



Clinical Management of Children Summary

Last Updated: August 8, 2022

Data from the Centers for Disease Control and Prevention demonstrate a lower incidence of SARS-CoV-2 infection, severe disease, and death in children compared with adults.¹⁻⁴ Although only a small percentage of children with COVID-19 will require medical attention, the percentage of intensive care unit admissions among hospitalized children is comparable to the percentage among hospitalized adults with COVID-19.⁵⁻¹⁶

Risk factors for severe COVID-19 have been identified through observational studies and meta-analyses primarily conducted before the availability of COVID-19 vaccines. Risk factors include having ≥ 1 severe comorbid conditions, such as medical complexity with respiratory technology dependence, a neurologic condition resulting in impaired mucociliary clearance, obesity (particularly severe obesity), severe underlying cardiac or pulmonary disease, or severely immunocompromised status. However, pediatric data on risk factors for severe COVID-19 are generally more limited and provide lower certainty than data for adults.

In general, COVID-19 has similar clinical manifestations and disease stages in children and adults, including an early phase driven by viral replication and a late phase that appears to be driven by a dysregulated immune/inflammatory response to SARS-CoV-2 that leads to tissue damage. Respiratory complications in young children that can occur during the early clinical phase include croup and bronchiolitis. In addition, a small number of children who have recovered from acute SARS-CoV-2 infection develop multisystem inflammatory syndrome in children (MIS-C) 2 to 6 weeks after infection. MIS-C is a postinfectious inflammatory condition that can lead to severe organ dysfunction, which is in contrast to COVID-19, the acute, primarily respiratory illness due to infection with SARS-CoV-2.

There are no results available from clinical trials that evaluated treatments for COVID-19 in children, and data from observational studies are limited. Applying adult data from COVID-19 trials to children is a unique challenge because most children experience a mild course of illness with COVID-19. Relative to adults, children with COVID-19 have substantially lower mortality and less need for hospitalization. Because of these differences in epidemiology and disease severity, the effect sizes for children are likely to be smaller than those observed in adults; therefore, to produce a beneficial outcome, the number needed to treat is higher. Collectively, these factors influence the risk versus benefit balance for pharmacologic therapies in children.

In the absence of sufficient clinical trial data on the treatment of children with COVID-19, the COVID-19 Treatment Guidelines Panel's (the Panel) recommendations for the therapeutic management of children are based largely on adult safety and efficacy data from clinical trials, the child's risk of disease progression, and expert opinion. In general, the older the child and the more severe the disease, the more reasonable it is to follow treatment recommendations for adult patients with COVID-19.

The Panel's recommendations for the management of children with COVID-19 or MIS-C are summarized in the tables below. Table 3a provides recommendations for the therapeutic management of nonhospitalized children with COVID-19. The Panel's recommendations are stratified by age (per the Food and Drug Administration Emergency Use Authorizations) and risk level. See [Therapeutic Management of Nonhospitalized Children With COVID-19](#) for more information. Table 3b includes a framework to help clinicians evaluate the risk for severe COVID-19 based on patient conditions and COVID-19 vaccination status.

The recommendations for hospitalized children in Table 3c are stratified by disease severity. See [Therapeutic Management of Hospitalized Children With COVID-19](#) for more information. Table 3d summarizes the recommendations for the therapeutic management of MIS-C. For the rationale behind these recommendations and supporting data, see [Therapeutic Management of Hospitalized Pediatric Patients With Multisystem Inflammatory Syndrome in Children \(MIS-C\) \(With Discussion on Multisystem Inflammatory Syndrome in Adults \[MIS-A\]\)](#).

Table 3a. Therapeutic Management of Nonhospitalized Children With COVID-19

Risk of Severe COVID-19	Panel's Recommendations	
	Aged 12–17 years	Aged <12 years
Symptomatic, Regardless of Risk Factors	<ul style="list-style-type: none"> • Provide supportive care (AIII). 	<ul style="list-style-type: none"> • Provide supportive care (AIII).
High Risk^{a,b}	<ul style="list-style-type: none"> • Use 1 of the following options (listed in order of preference):^c <ul style="list-style-type: none"> • Ritonavir-boosted nirmatrelvir (Paxlovid) within 5 days of symptom onset (BIII) • Remdesivir within 7 days of symptom onset (CIII) • There is insufficient evidence to recommend either for or against the use of bebtelovimab.^d 	<ul style="list-style-type: none"> • Ritonavir-boosted nirmatrelvir is not authorized by the FDA for use in children aged <12 years. • There is insufficient evidence to recommend either for or against routine use of remdesivir. Consider treatment based on age and other risk factors.
Intermediate Risk^{b,e}	<ul style="list-style-type: none"> • There is insufficient evidence to recommend either for or against the use of any antiviral therapy. Consider treatment based on age and other risk factors. 	<ul style="list-style-type: none"> • There is insufficient evidence to recommend either for or against routine use of remdesivir.
Low Risk^{b,f}	<ul style="list-style-type: none"> • Manage with supportive care alone (BIII). 	<ul style="list-style-type: none"> • Manage with supportive care alone (BIII).
<p>Rating of Recommendations: A = Strong; B = Moderate; C = Weak</p> <p>Rating of Evidence: I = One or more randomized trials without major limitations; IIa = Other randomized trials or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert opinion</p>		

^a Molnupiravir is not authorized by the FDA for use in children aged <18 years and should not be used.

^b See Table 3b for the Panel's framework for assessing the risk of progression to severe COVID-19 based on patient conditions and COVID-19 vaccination status.

^c Initiate treatment as soon as possible after symptom onset.

^d Bebtelovimab is the only anti-SARS-CoV-2 mAb active against the current dominant circulating Omicron subvariants. In nonhospitalized adults, bebtelovimab may be used as an alternative therapy when none of the preferred therapies (i.e., ritonavir-boosted nirmatrelvir, remdesivir) are available, feasible to use, or clinically appropriate.

^e The relative risk of severe COVID-19 for intermediate-risk patients is lower than the risk for high-risk patients but higher than the risk for low-risk patients.

^f Low-risk patients include those with comorbid conditions that have a weak or unknown association with severe COVID-19. Patients with no comorbidities are included in this group.

Key: FDA = Food and Drug Administration; mAb = monoclonal antibody; the Panel = the COVID-19 Treatment Guidelines Panel

Table 3b. The Panel’s Framework for Assessing the Risk of Progression to Severe COVID-19 Based on Patient Conditions and COVID-19 Vaccination Status

Conditions	Risk Level by Vaccination Status ^a		
	Unvaccinated	Primary Series	Up to Date
Strong or Consistent Association With Progression to Severe COVID-19			
<ul style="list-style-type: none"> Moderately or severely immunocompromised (see Special Considerations in People Who Are Immunocompromised) 	High		
<ul style="list-style-type: none"> Obesity (BMI \geq95th percentile for age), especially severe obesity (BMI \geq120% of 95th percentile for age)^b Medical complexity with dependence on respiratory technology^c Severe neurologic, genetic, metabolic, or other disability that results in impaired airway clearance or limitations in self care or activities of daily living Severe asthma or other severe chronic lung disease requiring \geq2 inhaled or \geq1 systemic medications daily Severe congenital or acquired cardiac disease Multiple moderate to severe chronic diseases 	High	Intermediate	
Moderate or Inconsistent Association With Progression to Severe COVID-19			
<ul style="list-style-type: none"> Aged <1 year Prematurity in children aged \leq2 years Sickle cell disease Diabetes mellitus (poorly controlled) Nonsevere cardiac, neurologic, or metabolic disease^d 	Intermediate		
Weak or Unknown Association With Progression to Severe COVID-19			
<ul style="list-style-type: none"> Mild asthma Overweight Diabetes mellitus (well controlled) 	Low		

^a **Unvaccinated** = individuals who are not eligible for COVID-19 vaccination or are <2 weeks from the final dose of the primary series. **Vaccinated with primary series** = individuals who completed the primary series of 2 or 3 doses (the current CDC term is “fully vaccinated”) and are >2 weeks after the final dose of the primary series but have not received a booster, if they are eligible for a booster. Children aged <5 years are not currently eligible for booster doses. **Vaccinated and up to date** = individuals who received the recommended booster dose(s) if eligible or have completed the primary series but are not yet eligible for a booster. See the [CDC](#) for more information.

^b The degree of risk conferred by obesity in younger children is less clear than it is in older adolescents.

^c Includes tracheostomy or NIV.

^d Data for this group are particularly limited.

Key: BMI = body mass index; CDC = Centers for Disease Control and Prevention; NIV = noninvasive ventilation; the Panel = the COVID-19 Treatment Guidelines Panel

Table 3c. Therapeutic Management of Hospitalized Children With COVID-19

Disease Severity	Panel's Recommendations
Hospitalized for COVID-19	For children aged ≥ 12 years admitted for COVID-19, use prophylactic anticoagulation unless contraindicated (BIII).
Does Not Require Supplemental Oxygen	For children admitted for COVID-19 who are at the highest risk of progression to severe COVID-19, ^a consider using remdesivir ^b for children aged 12–17 years (CIII). There is insufficient evidence for using remdesivir in children aged 28 days to <12 years. For children admitted for reasons other than COVID-19 who have mild to moderate COVID-19 and are at the highest risk of progression, ^a refer to Therapeutic Management of Nonhospitalized Children With COVID-19 .
Requires Conventional Oxygen^c	Use 1 of the following options: <ul style="list-style-type: none"> • Remdesivir^b (BIII) • Dexamethasone plus remdesivir^b for children with increasing oxygen needs, particularly adolescents (BIII)
Requires Oxygen Through High-Flow Device or NIV^d	Use 1 of the following options: <ul style="list-style-type: none"> • Dexamethasone (BIII) • Dexamethasone plus remdesivir^b (BIII) For children who do not have rapid (e.g., within 24 hours) improvement in oxygenation after initiation of dexamethasone, baricitinib ^e or tocilizumab can be considered for children aged 12–17 years (BIII) and for children aged 2–11 years (CIII).
Requires MV or ECMO^f	Dexamethasone ^f (AIII) For children who do not have rapid (e.g., within 24 hours) improvement in oxygenation after initiation of dexamethasone, baricitinib ^e or tocilizumab may be considered for children aged 12–17 years (BIII) and for children aged 2–11 years (CIII).
<p>Rating of Recommendations: A = Strong; B = Moderate; C = Weak</p> <p>Rating of Evidence: I = One or more randomized trials without major limitations; IIa = Other randomized trials or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert opinion</p>	

^a For example, for children who are severely immunocompromised regardless of COVID-19 vaccination status and those who are unvaccinated and have additional risk factors for progression (see [Therapeutic Management of Nonhospitalized Children With COVID-19](#)).

^b The clinical benefit of remdesivir is greatest if it is initiated within 10 days of symptom onset. Remdesivir should be given for 5 days or until hospital discharge, whichever comes first.

^c Conventional oxygen refers to oxygen supplementation that is not high-flow oxygen, NIV, MV, or ECMO.

^d Patients who are receiving NIV or MV at baseline and require a substantial increase in baseline support should be treated per the recommendations for patients requiring new NIV or MV.

^e **Tofacitinib** is an alternative if baricitinib is not available (**BIII**).

^f For children who started receiving remdesivir before admission to the ICU, the remdesivir should be continued to complete the treatment course.

Key: ECMO = extracorporeal membrane oxygenation; ICU = intensive care unit; MV = mechanical ventilation; NIV = noninvasive ventilation

Table 3d. Therapeutic Management of Hospitalized Pediatric Patients With MIS-C

Patient Condition	Panel's Recommendations
MIS-C	<p>Initial treatment for MIS-C includes both immunomodulatory and antithrombotic therapy.</p> <p><i>Initial Immunomodulatory Therapy:</i></p> <ul style="list-style-type: none"> • IVIg 2 g/kg IBW/dose (up to a maximum total dose of 100 g)^a IV plus low-to-moderate dose methylprednisolone (1–2 mg/kg/day) IV^a or another glucocorticoid at an equivalent dose^a (AIIb). • The Panel recommends against the routine use of IVIG monotherapy for the treatment of MIS-C unless glucocorticoid use is contraindicated (AIIb). <p><i>Intensification Immunomodulatory Therapy:</i></p> <ul style="list-style-type: none"> • For children with refractory MIS-C who do not improve within 24 hours of initial immunomodulatory therapy, start one of the following (listed in alphabetical order) (AIII): <ul style="list-style-type: none"> • High-dose anakinra 5–10 mg/kg IV or SUBQ daily (BIIB), <i>or</i> • Higher-dose glucocorticoid (e.g., methylprednisolone 10–30 mg/kg/day IV or equivalent glucocorticoid) (BIIB),^b <i>or</i> • Infliximab^c 5–10 mg/kg IV for 1 dose (BIIB). <p><i>Antithrombotic Treatment:</i></p> <ul style="list-style-type: none"> • Low-dose aspirin (3–5 mg/kg/day, up to maximum daily dose of 81 mg) PO for all patients without risk factors for bleeding (AIII), AND • Anticoagulation for patients who fall under 1 of the following clinical scenarios: <ul style="list-style-type: none"> • Therapeutic anticoagulation for patients with large CAAs according to the American Heart Association guidelines for Kawasaki disease (AIII). • Therapeutic anticoagulation for patients with moderate to severe LV dysfunction who have no risk factors for bleeding (AIII). • For patients with MIS-C who do not have large CAAs or moderate to severe LV dysfunction, consider prophylactic or therapeutic anticoagulation on an individual basis, taking into consideration risk factors for thrombosis. See Table 3e for additional information.
<p>Rating of Recommendations: A = Strong; B = Moderate; C = Weak</p> <p>Rating of Evidence: I = One or more randomized trials without major limitations; IIa = Other randomized trials or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert opinion</p>	

^a Duration of therapy may vary. For more information, see [Therapeutic Management of Hospitalized Pediatric Patients With Multisystem Inflammatory Syndrome in Children \(MIS-C\) \(With Discussion on Multisystem Inflammatory Syndrome in Adults \[MIS-A\]\)](#).

^b In certain patients with severe illness, intensification therapy may include dual therapy with higher-dose glucocorticoids and infliximab or anakinra. Anakinra and infliximab **should not be given** in combination.

^c Infliximab **should not be used** in patients with macrophage activation syndrome.

Key: CAA = coronary artery aneurysm; IBW = ideal body weight; IV = intravenous; IVIG = intravenous immunoglobulin; LV = left ventricular; MIS-C = multisystem inflammatory syndrome in children; PO = oral; SUBQ = subcutaneously

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