Centers for Disease Control and Prevention

Coronavirus Disease 2019 (COVID-19)

Information for Pediatric Healthcare Providers

Updated April 17, 2020

Summary of Recent changes

Revisions were made on April 14, 2020, to reflect the following:

- Updated epidemiology, including the pediatric proportion of COVID-19 cases in United States, China, Italy, and Spain
- Added incubation period and clinical presentation (symptoms)
- Added illness severity, treatment and prevention, and investigational therapeutics
- Removed information on SARS and MERS and replaced with newly published pediatric studies on COVID-19
- Added references

Who this is for: Pediatric Healthcare Providers

What this is for: To inform pediatric healthcare providers of information available on children with COVID-19.

How to use: Refer to this information when managing pediatric patients with confirmed or suspected COVID-19.

Maintaining Childhood Immunizations During COVID-19 Pandemic

The COVID-19 pandemic is changing rapidly and continues to affect communities across the United States differently. Some of the strategies used to slow the spread of disease in communities include postponing or cancelling non-urgent elective procedures and using telemedicine instead of face-to-face encounters for routine medical visits.

Ensuring the delivery of newborn and well-child care, including childhood immunization, requires different strategies. Healthcare providers in communities affected by COVID-19 are using strategies to separate well visits from sick visits . Examples include:

- Scheduling well visits in the morning and sick visits in the afternoon
- Separating patients spatially, such as by placing patients with sick visits in different areas of the clinic or another location from patients with well visits.
- Collaborating with providers in the community to identify separate locations for holding well visits for children.

Because of personal, practice, or community circumstances related to COVID-19, some providers may not be able to provide well child visits, including provision of immunizations, for all patients in their practice. **If a practice can provide only limited well child visits, healthcare providers are encouraged to prioritize newborn care and vaccination of infants and young children (through 24 months of age) when possible**. CDC is monitoring the situation and will continue to provide guidance.

Burden of COVID-19 Among Children

Pediatric cases of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), have been reported. However, there are relatively fewer cases of COVID-19 among children compared to cases among adult patients.[1-5]

- In the United States, 2% of confirmed cases of COVID-19 were among persons aged <18 years.[4]
- In China, 2.2% of confirmed cases of COVID-19 were among persons aged <19 years old.[1]
- In Italy, 1.2% of COVID-19 cases were among children aged ≤18 years.[2]
- In Spain, 0.8% of confirmed cases of COVID-19 were among persons aged < 18 years.[5]

Among cases in children reported from China, most had exposure to household members with confirmed COVID-19.[6-10]

Clinical Presentation in Children

Symptoms in Pediatric Patients

Illness among pediatric cases appear to be mild, with most cases presenting with symptoms of upper respiratory infection such as:

- Fever
- Cough
- Nasal congestion
- Rhinorrhea
- Sore throat

Outcomes in Pediatric Patients

Relatively few children with COVID-19 are hospitalized, and fewer children than adults experience fever, cough, or shortness of breath. Severe outcomes have been reported in children including SARS-CoV-2 associated deaths. Hospitalization was most common among pediatric patients aged <1 year and those with underlying conditions.

Although most cases reported among children to date have not been severe, clinicians should maintain a high index of suspicion for SARS-CoV-2 infection in children and monitor for progression of illness, particularly among infants and children with underlying conditions.

Incubation Period

While data on the incubation period for COVID-19 in the pediatric population are limited, it is thought to extend to 14 days, similar to adult patients with COVID-19.[11] In studies from China, the reported incubation period among pediatric patients ranged from 2 to 10 days.[7,12]

Clinical Presentation

Pediatric patients with COVID-19 may experience the following signs or symptoms over the course of the disease:[3,4,6,13-15]

- Fever
- Cough
- Nasal congestion or rhinorrhea
- Sore throat
- Shortness of breath
- Diarrhea
- Nausea or vomiting
- Fatigue
- Headache

- Headache
- Myalgia
- Poor feeding or poor appetite

The predominant signs and symptoms of COVID-19 reported to date among all patients are similar to other viral respiratory infections, including fever, cough, and shortness of breath. Although these signs and symptoms may occur at any time during the overall disease course, children with COVID-19 may not initially present with fever and cough as often as adult patients.[4,15,16] In a report of nine hospitalized infants in China with confirmed COVID-19, only half presented with fever.[9] Gastrointestinal symptoms, including abdominal pain, diarrhea, nausea, and vomiting, were reported in a minority of adult patients.[17] In one pediatric case of COVID-19, diarrhea was the only symptom reported.[10]

There have been multiple reports to date of children with asymptomatic SARS-CoV-2 infection.[3,6,14,15] In one study, up to 13% of pediatric cases with SARS-CoV-2 infection were asymptomatic.[16] The prevalence of asymptomatic SARS-CoV-2 infection and duration of pre-symptomatic infection in children are not well understood, as asymptomatic individuals are not routinely tested.

Signs and symptoms of COVID-19 in children may be similar to those for common viral respiratory infections or other childhood illnesses. It is important for pediatric providers to have an appropriate suspicion of COVID-19, but also to continue to consider and test for other diagnoses, such as influenza (see CDC's Flu Information for Healthcare Professionals for more information).

Clinical Course and Complications in Children

The largest study of pediatric patients (>2,000) with COVID-19 from China reported that illness severity ranged from asymptomatic to critical:[16]

- Asymptomatic (no clinical signs or symptoms with normal chest imaging): 4%
- Mild (mild symptoms, including fever, fatigue, myalgia, cough): 51%
- Moderate (pneumonia with symptoms or subclinical disease with abnormal chest imaging): 39%
- Severe (dyspnea, central cyanosis, hypoxia): 5%
- Critical (acute respiratory distress syndrome [ARDS], respiratory failure, shock, or multi-organ dysfunction): 0.6%

Based on these early studies, children of all ages are at risk for COVID-19; however, complications of COVID-19 appear to be milder among children compared with adults based on limited reports from China[16] and the U.S.[4,18] In children, SARS-CoV-2 may have more affinity for the upper respiratory tract (including nasopharyngeal carriage) than the lower respiratory tract.[16]

As of April 2, 2020, infants aged <1 year accounted for 15% of pediatric COVID-19 cases in the U.S.[4] However, this age group remains underrepresented among COVID-19 cases in patients of all ages (0.3%) compared to their percentage in the U.S. population (1.2%). Relative to adult patients with COVID-19, there were fewer children with COVID-19 requiring hospitalization (6–20%) and ICU admission (0.6–2%).[4] Although severe complications (e.g., acute respiratory distress syndrome, septic shock) have been reported in children of all ages,[4,9,12,19] they appear to be infrequent. Based on limited data on children with either suspected or confirmed infection with SARS-CoV-2, infants (<12 months of age) may be at higher risk of severe or critical disease compared with older children,[16] with hospitalization being most common among children aged <1 year and those with underlying conditions, such as chronic lung disease (including asthma), cardiovascular disease, and immunosuppression.[4] Other reports describe a mild disease course, including in infants.[7,9,16]

As of March 8, 2020, just one pediatric death was reported among confirmed COVID-19 cases in China,[15] and as of March 15, 2020, none of the 1,625 deaths associated with COVID-19 in Italy were among children aged ≤18 years.[2] In Spain, no pediatric deaths were reported as of March 16, 2020.[5] In the U.S., as of April 2, 2020, there have been three deaths among children with laboratory-confirmed SARS-CoV-2 infection that have been reported to CDC, but the contribution of SARS-CoV-2 infection to the cause of death in these cases is unclear.[4]

There are limited data on laboratory findings associated with COVID-19 in pediatric patients. Unlike adult patients with COVID-19,[20,21] there have been no consistent leukocyte abnormalities reported in pediatric patients.[22] Additional studies are required to understand the laboratory findings associated with pediatric cases of COVID-19.

Chest x-rays of children with COVID-19 show patchy infiltrates consistent with viral pneumonia, and chest CT scans have shown nodular ground glass opacities;[14,23,24] however, these findings are not specific to COVID-19, may overlap with other diagnoses, and some children may have no radiographic abnormalities. Chest radiograph or CT alone is not recommended for the diagnosis of COVID-19.

The American College of Radiology also does not recommend CT for screening or as a first-line test for diagnosis of COVID-19. (See American College of Radiology Recommendations)

Treatment and Prevention

Currently, there are no specific drugs approved by the U.S. Food and Drug Administration (FDA) for COVID-19. Treatment remains largely supportive and includes prevention and management of complications. Healthcare facilities should ensure that infection prevention and control policies and universal source control are in place to minimize chance of exposure to SARS-CoV-2 among providers, patients, and families. For infection prevention and control considerations for infants born to mothers with known or suspected COVID-19, please visit Considerations for Inpatient Obstetric Healthcare Settings. For infection prevention and control considerations for other pediatric healthcare facilities, please visit Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings.

The decision to manage a pediatric patient with mild to moderate COVID-19 in the outpatient or inpatient setting should be decided on a case-by-case basis. Pediatric healthcare providers should consider the patient's clinical presentation, requirement for supportive care, underlying conditions, and the ability for parents or guardians to care for the child at home. For more information on home care of patients not requiring hospitalization visit: Interim Guidance for Implementing Home Care of People Not Requiring Hospitalization for Coronavirus Disease 2019 (COVID-19). There have been limited data on which underlying conditions in children might increase their risk of infection or disease severity. People of all ages, including children and adolescents, with certain underlying medical conditions such as chronic lung disease or moderate to severe asthma, serious heart conditions (e.g., congenital heart defects), immunocompromised conditions (e.g., cancer undergoing treatment), severe obesity (body mass index [BMI]≥40), diabetes, chronic kidney disease on dialysis or liver disease might be at higher risk for severe illness from COVID-19 and should be monitored for symptoms or signs of concern by their caregivers at home and by their clinical providers.

Severe complications associated with COVID-19 in pediatric patients have not been well-described. However, the treatment of severe and critical cases of pediatric patients with COVID-19 in the hospital may include management of pneumonia, respiratory failure, exacerbation of underlying conditions, sepsis or septic shock, or secondary bacterial infection. Situations in which a patient requires prolonged hospitalization may also result in secondary nosocomial infections.

The World Health Organization has published guidelines for the management of adult and pediatric patients with COVID-19 in the inpatient setting or ICU. For more information visit: Interim Guidance on Clinical Management of Severe Acute Respiratory Infection when Novel Coronavirus (nCoV) Infection is Suspected (WHO) .

The Surviving Sepsis Campaign has published guidelines for the management of septic shock and sepsis-associated organ dysfunction in children. For more information visit: Surviving Sepsis Campaign International Guidelines for the Management of Septic Shock and Sepsis-Associated Organ Dysfunction in Children .

For information regarding discontinuing transmission-based precautions and disposition of patients with COVID-19 in healthcare settings, please see: Discontinuation of Transmission-Based Precautions and Disposition of Patients with COVID-19 in Healthcare Settings (Interim Guidance)

For information about clinical trials involving remdesivir or other investigational therapeutics, please visit Information for Clinicians on Therapeutic Options for COVID-19 Patients .

Additional Information

- What Healthcare Personnel Should Know about Caring for Patients with Confirmed or Possible COVID-19 Infection
- Interim Clinical Guidance for Management of Patients with Confirmed COVID-19
- Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed COVID-19 in Healthcare Settings
- Frequently Asked Questions and Answers: COVID-19 and Pregnancy

- Frequently Asked Questions and Answers: COVID-19 and Pregnancy
- Interim Guidance on Breastfeeding for a Mother Confirmed or Under Investigation For COVID-19
- Steps Healthcare Facilities Can Take to Prepare for COVID-19

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Page last reviewed: April 17, 2020