References

1. Parri N, Lenge M, Buonsenso D, et al. [Children with Covid-19 in Pediatric Emergency Departments in Italy](https://doi.org/10.1056/NEJMoa2007617). *New England Journal of Medicine*. 2020; doi: 10.1056/NEJMoa2007617
2. Li W, Zhang B, Lu J, et al. [The characteristics of household transmission of COVID-19](https://doi.org/10.1093/cid/cia450). Oxford University Press. 2020; doi: 10.1093/cid/cia450
3. US Centers for Disease Control and Prevention. [Coronavirus Disease 2019 in Children – United States, February 12–April 2, 2020](https://doi.org/10.15585/mmwr.mm6914e4). *MMWR Morb Mortal Wkly Rep*. 2020; doi: 10.15585/mmwr.mm6914e4
4. Gudbjartsson DF, Helgason A, Jonsson H, et al. [Spread of SARS-CoV-2 in the Icelandic Population](https://doi.org/10.1056/NEJMoa2006100). *New England Journal of Medicine*. 2020; doi:10.1056/NEJMoa2006100.
5. Lu X, Zhang L, Du H, et al. [SARS-CoV-2 Infection in Children](https://doi.org/10.1056/NEJMoa2005073). *New England Journal of Medicine*. 2020; doi: 10.1056/NEJMoa2005073
6. Yi X, Li X, Zhu B, et al. [Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding](https://doi.org/10.1038/s41591-020-0817-4). *Nature Medicine*. 2020; doi: 10.1038/s41591-020-0817-4
7. Shekerdemian L, Mahmood N, Wolfe K, et al. [Characteristics and Outcomes of Children With Coronavirus Disease 2019 \(COVID-19\) Infection Admitted to US and Canadian Pediatric Intensive Care Units](https://doi.org/10.1001/jamapediatrics.2020.1948). *JAMA Pediatr*. 2020; doi: 10.1001/jamapediatrics.2020.1948
8. Casas G, Catalá A, Hernández G, et al. [Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases](https://doi.org/10.1111/BJD.19163). *British Journal of Dermatology*. 2020; doi: 10.1111/BJD.19163
9. Piccolo V, Neri I, Filippeschi C, et al. [Chilblain-like lesions during COVID-19 epidemic: a preliminary study on 63 patients](https://doi.org/10.1111/jdv.16526). *Journal of the European Academy of Dermatology and Venereology*. 2020; doi: 10.1111/jdv.16526
10. Recalcati S, Barbagallo T, Frasin LA, et al. [Acral cutaneous lesions in the Time of COVID-19](https://doi.org/10.1111/jdv.16533). *Journal of the European Academy of Dermatology and Venereology*. 2020; doi: 10.1111/jdv.16533
11. Riphagen S, Gomez X, Gonzalez-Martinez C, et al. [Hyperinflammatory shock in children during COVID-19 pandemic](https://doi.org/10.1016/S0140-6736(20)31094-1). *The Lancet*. 2020; doi:10.1016/S0140-6736(20)31094-1
12. Dong Y, Mo X, Hu Y, et al. [Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China](https://doi.org/10.1542/peds.2020-0702). *Pediatrics*. 2020; doi: 10.1542/peds.2020-0702
13. Zheng F, Liao C, Fan Q, et al. [Clinical Characteristics of Children with Coronavirus Disease 2019 in Hubei, China](https://doi.org/10.1007/s11596-020-2172-6). *Current Medical Science*. 2020; doi: 10.1007/s11596-020-2172-6
14. Rieder M, 't Jong G, Salvadori M, et al. [Can NSAIDs be used in children when COVID-19 is suspected? Canadian Pediatric Society](https://doi.org/10.1007/s11596-020-2172-6). 2020
15. Public Health Agency of Canada. [Infection prevention and control for COVID-19: interim guidance for outpatient and ambulatory care settings](https://www150.com/infocentre/infocentre.aspx?lang=eng). Last updated on May 23, 2020.
16. Alberta Health Services – Emergency Strategic Clinical Network. [Care of the Adult Suspected/Confirmed COVID-19/ILI Patient in the Emergency Department/Urgent Care Centre](https://www150.com/infocentre/infocentre.aspx?lang=eng). Last updated on May 20, 2020.