<table>
<thead>
<tr>
<th>Illness Severity¹</th>
<th>Current Potential Therapy Options</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Supportive care</td>
<td>In both inpatients and outpatients, corticosteroids are not recommended.</td>
</tr>
<tr>
<td>Symptomatic not requiring supplemental oxygen (&gt; 94% on room air)</td>
<td>Supportive care</td>
<td>In both inpatients and outpatients, corticosteroids are not recommended.</td>
</tr>
<tr>
<td></td>
<td><strong>Outpatient:</strong> SARS-CoV-2 specific monoclonal antibody therapy is available for patients at high risk of progression to severe COVID-19 – referral can be made through e-mailing <a href="mailto:covidtherapeuticreferrals@mountsinai.org">covidtherapeuticreferrals@mountsinai.org</a> or calling 212-824-8390. Mount Sinai South Nassau in Long Island also provides SARS-CoV-2 specific monoclonal antibody therapy. Referrals for patients at high risk of progression to severe COVID-19 can be referred to the MSSN COVID Infusion Center at 516-632-4998. <strong>Inpatient:</strong> Inpatients not hospitalized for COVID-19 but who develop mild to moderate COVID-19 while hospitalized and who are at risk for progression to severe COVID-19 can be considered for EUA SARS-CoV-2 specific monoclonal antibody therapies if not requiring supplemental oxygen. Infectious diseases consultation and site-specific designee approval is required.</td>
<td>Emergency use authorization (EUA) monoclonal antibody therapies: <strong>Bamlanivimab/Etesevimab</strong>² The FDA issued an EUA on November 9, 2020 for bamlanivimab, a single monoclonal SARS-CoV-2 antibody, in select non-hospitalized patients 12 years of age or older (≥ 40kg) with a laboratory-confirmed COVID-19 (i.e., direct SARS-CoV2 viral test), symptom onset within 5 days and risk factors for progression to severe COVID-19. On February 9, 2021, an EUA was issued for the dual monoclonal SARS CoV-2 antibody cocktail, bamlanivimab/etesevimab for similar indications based on the findings of the BLAZE-1 trial. Due to an increase in the recovery of variants of interest and variants of concern with decreased susceptibility to bamlanivimab, single monoclonal therapy is not recommended. <strong>Casirivimab/Imdevimab</strong>³ The FDA issued an EUA on November 21, 2020 for casirivimab/imdevimab, a dual monoclonal SARS-CoV2 antibody cocktail, for similar indications as bamlanivimab/etesevimab.</td>
</tr>
<tr>
<td>Hospitalized requiring low-flow nasal cannula (SpO2 ≤ 94% on RA)</td>
<td>Supportive care</td>
<td><strong>Remdesivir</strong> — requires ID consultation and is non-formulary Remdesivir is not recommended in patients with an ALT &gt; 5 times with upper limit of normal. Remdesivir was FDA-approved for the treatment of COVID-19 on October 22, 2020 in hospitalized patients 12 years of age and older weighing at least 40 kg. <strong>Convalescent plasma</strong>⁴⁻⁷ — requires ID consultation On August 23, 2020, the FDA issued an EUA for the use of convalescent plasma (CP) in hospitalized patients and updated the EUA to only include high-titer CP on February 4, 2021. The Mount Sinai Health System has a protocol in place for the</td>
</tr>
</tbody>
</table>

¹ Asymptomatic: No symptoms. Symptomatic not requiring supplemental oxygen (≥ 94% on room air): No supplemental oxygen. Symptomatic requiring low-flow nasal cannula (SpO2 ≤ 94% on RA): Require low-flow nasal cannula.

² Bamlanivimab/Etesevimab was FDA approved for the treatment of COVID-19 on November 9, 2020.

³ Casirivimab/Imdevimab was FDA approved for the treatment of COVID-19 on November 21, 2020.

⁴ Convalescent plasma was FDA approved for the treatment of COVID-19 on August 23, 2020.

⁵ Remdesivir is a potent, broad-spectrum antiviral medicine that inhibits viral RNA-dependent RNA polymerase (RdRp), an enzyme required for the replication of SARS-CoV-2 and other RNA viruses.

⁶ Convalescent plasma is a treatment option for COVID-19 that uses blood from individuals who have survived the disease to provide antibodies that may help fight the virus.

⁷ The EUA for convalescent plasma was updated on February 4, 2021 to only include high-titer plasma.
<table>
<thead>
<tr>
<th>Hospitalized requiring non-rebreather, high flow nasal cannula, or non-invasive ventilation (i.e., BiPAP)</th>
<th>Supportive care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended:</strong></td>
<td></td>
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<tr>
<td>• SARS-CoV-2 antibody therapy*</td>
<td></td>
</tr>
<tr>
<td>• Dexamethasone</td>
<td></td>
</tr>
<tr>
<td>• Remdesivir</td>
<td></td>
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<tr>
<td>• Tocilizumab†</td>
<td></td>
</tr>
<tr>
<td>In addition to remdesivir, anticoagulation, antibody therapy, and dexamethasone consider referring for enrollment in available <a href="#">Clinical Trials</a>.</td>
<td></td>
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</tbody>
</table>

*Not inclusive of EUA bamlanivimab/etesevimab and casirivimab/imdevimab

<table>
<thead>
<tr>
<th>Hospitalized requiring mechanical ventilation or ECMO</th>
<th>Supportive care</th>
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</thead>
<tbody>
<tr>
<td><strong>Consider</strong></td>
<td></td>
</tr>
<tr>
<td>• Dexamethasone</td>
<td></td>
</tr>
<tr>
<td>• Tocilizumab†</td>
<td></td>
</tr>
<tr>
<td>In addition to anticoagulation and dexamethasone consider referring for enrollment in available <a href="#">Clinical Trials</a>.</td>
<td></td>
</tr>
</tbody>
</table>

Remdesivir is not recommended.

See above.

administration of high-titer convalescent plasma in select immunocompromised individuals with ID physician approval. In patients with evidence of SARS-CoV-2 antibodies, SARS-CoV-2 antibody therapy is not recommended.

**Dexamethasone 6 mg IV/PO once daily for up to 10 days**

Patients with symptom duration of < 7 days have not demonstrated benefit from dexamethasone. Dexamethasone should not be continued after discharge unless patient has a history of being on chronic steroid therapy.

**Hospitalized requiring non-rebreather, high flow nasal cannula, or non-invasive ventilation (i.e., BiPAP)**

Supportive care

**Recommended:**

- SARS-CoV-2 antibody therapy*
- Dexamethasone
- Remdesivir
- Tocilizumab†

In addition to remdesivir, anticoagulation, antibody therapy, and dexamethasone consider referring for enrollment in available [Clinical Trials](#).

*Not inclusive of EUA bamlanivimab/etesevimab and casirivimab/imdevimab

**Dexamethasone 6 mg IV/PO once daily for up to 10 days**

Patients with symptom duration of < 7 days have not demonstrated benefit from dexamethasone. Dexamethasone should not be continued after discharge unless patient has a history of being on chronic steroid therapy.

**Hospitalized requiring mechanical ventilation or ECMO**

Supportive care

**Consider**

- Dexamethasone
- Tocilizumab†

In addition to anticoagulation and dexamethasone consider referring for enrollment in available [Clinical Trials](#).
Medications:

**Anticoagulation** The Mount Sinai Health System COVID-19 Anticoagulation Protocol

**Bamlanivimab/Etesevimab**

The FDA issued an emergency use authorization (EUA) for outpatient infusion of bamlanivimab on November 9, 2020 and for bamlanivimab/etesevimab on February 9, 2021. Bamlanivimab is a monoclonal antibody targeting the spike protein of SARS-CoV-2 and bamlanivimab/etesevimab is a dual monoclonal antibody cocktail also targeting the spike protein. Due to increasing recovery of variants of interest and variants of concern with decreased susceptibility to bamlanivimab, single monoclonal therapy is not recommended.

- Patients 12 years or older (and over 40 kg) referred for bamlanivimab/etesevimab must have a documented direct SARS-CoV2 viral test (antigen or PCR), symptoms of COVID-19 for ≤ 5 days and be at high risk for progressing to severe COVID-19. These high-risk conditions are listed in the fact sheet for health care providers for bamlanivimab/etesevimab.
- The following must be documented in the medical record prior to prescribing bamlanivimab/etesevimab: the patient/caregiver has received the appropriate fact sheet and that the patient has been informed of potential alternatives, and that bamlanivimab/etesevimab is not FDA-approved but is authorized for use under an EUA.
- A [moab consent form](#) will need to be completed.
- If the patient receives SARS-CoV-2 specific monoclonal antibody therapy, receipt of EUA COVID-19 vaccination will be delayed for 90 days or repeat vaccination may be recommended.

**Dosing:**

700 mg of bamlanivimab with 1400 mg of etesevimab x 1 dose infused over 1 hour*

* Depending on the volume of diluent and patient weight, infusion times vary from 21 minutes to 70 minutes.

**Caution:**

Monitor for infusion reactions and/or anaphylaxis for 1 hour after infusion

- Adverse events should be reported to FDA [Medwatch](#).

**Casirivimab/Imdevimab**

The FDA issued an EUA for outpatient infusion of casirivimab/imdevimab on November 21, 2020. Casirivimab/Imdevimab is a monoclonal antibody cocktail targeting the spike protein of SARS-CoV2. Benefit has not been observed in patients who require oxygen or who are hospitalized. Casirivimab/imdevimab therapy is not considered standard of care.

- Patients 12 years or older (and over 40 kg) referred for casirivimab/imdevimab must have a documented direct SARS-CoV2 viral test (antigen or PCR), symptoms of COVID-19 for ≤ 5 days and be at high risk for progressing to severe COVID-19. These high-risk conditions are described in the [fact sheet for health care providers](#).
- The following must be documented in the medical record prior to prescribing casirivimab/imdevimab: the patient/caregiver has received the appropriate fact sheet and that the patient has been informed of potential alternatives, and that casirivimab/imdevimab is not FDA-approved but is authorized for use under an EUA.
- A [moab consent form](#) will need to be completed.
- If the patient receives SARS-CoV-2 specific monoclonal antibody therapy, receipt of EUA COVID-19 vaccination will be delayed for 90 days or repeat vaccination may be recommended.

**Dosing:**

1200 mg of casirivimab with 1200 mg of imdevimab x 1 dose infused over 1 hour
Caution:
Monitor for infusion reactions and/or anaphylaxis for 1 hour after infusion

- Adverse events should be reported to FDA Medwatch.

**Corticosteroids**[^11-13]

- Dexamethasone is recommended in patients with confirmed COVID-19 who require supplemental oxygen including those who require mechanical ventilation. Corticosteroid use has not been found to be beneficial in patients who do not require respiratory support and use in this population could be potentially harmful.
- The benefit of dexamethasone was observed in patients > 7 days out from symptom onset.
- Corticosteroids prescribed specifically for the treatment COVID-19 should not be continued after 10 days or discharge whichever is earlier.
- Oral or inhaled corticosteroids prescribed prior to the diagnosis of COVID-19 for an underlying condition should not be discontinued.

**Dosing:**
Dexamethasone 6 mg PO or IV q 24 hours for up to 10 days
Alternative corticosteroids (dose equivalent to dexamethasone): Methylprednisolone 32 mg IV q 24 hours, Hydrocortisone 160 mg, or Prednisone 40 mg PO q 24 hours for up to 10 days

In the setting of escalating acuity, escalating dosing of corticosteroids, including stress-dose steroids, may be recommended in consultation with critical care. In a prospective meta-analysis of 7 trials, administration of corticosteroids was associated with lower all-cause mortality with the greatest benefit in those not receiving vasoactive medications. There was no evidence of mortality benefit when comparing high-dose and low-dose corticosteroids.[^13-15]

Caution:
- Monitor for hyperglycemia, psychiatric effects, and secondary infections.

**Remdesivir (Veklury®)**[^16,17]
Remdesivir was FDA-approved for the treatment of COVID-19 on October 22, 2020 in hospitalized patients 12 years of age and older weighing at least 40 kg. The Adaptive COVID-19 Treatment Trial (ACTT-1) is a randomized placebo-controlled trial. In this trial hospitalized patients with lab-confirmed COVID-19 on low-flow oxygen had shorter median symptom duration (10 versus 15 days) and improved 29-day survival (HR for death 0.3). The trial was not powered to evaluate for differences in recovery time or mortality in patients receiving non-invasive ventilation. The WHO SOLIDARITY study combined data from four trials including ACTT-1. In the analysis, low and high flow oxygen were combined and did not demonstrate a mortality benefit.

- Exclusions for initiation and continuation of remdesivir include ALT > 5 times the upper limit of normal and those patients mechanically ventilated or requiring extracorporeal membrane oxygenation (ECMO).
- Consult Infectious Diseases for consideration for remdesivir therapy. Remdesivir is non-formulary and requires ID approval.
- Use of remdesivir in pediatric patients (< 12 years of age) and patients weighing < 40 kg would be considered off-label use of remdesivir. Use of the lyophilized powder for hospitalized pediatric patients weighing ≥ 3.5 kg is available under an emergency use authorization. Due to the lack of data in adults <40 kg, using the EUA to document the off-label use is recommended at this time.

**Dosing:**
Patients ≥ 40 kg: 200 mg IV on day 1 then 24 hours later start 100 mg IV q 24h for 4 days for a total duration of 5 days[^18] or until hospital discharge, whichever is sooner. Patients should not remain hospitalized solely to complete course of remdesivir if discharge is appropriate. Dose adjustment for renal replacement therapy recommended.
Caution:
- Hepatic function tests should be checked prior to initiating remdesivir and daily. Elevation in transaminases have been observed in clinical trials including in both healthy volunteers and patients with COVID-19.
- Remdesivir should be discontinued if ALT > 5 times the upper limit of normal or if there is signs and symptoms of liver inflammation (e.g., increased bilirubin, alkaline phosphatase, or INR).
- Adverse events should be reported to FDA Medwatch.

Tocilizumab (Actmera®)

The role of IL-6 receptor antagonists (i.e., tocilizumab, siltuximab, sarilumab) remains under study and results of prospective trials are mixed. COVACTA, a phase 3 RCT, noted a decrease time to discharge and ICU length of stay but no impact on mortality. EMPACTA noted that hospitalized patients were less likely to progress to mechanical ventilation or death. A randomized open label trial in Brazil, TOCIBRAS, noted use of tocilizumab was not associated with improved clinical outcomes and potentially associated with increased mortality. The RE-MAP trial demonstrates a decrease in mortality in patients requiring HFNC, BiPAP, or mechanical ventilation receiving a single dose of an IL-6 receptor antagonist administered within 24 hours of ICU admission and with symptoms less than 14 days. The results of the RECOVERY trial, available in pre-print, demonstrates a 4% decrease in all-cause 28-day mortality for patients requiring supplemental oxygen. However, it is unclear if the mortality benefit achieved was due to the use of corticosteroids alone or in patients receiving mechanical ventilation and potential adverse events were not reported.

In the setting of a critically ill patient with planned admission to the ICU, it is reasonable to consider the use of a single dose of tocilizumab.

Consider tocilizumab in patients requiring HFNC, BiPAP, or mechanical ventilation with an FiO2 >40% within 24 hours of admission to an ICU and within 72 hours of admission to the hospital. Both ID and Critical Care approval is required.

- Exclusions from initiation of tocilizumab include ALT or AST > 3 times the upper limit of normal, thrombocytopenia (platelets < 50,000), and neutrophil count < 1,000.
- Use of tocilizumab and other immunosuppressants or immunomodulatory agents including corticosteroids may place the patient at higher risk for bacterial, viral, and fungal infections including opportunistic infections. In patients on concomitant immunosuppressants or immunomodulators (e.g., organ transplant or hematopoietic stem cell transplant), discuss use of tocilizumab with primary attending physician.
- The use of tocilizumab in a pregnant person must be discussed with maternal fetal medicine.

A moab consent form will need to be completed and discussion regarding off-label use must be documented in the EMR

Dosing:
Patients ≥30 kg: 8 mg/kg (actual body weight) IV x single dose (maximum dose: 800 mg)

Caution:
- Interaction: Tocilizumab may reduce levels of apixaban and rivaroxaban but does NOT interfere with enoxaparin or heparin
- Associated with lower gastrointestinal perforations in patients on concomitant steroids (> 10 mg prednisone daily or equivalent), NSAIDS, and/or methotrexate and in patients with diverticulitis
Medications **NOT** currently recommended for the treatment of SARS-CoV2 (COVID-19):

<table>
<thead>
<tr>
<th>Medication</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACE inhibitors and ARBs</strong>&lt;sup&gt;26&lt;/sup&gt;</td>
<td>Patients prescribed ACE inhibitors and ARBs for preexisting conditions should be continued on their ACE inhibitor and ARB therapy. Currently, there is no scientific or clinical evidence that taking ACE inhibitors or ARBs increases the risk of acquiring COVID-19 or that use may increase the severity of illness for those acquiring infections.</td>
</tr>
<tr>
<td><strong>Azithromycin</strong>&lt;sup&gt;27&lt;/sup&gt;</td>
<td>Azithromycin with or without hydroxychloroquine is <strong>NOT</strong> recommended for the treatment of COVID-19.</td>
</tr>
<tr>
<td><strong>Baricitinib and kinase inhibitors (Janus kinase (JAK) inhibitors and Bruton’s tyrosine kinase (BTK) inhibitors)</strong>&lt;sup&gt;28,29&lt;/sup&gt;</td>
<td>On November 19, 2020, a EUA was issued for the combination of baricitinib, a JAK inhibitor, with remdesivir for the treatment of COVID-19 in hospitalized patients age 2 and older based on limited data from ACTT-2. Patients treated with the combination had a median time to recovery of 1 day less compared to those treated with remdesivir alone.&lt;sup&gt;30&lt;/sup&gt; In a subsequent analysis, a day 29 mortality benefit was noted in patients who at baseline required low-flow, high flow oxygen, or non-invasive ventilation. Patients with prior initiation of remdesivir and receipt of antibody therapy (e.g., monoclonal SARS-CoV2 antibodies or convalescent plasma) were excluded. Currently, MSHS does not recommend the use of baricitinib with or without remdesivir for the treatment of COVID-19. There are insufficient data to recommend the use of JAK or BTK inhibitors for the treatment of COVID-19. Use of one of these agents for the off-label treatment of COVID-19 requires ID non-formulary approval at all times.</td>
</tr>
<tr>
<td><strong>Colchicine</strong>&lt;sup&gt;31&lt;/sup&gt;</td>
<td>Use of colchicine for the treatment of COVID-19 is <strong>currently not recommended</strong> for ambulatory or hospitalized patients outside of a clinical trial.</td>
</tr>
<tr>
<td><strong>Famotidine</strong>&lt;sup&gt;32&lt;/sup&gt;</td>
<td>Use of H2 blockers or proton pump inhibitors specifically for the treatment of COVID-19 is <strong>not recommended</strong>.</td>
</tr>
<tr>
<td><strong>Hydroxychloroquine</strong>&lt;sup&gt;27,33-36&lt;/sup&gt;</td>
<td>Hydroxychloroquine is <strong>NOT</strong> recommended for prophylaxis or treatment of COVID-19. Co-administration of remdesivir and hydroxychloroquine or may result in reduced antiviral activity of remdesivir.&lt;sup&gt;37&lt;/sup&gt; Patients prescribed hydroxychloroquine for preexisting rheumatologic conditions should be continued on their current dose.</td>
</tr>
<tr>
<td><strong>Interferons</strong>&lt;sup&gt;38&lt;/sup&gt;</td>
<td>Data specific to SARS CoV-2 are lacking. Interferon is currently not recommended for the treatment of COVID-19. Clinical trials are ongoing.</td>
</tr>
<tr>
<td><strong>Ivermectin</strong>&lt;sup&gt;39,40&lt;/sup&gt;</td>
<td><em>In vitro</em> studies demonstrate that ivermectin inhibits SARS-CoV-2 replication at concentrations not achieved by current FDA-approved dosing. Currently, ivermectin is not recommended for the treatment of or prophylaxis against COVID-19 as well-powered randomized controlled trials evaluating the role of ivermectin are lacking. However, if disseminated strongyloidiasis is being considered ivermectin remains the treatment of choice and requires ID approval.&lt;sup&gt;41,42&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>IVIG</strong></td>
<td>Use of IVIG for COVID-19 is <strong>not recommended</strong>.</td>
</tr>
<tr>
<td><strong>Lopinavir/ritonavir (Kaletra)</strong>&lt;sup&gt;43,44&lt;/sup&gt;</td>
<td>Lopinavir/ritonavir is <strong>not recommended</strong> for the treatment of COVID-19.</td>
</tr>
<tr>
<td><strong>Nitazoxanide</strong>&lt;sup&gt;45&lt;/sup&gt;</td>
<td>Displays inhibitory activity against the virus <em>in vitro</em> however no clinical data in humans exists.</td>
</tr>
<tr>
<td><strong>Oseltamivir</strong></td>
<td>SARS-CoV-2 does <strong>NOT</strong> use neuraminidase as part of the viral replication cycle therefore neuraminidase inhibitors are not likely to provide therapeutic value.</td>
</tr>
<tr>
<td><strong>Ribavirin</strong></td>
<td>There are insufficient data to recommend the use of ribavirin for the treatment of COVID-19.</td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td>There are insufficient data to recommend the use of for the treatment of COVID-19.</td>
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References: