Medications Being Studied for COVID-19

The rapidly evolving COVID-19 pandemic has placed a tremendous strain on the health care system. Pharmacists on the front lines need to stay up to date with the latest treatment information to provide timely patient care. It is important to note that, although several different treatments are now available, including several emergency use authorizations (EUAs), there is still no cure for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the resulting syndrome coronavirus disease (COVID-19), so prevention is still the best measure of containing the infection. Remdesivir is the only Food and Drug Administration (FDA)-approved drug for the treatment of COVID-19. This table is adapted from the full National Institutes of Health (NIH) COVID-19 Treatment Guidelines and also covers several new EUAs for specific medications.

Evidence Legend

Strength of Recommendation

A: Strong recommendation for the statement

B: Moderate recommendation for the statement

C: Optional recommendation for the statement

Quality of Evidence for Recommendation

I: One or more randomized trials with clinical outcomes and/or validated laboratory endpoints

II: One or more well-designed, nonrandomized trials or observational cohort studies

III: Expert opinion

Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Antithrombotic Therapy, Various Agents (Enoxaparin, UFH, Warfarin, etc.)	Thromboprophylaxis	**Off-Label Use:** Recommended for hospitalized COVID-19 patients **(AIII)**	Use therapeutic doses.	Standard monitoring applies.	Inflammation from COVID-19 has been associated with a prothrombotic state; increases in fibrin, fibrin degradation products, fibrinogen, and D-dimers. For nonhospitalized patients with COVID-19, anticoagulant or antiplatelet therapy should not be initiated for VTE prophylaxis or at therapeutic doses **(AIII)**. Hospitalized patients with COVID-19 should not routinely be discharged on VTE prophylaxis **(AIII)**.

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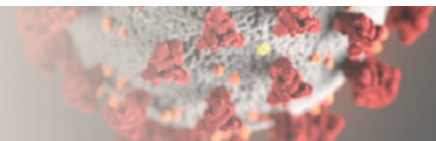

Medications Being Studied for COVID-19 (continued)

Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Bamlanivimab (LY-CoV555 and LY3819253)	Neutralizing monoclonal antibody that targets the receptor-binding domain of the spike protein of SARS-CoV-2, which blocks SARS-CoV-2 entry into host cells	**EUA:** Use in high-risk (see comments), moderately ill patients within 10 days of infection; the NIH expert panel has determined that there are insufficient data for or against its use	700 mg in 200 mL 0.9% NaCl IVPB over at least 60 minutes (PVC infusion set with 0.20/0.22-micron filter)	Monitor during infusion (no specified interval) and for 1 hour after completion	High-risk patients are defined as individuals aged ≥12 years who have one of the following conditions: • Have a body mass index (BMI) ≥35 • Have chronic kidney disease • Have diabetes • Have immunosuppressive disease • Are currently receiving immunosuppressive treatment • Are ≥65 years of age • Individuals aged ≥55 years who have: > Cardiovascular disease, or > Hypertension, or > Chronic obstructive pulmonary disease/other chronic respiratory disease Not for severe patients (hospitalized or needing oxygen)

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Baricitinib	JAK inhibitor; shown to reduce time to recovery in combination with remdesivir	**EUA in conjunction with remdesivir:** Recommended for hospitalized patients needing oxygen, invasive mechanical ventilation, or extracorporeal membrane oxygenation (ECMO) ***The NIH only recommends use in clinical trials* ***(AIII)***	4 mg once daily x 14 days or until hospital discharge	Risk of viral reactivation Risk of thrombosis	Consider the risks and benefits of treatment prior to initiating treatment in patients with: • Chronic or recurrent infection who have been exposed to TB • A history of a serious or an opportunistic infection who have resided or traveled in areas of endemic tuberculosis or endemic mycoses • Liver dysfunction Caution in patients at risk for gastrointestinal perforations. Avoid use with live vaccines.
Chloroquine, Hydroxy-chloroquine	Immuno-modulatory; some demonstrated antiviral activity in vitro	**EUA Revoked, Off Label:** Not currently recommended; the NIH expert panel recommends **against** the use of high-dose chloroquine and hydroxychloroquine for the treatment of COVID-19 (AI). *Not Recommended*			Hydroxychloroquine does not decrease 28-day all-cause mortality compared with the usual standard of care in hospitalized persons with clinically suspected or laboratory-confirmed SARS-CoV-2 infection.

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Medications Being Studied for COVID-19 (continued)

Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Convalescent Plasma	Plasma from donors who have recovered from COVID-19 may contain antibodies to SARS-CoV-2 that may help suppress the virus and modify the inflammatory response.	**EUA:** The NIH expert panel has determined that there are insufficient data to recommend for or against its use.	1 or 2 units (200–500 mL) I.V.		The risks associated with convalescent plasma transfusion include transfusion-associated circulatory overload (TACO), transfusion-related acute lung injury (TRALI), and allergic transfusion reactions. Rare complications include the transmission of infectious pathogens and red cell alloimmunization. There is a theoretical risk of antibody-mediated enhancement of infection. ABO-compatible plasma is used preferentially, but in the absence of ABO-compatible plasma, patients may receive either Group A plasma or low anti-A titer Group O plasma, as available.

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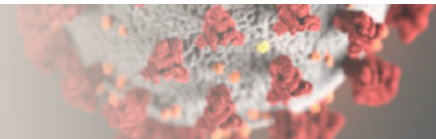

Medications Being Studied for COVID-19 (continued)

Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Corticosteroids, Dexamethasone	Patients with severe COVID-19 can develop a systemic inflammatory response that can lead to lung injury and multisystem organ dysfunction. It has been proposed that the potent anti-inflammatory effects of corticosteroids might prevent or mitigate these deleterious effects.	**Off Label:** The NIH recommends using corticosteroids for the treatment of COVID-19 in hospitalized patients who are mechanically ventilated **(AIII)** and in hospitalized patients who require supplemental oxygen but who are not mechanically ventilated **(BIII)**. It is not recommended in COVID-19 patients who do not require supplemental oxygen **(AI)**.	Dexamethasone 6 mg daily x 10 days or until hospital discharge, whichever comes first. If dexamethasone is not available, alternative glucocorticoids such as prednisone, methylprednisolone, or hydrocortisone can be used.	Monitor patients with COVID-19 who are receiving dexamethasone for adverse effects (e.g., hyperglycemia, secondary infections, psychiatric effects, avascular necrosis). Prolonged use of systemic corticosteroids may increase the risk of reactivation of latent infections (e.g., hepatitis B virus [HBV], herpes virus infections, strongyloidiasis, tuberculosis).	Coadministration of remdesivir and dexamethasone has not been formally studied, but a clinically significant pharmacokinetic interaction is not predicted.

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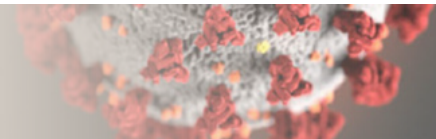

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Interleukin-6 Inhibitor	COVID-19-associated systemic inflammation and hypoxic respiratory failure can be associated with heightened cytokine release, as indicated by elevated blood levels of IL-6, C-reactive protein (CRP), D-dimer, and ferritin. It is hypothesized that modulating the levels of IL-6 or its effects may alter the course of disease.	**Off Label:** NIH Panel recommends against use outside of clinical trials (BI) *Not recommended by the NIH*		Laboratory abnormalities reported with tocilizumab treatment are dose-dependent elevated liver enzyme levels. Adverse effects, such as risk for serious infections (e.g., TB, bacterial, or fungal infections) and bowel perforation, have been reported only in the context of continuous dosing of tocilizumab.	

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Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Regeneron (Casirivimab and Imdevimab)	Two potent antibodies in an antibody cocktail appear to neutralize COVID-19 and reduce the viral load.	**EUA:** Mild to moderate COVID-19 in adults and pediatric patients (12 years of age and older weighing at least 40 kg) with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progressing to severe COVID-19 and/or hospitalization. ***The NIH acknowledges numerous clinical trials are in progress; however, these drugs are not yet covered by the NIH guidelines.*	Administer 1,200 mg of casirivimab and 1,200 mg of imdevimab together as a single I.V. infusion over at least 60 minutes via pump or gravity.	Monoclonal antibodies, such as casirivimab and imdevimab, may be associated with worse clinical outcomes when administered to hospitalized patients requiring high-flow oxygen or mechanical ventilation with COVID-19.	Casirivimab and imdevimab are not authorized for use in patients who are hospitalized due to COVID-19, or who require oxygen therapy due to COVID-19, or who require an increase in baseline oxygen flow rate due to COVID-19 in those on chronic oxygen therapy due to undxerlying non–COVID-19 related comorbidity. Benefit of treatment with casirivimab and imdevimab has not been observed in patients hospitalized due to COVID-19.

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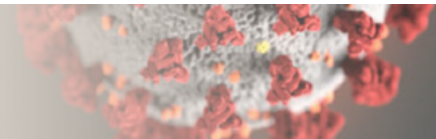

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Treatment	Mechanism of Action	FDA Approval Status and Use	Dosage	Monitoring	Comments
Remdesivir	**Antiviral**	**FDA Approved and EUA:** Remdesivir was approved on 10/22/20 for treatment of suspected or laboratory confirmed COVID-19 in hospitalized patients **(BI)**. *Recommended by the NIH* *Not recommended by the WHO*	**Adult Dose:** Loading dose (Day 1): 200 mg I.V. as a single dose Maintenance dose (from Day 2): 100 mg I.V. once a day. **Duration of Therapy:** Invasive mechanical ventilation and/or extracorporeal membrane oxygenation (ECMO) required: 10 days total. Invasive mechanical ventilation and/or ECMO not required: 5 days total; may extend up to 5 additional days (i.e., up to 10 days total) if no clinical improvement shown. See EUA for more details on dosing.	Risk of hepatic and in renal dysfunction: Not recommended for adults or children with eGFR less than 30 mL/min or in full-term neonates (at least 7 days and less than or equal to 28 days old) with serum creatinine greater than or equal to 1 mg/dL unless the potential benefit outweighs the potential risk. Check LFTs prior to start and daily while on the drug. Stop for LFTs > 5xULN; restart once LTF returns to <5xULN.	For patients requiring invasive mechanical ventilation and/or ECMO, the recommended total treatment duration is 10 days. For patients not requiring invasive mechanical ventilation and/or ECMO, the recommended total treatment duration is 5 days. If a patient does not demonstrate clinical improvement, treatment may be extended for up to 5 additional days for a total treatment duration of up to 10 days. Not for nonhospitalized individuals or hospitalized patients who do not require hospitalization.

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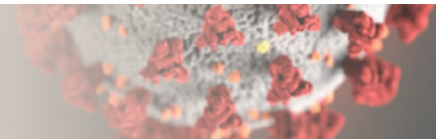

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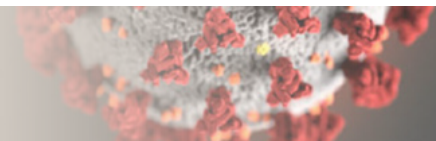
Vitamin C (Ascorbic Acid)	Serious COVID-19 may cause sepsis and acute respiratory distress syndrome (ARDS). There is a potential role of high doses of vitamin C in ameliorating inflammation and vascular injury in patients.	**Off Label:** There are insufficient data for the NIH expert panel to recommend either for or against the use of vitamin C for the treatment of COVID-19 in non–critically ill patients.	200 mg/kg I.V. daily x 4 days		It is worth noting that high circulating concentrations of vitamin C may affect the accuracy of point-of-care glucometers.
Zinc Sulphate	Increased intracellular zinc concentrations efficiently impair replication in a number of RNA viruses and may have some value treating COVID-19.	**Off Label:** NIH Panel recommends **against** use outside of clinical trials **(BIII)**	220 mg (50 mg of elemental zinc) twice daily	Long-term zinc supplementation can cause copper deficiency with subsequent reversible hematologic defects (i.e., anemia, leukopenia) and potentially irreversible neurologic manifestations (i.e., myelopathy, paresthesia, ataxia, spasticity).	



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Vitamin D	Vitamin D has immunomodulatory effects that could protect against COVID-19 infection or decrease the severity of illness. Vitamin D supplements may increase the levels of T regulatory cells.	**Off Label:** There are insufficient data for the NIH expert panel to recommend either for or against the use of vitamin D for the treatment of COVID-19 in non–critically ill patients.	100,000 I.U. doses of vitamin D-3 to be administered every 2 weeks	Signs and symptoms of toxicity	
Melatonin	Melatonin can inhibit inflammation NLRP3, in addition to various anti-inflammatory effects, especially after severe inflammatory bout	Clinical trials under way. *NIH has not taken a position on melatonin.*	Administered orally as a 10 mg dose three times a day for 14 days