Coronavirus Disease 2019 (COVID-19)

Information for Pediatric Healthcare Providers

Updated May 29, 2020

Summary of Recent Changes

Revisions were made on May 29, 2020, to reflect the following:

- Refer to new multisystem inflammatory syndrome in children (MIS-C) guidance for healthcare providers

Revisions were made on May 20, 2020, to reflect the following:

- Refer to new guidance for Evaluation and Management Considerations for Neonates At Risk for COVID-19

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. For healthcare providers caring for neonates (≤28 days old), please refer to CDC guidance for evaluating and managing neonates at risk for COVID-19.

Maintaining Childhood Immunizations and Well-Child Care During COVID-19 Pandemic

Stay-at-home and shelter-in-place orders have resulted in declines in outpatient pediatric visits and fewer vaccine doses being administered, leaving children at risk for vaccine-preventable diseases. As states develop plans for reopening, healthcare providers are encouraged to **work with families to keep or bring children up to date with their vaccinations**. Primary care practices in communities affected by COVID-19 should continue to use strategies to separate well visits from sick visits. Examples could include:

- Scheduling sick visits and well-child visits during different times of the day
- Reducing crowding in waiting rooms, by asking patients to remain outside (e.g., stay in their vehicles, if applicable) until they are called into the facility for their appointment, or setting up triage booths to screen patients safely
- Collaborating with healthcare providers in the community to identify separate locations for providing well visits for children

Healthcare providers should **identify children who have missed well-child visits and/or recommended vaccinations** and contact them to schedule in person appointments, starting with newborns, infants up to 24 months, young children and extending through adolescence. State-based immunization information systems and electronic health records may be able to support this work.

All newborns should be seen by a pediatric healthcare provider shortly after hospital discharge (3 to 5 days of age). Ideally, **newborn visits should be done in person** during the COVID-19 pandemic in order to evaluate for dehydration and jaundice, ensure all components of newborn screening were completed and appropriate confirmatory testing and follow-up is arranged, and evaluate mothers for postpartum depression. **Developmental surveillance and early childhood screenings**, including developmental and autism screening, **should continue** along with referrals for early intervention services and further evaluation if concerns are identified.

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 COVID-19 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
- 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 less common 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]

In the United States, 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]

Multisystem Inflammatory Syndrome in Children (MIS-C)

CDC is collaborating with domestic and international partners to learn more about multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19.

Patients with MIS-C have presented with a persistent fever and a variety of signs and symptoms including multiorgan (e.g., cardiac, gastrointestinal, renal, hematologic, dermatologic, neurologic) involvement, and elevated inflammatory markers.

Healthcare providers who have cared or are caring for patients younger than 21 years of age meeting MIS-C criteria should report suspected cases to their local, state, or territorial health department. For more information including a full case definition, please visit MIS-C Information for Healthcare Providers.

Testing, Laboratory Findings, and Radiographic Findings

Diagnosis of COVID-19 requires detection of SARS-CoV-2 RNA by reverse transcription polymerase chain reaction (RT-PCR) testing. Testing strategies, including clinical criteria for considering testing and recommended specimen type, are the same for children and adults. CDC's guidance for evaluation and management of neonates at risk for COVID-19 details specific testing considerations for newborns. For more information about testing, visit Evaluating and Testing Persons for Coronavirus Disease 2019 (COVID-19), Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons for COVID-19, and Frequently Asked Questions on COVID-19 Testing at Laboratories.

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 have shown 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 treatment or prevention of COVID-19. Treatment remains largely supportive and includes prevention and management of complications. Healthcare facilities, including pediatric healthcare facilities, should ensure that infection prevention and control policies, including universal source control, are in place to minimize chance of exposure to SARS-CoV-2 among providers, patients, and families. CDC has published specific guidance, including infection prevention and control considerations, for inpatient obstetric healthcare settings and the evaluation and management of neonates at risk for COVID-19.

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. One newly described severe complication, multisystem inflammatory syndrome (MIS-C), is being investigated by CDC and partners. 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.

Several organizations have published guidelines related to the treatment and management of COVID-19 patients, including pediatric patients:

- The National Institutes of Health (NIH) has published Coronavirus Disease 2019 (COVID-19) Treatment Guidelines that address prophylaxis use, testing, and management of COVID-19 patients and include special considerations for children. The recommendations in the guidelines were based on scientific evidence and expert opinion and will be updated as more data becomes available.
- The World Health Organization (WHO) has published Interim Guidance on Clinical Management of Severe Acute Respiratory Infection when Novel Coronavirus (nCoV) Infection is Suspected .
- The Surviving Sepsis Campaign has published 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).

Additional Information

- MIS-C Information for Healthcare Providers
- Interim Clinical Guidance for Management of Patients with Confirmed COVID-19
- Considerations for Inpatient Obstetric Healthcare Settings
- Evaluation and Management Considerations for Neonates At Risk for COVID-19
- Guidance on Care for Breastfeeding Women
- Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed COVID-19 in Healthcare Settings
- Health Alert Network (HAN): Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with Coronavirus Disease 2019 (COVID-19)
- Steps Healthcare Facilities Can Take to Prepare for COVID-19
- What Healthcare Personnel Should Know about Caring for Patients with Confirmed or Possible COVID-19 Infection
- National Institutes of Health: Coronavirus Disease 2019 (COVID-19) Treatment Guidelines

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