Pediatric Cases of COVID-19

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Summary:

- **Clinical Features**
  - According to the CDC, incubation period for COVID-19 in the pediatric population is around 14 days, similar to adult patients. Common signs and symptoms include fever, cough, nasal congestion, sore throat, shortness of breath, nausea/vomiting, diarrhea, fatigue, headache, and muscle pain.[1] Fever, cough and shortness of breath are the predominant symptoms in pediatric patients. It is important to note that children with COVID-19 may not always present with fever and cough, unlike adult patients.[2] Most pediatric patients that contract COVID-19 do not require mechanical respiration, but the few (~2%) typically have comorbidities such as liver disease, cancer, and GI conditions.[3]

- **Disease Progression**
  - Mild/moderate: No new or increased supplemental oxygen required.[4]
  - Severe: New requirement for supplemental oxygen or increase requirement from baseline without the need of new or increased noninvasive or invasive mechanical ventilation.[4]
  - Critical: New or increased need for noninvasive or invasive mechanical ventilation. Or if there is sepsis or multiorgan failure or worsening clinical trajectory.[4]

- **Current Treatment Options**
  - Currently, there is no data to recommend the use for or against antiviral or immunomodulatory agents in pediatric patients. Antiviral agents can be considered on a case by case basis. If the decision of an antiviral treatment is made, it should be only done in a clinical trial setting. Antivirals should be considered only in children with positive tests for COVID-19. In the event that an antiviral is used, the preferred agent is Remdesivir. Remdesivir is a nucleoside analog prodrug that binds to viral RNA dependent RNA polymerase which results in premature RNA chain termination. Hydroxychloroquine can be used for children who are not candidates to receive Remdesivir, if Remdesivir is not available or if waiting for delivery of Remdesivir to the hospital. Currently, there are recommendations against the use of hydroxychloroquine in combination with azithromycin in children with COVID-19 and against the use of lopinavir-ritonavir and ribavirin in combination.[4]
  - Nearly all children based COVID-19 cases are treated mainly with supportive care. This includes mild/moderate, severe, and critical care patients. Supportive care includes supplemental oxygen, ventilatory support, and addition of

fluids and electrolytes. Empiric antibiotics are given based on community or nosocomial pneumonia.[5] In the case that there is evidence of bacterial infection present, broad spectrum antibiotics can be administered.[6]

- **Multiorgan Inflammatory Syndrome in Children (MIS-C)**
  - MIS-C is an inflammatory reaction that is associated with COVID-19 in children under 21. It is defined as a persistent fever, inflammatory markers (neutrophilia, elevated CRP, etc.), and evidence of single or multi-organ damage with or without additional features (hypoxia and hypotension). MIS-C has a similar presentation to Kawasaki disease, toxic shock syndrome, bacterial sepsis, and macrophage activation syndromes. Bacterial infections may or may not be present in blood cultures. [7]
  - Management of MIS-C: All patients should be treated as COVID-19 positive. Blood cultures should be taken per sepsis protocol and empiric antibiotics should be started immediately. Cardiorespiratory measures should be monitored closely such as oxygen saturation, blood pressure, and mean arterial pressure. Consider IVIG with aspirin therapy if Kawasaki or toxic shock syndrome are not ruled out. For mild to moderate cases of MIS-C, supportive care is recommended. In patients who are deteriorating or severe, they should be transferred to the PICU. Antiviral therapies should only be considered in a clinical trial setting.[7]

Literature:

Trial	Study Design	Baseline Characteristics	Efficacy	Safety	Conclusions
Clinical Characteristics and Outcomes of Pediatric COVID-19 (PERN-COVID-19) NCT04330261 (**ongoing**) [8]	Prospective observational	Less than 18 years of age Undergo SARS-CoV-2 testing Presenting to ED for care	No results reported as of 6/2/2020	No safety conclusions as of 6/2/2020	No conclusions as of 6/2/2020

Resources:

1. Freedman S; Clinical Characteristics and Outcomes of Pediatric COVID-19 (PERN-COVID-19); Clinicaltrials.gov; 2020 April 1; https://clinicaltrials.gov/ct2/show/study/NCT04330261

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4. Chiotos K., Hayes M., Kimberlin DW., et al. Multicenter Initial Guidance on Use of Antivirals for Children With Coronavirus Disease 2019/Severe Acute Respiratory Syndrome Coronavirus 2. *Journal of the Pediatric Infectious Disease Society.* 2020; piaa045
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