

ECU Health (formerly Vidant Health) COVID-19 Inpatient Adult Treatment

Outpatient Options

- See separate outpatient treatment algorithm
- Outpatient **clinical trial** (call or text 252-414-2655 day of positive results)

Supportive Care

- **Anticoagulation** (see separate anticoagulation algorithm)
- **Vitamin Supplementation**
 - Zinc sulfate 220 mg daily x 14 days
 - Multivitamin with minerals BID x 14 days
 - Ergocalciferol 50,000 IU twice weekly X 4 doses
 - If vitamin D < 40 ng/ml

Risk Factors for Severe Disease

CV disease, HTN, age >55, underlying lung disease, smoking history, chronic liver disease, DM, CKD, cancer, HIV, transplant, immunosuppression, chemotherapy, SNF/LTAC residents, obesity, or pregnancy

Inpatient Options

Mild-Moderate Disease

(Asymptomatic or No Oxygen Requirement)

- **Paxlovid** 300/100 mg PO BID x 5 days (1st choice if admitted for reasons **other than COVID-19 and within 5 days of symptom onset**)
OR
- **Remdesivir** 200 mg on day 1 then 100 mg daily x 2 days or until discharge
 - Requires ID approval if not within 5 days of symptom onset

Low-Flow Oxygen (<6L)

- **Dexamethasone** 6 mg daily x 10 days or until discharge
 - Consider famotidine 20 mg BID with steroids if not on PPI/H2 blocker
- **Remdesivir** 200 mg on day 1 then 100 mg daily x 2 days or until discharge
 - Requires ID approval if not within 5 days of symptom onset

High-Flow Oxygen (≥6L) or Mechanically Ventilated

- **Dexamethasone** 6 mg daily x 10 days or until discharge
 - Consider famotidine 20 mg BID with steroids if not on PPI/H2 blocker
- **Baricitinib** 4 mg daily x 14 days or until discharge
 - Renal dose adjustment needed
 - Requires ID approval if not within 5 days of respiratory requirements
- **Tocilizumab** (alternative to baricitinib)
 - Requires ID approval (**on shortage**)

Decision to use these agents should be made only with close attention to the patient's clinical status, comorbidities, interacting medications, and with the understanding that there are limited/controversial data available to support use. Use of some of these agents for COVID-19 requires ID or investigator approval (details below). See drug table below for detailed information on each therapy.

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Drug Information:

Remdesivir (Veklury®)	<ul style="list-style-type: none">• <u>Adult use is allowed without ID approval if the patient meets the following criteria:</u> Adult use is allowed without ID approval if the patient meets all the following criteria: 1) Adult patient on room air or < 6L low-flow oxygen AND, 2) within 5 days of symptom ONSET (not test date, but date of any respiratory or non-respiratory viral symptom) AND, 3) are unvaccinated (or not completely up-to-date on vaccination per latest CDC guidance) or immunocompromised (i.e. not expected to properly respond to vaccination**). **Conditions/treatments that may result in severe immunocompromise/inadequate response to vaccine include active treatment for solid tumor and hematologic malignancies, receipt of solid organ transplant and taking immunosuppression, receipt of chimeric antigen receptor (CAR)-T-cell or hematopoietic stem cell transplant, moderate or severe primary immunodeficiency, advanced or untreated HIV, active treatment with high-dose corticosteroids (i.e. ≥ 20 mg prednisone or equivalent per day), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents, TNF blockers, and other biologic agents that are immunosuppressive or immunomodulatory.• <u>All other adult use requires ID approval by any ID attending. Call 252-814-4296 from 08:00–21:00 seven days a week. Any request after 21:00 will need to be approved and started the following morning. All pediatric use requires pediatric ID approval, contact Dr. William Alex Dalzell, Dr. Salma Syed, or Dr. Yamini Mandelia.</u>• <u>Recommended use:</u> Greatest benefit may be in patients early in the course of disease (<7 days of symptoms). Remdesivir is unlikely to be beneficial in patients with diffuse infiltrates on CXR or CT scan, those requiring high supplemental oxygen, or those with markedly elevated inflammatory markers such as CRP or D-Dimer.• <u>Mechanism:</u> Broad-spectrum antiviral nucleotide prodrug with potent in vitro activity against a range of RNA viruses including Ebola virus, Marburg, MERS-CoV, SARS-CoV, respiratory syncytial virus, Nipah virus, and Hendra virus. The mechanism of action of remdesivir is premature termination of viral RNA transcription.• <u>Options for obtaining remdesivir:</u><ul style="list-style-type: none">○ FDA approved on October 22, 2020 and available via wholesaler○ Emergency Use Authorization (EUA) still required for hospitalized children weighing 3.5 kg-40 kg or hospitalized children less than 12 years of age• <u>Adult dosing:</u> Suggested dose is a single loading dose of remdesivir 200 mg IV on Day 1, followed by once-daily maintenance doses of remdesivir 100 mg IV for 2-4 days. Remdesivir is to be administered via IV infusion in a total volume of up to 250 mL 0.9% saline. Doses of 200 mg will be infused over 2 hours and doses of 100 mg will be infused over 1 hour. Duration can be shortened to 3 days total if otherwise ready for discharge.• <u>Monitoring:</u> Suggest daily renal and hepatic function monitoring• <u>Renal dysfunction:</u> There are now several case reports describing use of remdesivir in patients with AKI or ESRD. These patients can be considered on a case by case basis. Dose and duration should be the same. When given on HD days make sure dose is after HD (as drug is cleared by HD).
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<p>Baricitinib (Olumiant®)</p>	<ul style="list-style-type: none"> • Adult use is allowed without ID approval if the patient meets the following criteria: Within 5 days of requiring at least >6 L NC respiratory support for COVID-19 pneumonia, AND has at least one elevated inflammatory marker, AND eGRF >15 mL/min. • All other adult use requires ID approval by any ID attending. Call 252-814-4296 from 08:00–21:00 seven days a week. Any request after 21:00 will need to be approved and started the following morning. All pediatric use requires pediatric ID approval, contact Dr. William Alex Dalzell, Dr. Salma Syed, or Dr. Yamini Mandelia. • Recommend use in patients who are in the inflammatory component of their illness and are at least requiring 6 L oxygen, including those who are rapidly deteriorating despite dexamethasone. Factors that will be considered include: use of supplemental oxygen, CXR or CT scan findings, inflammatory markers particularly CRP and D-Dimer, and how long into inflammatory phase the patient is since drug more likely to be effective if given earlier in the course of the inflammatory process. • Mechanism: Inhibitor of JAK1 and JAK2. Baricitinib is proposed to reduce an inflammatory response and have potential antiviral activity against COVID-19. • FDA approved on May 10, 2022 for use in hospitalized adult patients with COVID-19 requiring supplemental oxygen, non-invasive or invasive mechanical ventilation, or ECMO. Obtaining verbal consent and disseminating the fact sheet is no longer required for adults. • Used via EUA only for pediatrics. Baricitinib is authorized for emergency use by the US FDA for treatment of COVID-19 in hospitalized patients requiring supplemental oxygen, non-invasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation (ECMO). It is the responsibility of the primary team to provide the Patient Fact Sheet for Patients, Parents, and Caregivers; obtain verbal consent from the patient/caregiver and document in the chart, place the appropriate drug order based on renal function, and monitor renal/hepatic function plus ANC/ALC daily during treatment. Documentation is included in the order by appropriately answering “Yes” when the above criteria have been satisfied. Mandatory reporting of all medication errors and all serious adverse events is required. • Dose: 4 mg PO/per tube daily x 14 days or until discharge. Dose adjustment or drug interruption may be needed for decreasing eGFR, ALC <200 cells/uL, ANC <500 cells/uL, or if drug induced liver injury (AST/ALT increase) is suspected (see fact sheet for specific recommendations). Tocilizumab may be preferred in severe renal dysfunction or when PO/per tube is not feasible, but will be a patient specific decision. • Remdesivir plus baricitinib: In general, patients who begin to qualify for baricitinib will be entering a phase of their illness that will no longer benefit from remdesivir. Therefore, if a patient on remdesivir is being considered for baricitinib, it usually makes most sense that remdesivir is discontinued as baricitinib is initiated. An exception to this would be in a patient who is on remdesivir and would qualify for concomitant dexamethasone but cannot receive a corticosteroid due to contraindication (this patient could be on remdesivir plus baricitinib). • Other considerations: Risk of latent TB reactivation or other infection; and thrombosis.
<p>Tocilizumab (Actemra®)</p>	<ul style="list-style-type: none"> • Drug shortage is currently impacting supply. • Adult use requires ID approval by any ID attending. Call 252-814-4296 from 08:00–21:00 seven days a week. Any request after 21:00 will need to be approved and started the following morning. All pediatric use requires pediatric ID approval, contact Dr. William Alex Dalzell, Dr. Salma Syed, or Dr. Yamini Mandelia.

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	<ul style="list-style-type: none"> • <u>EHR order may say “for outpatient use only except for heme/onc and transplant patients”, however, this can be bypassed if you have ID approval for COVID-19.</u> • <u>Recommend use</u> in patients who are in the inflammatory component of their illness, are exhibiting rapid respiratory deterioration despite dexamethasone due to COVID-19, and are at least requiring 6 L oxygen. Factors that will be considered include: use of supplemental oxygen, CXR or CT scan findings, inflammatory markers particularly CRP and D-Dimer, and how long into inflammatory phase the patient is since drug more likely to be effective if given earlier in the course of the inflammatory process. • <u>Mechanism:</u> monoclonal anti-IL-6 receptor blocking antibody proposed as a therapeutic agent to mitigate hyperinflammation associated with COVID-19. FDA approved for various rheumatologic conditions as well as cytokine release syndrome associated with CAR-T cell therapy. • <u>This drug is now being used via EUA.</u> Tocilizumab is authorized for emergency use by the FDA for treatment of COVID-19 in hospitalized adult and pediatric patients (2 years of age and older) who are receiving systemic corticosteroids and require supplemental oxygen, non-invasive or invasive mechanical ventilation, or ECMO. Providers must communicate to the patient and/or caregiver information consistent with the Fact Sheet for Patients, Parents, and Caregivers and <u>provide them with a copy of this Fact Sheet</u> prior to the administration. However, if providing this information will delay the administration to a degree that would endanger the life of a patient, the information must be provided as soon as feasible after administration. Mandatory reporting of all medication errors and all serious adverse events is required. • <u>Dose:</u> 8mg/kg based on actual body weight (max dose 800 mg). Clinical assessment and laboratory assessment (including CRP) to guide need for repeat dosing, which can be done at least 8 hours after the initial dose. Round dose to nearest vial size (either 80 mg or 200 mg vials depending on availability). • <u>Other considerations:</u> Risk of latent TB reactivation or other infection; risk vs benefit for initiation in patients with neutropenia, thrombocytopenia, or elevated AST/ALT; and need for concomitant steroid therapy.
<p>Monoclonal antibodies (MAB)</p> <p>Treatment: Sotrovimab Bebtelovimab</p> <p>Prevention: Tixagevimab/ cilgavimab (Evusheld®)</p>	<ul style="list-style-type: none"> • In the United States, predominant variants are resistant to currently available monoclonal antibodies, and therefore efficacy is unlikely. There are no recommendations for monoclonal antibodies in the United States at this time (for treatment or prevention).

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<p>Nirmatrelvir/ ritonavir (Paxlovid®)</p>	<ul style="list-style-type: none"> • <u>For referrals see outpatient treatment algorithm.</u> • EUA authorized Dec 2021 for mild-to-moderate COVID-19 in adults and pediatric outpatients (12 years of age and older weighing at least 40 kg) who are at high risk for progression to severe COVID-19. Patients with mild-to-moderate COVID-19 who are at high risk of progression to severe disease <u>admitted to the hospital for reasons other than COVID-19</u> may also receive nirmatrelvir/ritonavir. • <u>Mechanism:</u> Nirmatrelvir is a SARS-CoV-2 main protease (Mpro) inhibitor (also referred to as 3CLpro) which renders it incapable of processing polyprotein precursors and therefore prevents viral replication. Ritonavir is an HIV-1 protease inhibitor and CYP3A inhibitor that inhibits CYP3A-mediated metabolism of nirmatrelvir resulting in increased nirmatrelvir plasma concentrations. • <u>Dose:</u> 300 mg nirmatrelvir (two 150 mg tablets) + 100 mg ritonavir PO BID x 5 days with or without food • <u>Special considerations:</u> Renal dose adjustment needed for eGFR ≥30 to <60 mL/min. Not recommended for patients with eGFR <30 mL/min. Not recommended with severe hepatic impairment (Child-Pugh Class C). Can increase risk of HIV-1 developing resistance to HIV protease inhibitors in individuals with uncontrolled or undiagnosed HIV-1 infection. • <u>DRUG INTERACTIONS:</u> Ritonavir is a strong CYP3A4 inhibitor and can significantly increase other CYP3A4 substrate concentrations. Co-administration with potent CYP3A4 inducers may impact Paxlovid® concentrations. <u>Medication profile MUST be reviewed for drug interactions prior to initiation.</u> • <u>As with other EUAs, dissemination of fact sheet, verbal consent, and reporting of all serious adverse events and/or medication errors is required.</u> • <u>ECU Health criteria for use can be found on outpatient treatment algorithm</u>
<p>Molnupiravir</p>	<ul style="list-style-type: none"> • <u>For referrals see outpatient treatment algorithm.</u> • EUA authorized Dec 23, 2021 for adult outpatients with mild-to-moderate COVID-19 who are at high risk for progressing to severe COVID-19 and for whom alternative COVID-19 treatment options authorized by FDA are not accessible or clinically appropriate. • <u>Mechanism:</u> Nucleoside analogue that inhibits SARS-CoV-2 replication • <u>Dose:</u> 800 mg (four 200 mg capsules) PO BID x 5 days with or without food • <u>Special considerations:</u> NOT for use during pregnancy (animal reproductive studies showed possibility of fetal harm) • <u>As with other EUAs, dissemination of fact sheet, verbal consent, and reporting of all serious adverse events and/or medication errors is required.</u> • <u>ECU Health criteria for use can be found on outpatient treatment algorithm</u>
<p>Fluvoxamine</p>	<ul style="list-style-type: none"> • <u>IDSA guideline recommendation:</u> Among ambulatory patients with COVID-19, the IDSA guideline panel recommends fluvoxamine only in the context of a clinical trial. • <u>Mechanism:</u> Selective serotonin reuptake inhibitor (SSRI) that is FDA-approved for the treatment of obsessive-compulsive disorder. SSRIs have been shown to have affinity for Sigma-1 receptors, which modulate cytokine levels in animal models of septic shock and demonstrate in vitro activity against SARS-CoV-2. Of the SSRIs, fluvoxamine has high activity for these receptors. SSRIs may also decrease uptake of serotonin from platelets during thrombosis, resulting in decreased neutrophil recruitment and platelet aggregation.

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Ivermectin	<ul style="list-style-type: none"> • <u>Ivermectin has not been added to these treatment recommendations.</u> • <u>IDSA guideline recommendation:</u> In hospitalized patients with severe COVID-19, the IDSA panel suggests against ivermectin use outside of the context of a clinical trial (conditional recommendation, very low certainty of evidence). In outpatients with COVID-19, the IDSA panel suggests against ivermectin use outside of the context of a clinical trial (conditional recommendation, very low certainty of evidence). See guideline for data summary. • <u>Mechanism:</u> Anti-parasitic agent FDA approved for some indications. Has in-vitro activity against some viruses, including SARS-CoV-2 but no proven therapeutic utility. Concentrations needed to obtain the in-vitro IC50 for SARS-CoV-2 are considerably higher than those achieved in human plasma and lung tissue.
Convalescent plasma	<ul style="list-style-type: none"> • <u>Convalescent plasma was officially removed from this algorithm in the December 30, 2021 update</u> • <u>IDSA guideline recommendation:</u> Among ambulatory patients the IDSA guideline panel recommends against COVID-19 convalescent plasma outside of the context of a clinical trial. Among hospitalized patients they recommended against it. • <u>Mechanism:</u> Passive immunotherapy (pathogen neutralization, antibody-dependent cellular cytotoxicity, enhanced phagocytosis)
Hydroxychloroquine (HCQ)	<ul style="list-style-type: none"> • <u>HCQ was officially removed from this algorithm in the June 16, 2020 update.</u> On June 15, 2020, based on FDA’s continued review of the scientific evidence available for HCQ and chloroquine (CQ) to treat COVID-19, FDA has determined that the statutory criteria for EUA as outlined in Section 564(c)(2) of the Food, Drug, and Cosmetic Act are no longer met. Specifically, FDA has determined that CQ and HCQ are unlikely to be effective in treating COVID-19 for the authorized uses in the EUA. Additionally, in light of ongoing serious cardiac adverse events and other serious side effects, the known and potential benefits of CQ and HCQ no longer outweigh the known and potential risks for the authorized use. This warrants revocation of the EUA for HCQ and CQ for the treatment of COVID-19. • <u>IDSA guideline recommendation:</u> Among hospitalized patients with COVID-19, the IDSA guideline panel recommends against hydroxychloroquine. See guideline for data summary.
HCQ + Azithromycin	<ul style="list-style-type: none"> • <u>HCQ + azithromycin combination was officially removed from this algorithm in the April 30, 2020 update.</u> • <u>IDSA guideline recommendation:</u> Among hospitalized patients with COVID-19, the IDSA guideline panel recommends against hydroxychloroquine plus azithromycin. See guideline for data summary.
Lopinavir/ritonavir (Kaletra)	<ul style="list-style-type: none"> • <u>Kaletra was officially removed from this algorithm in the May 8, 2020 update.</u> • <u>IDSA guideline recommendation:</u> Among hospitalized patients with COVID-19, the IDSA guideline panel recommends against the use of the combination lopinavir/ritonavir. See guideline for data summary.
Interferon Beta-1a	<ul style="list-style-type: none"> • <u>Interferon Beta-1a has not been added to these treatment recommendations.</u> • <u>Mechanism:</u> Subcutaneous interferon beta-1a is approved in the U.S. and more than 90 other countries for the treatment of multiple sclerosis. Interferon beta-1a has the same amino acid sequence as a naturally occurring protein called interferon beta, which is part of a class of proteins called type 1 interferons. Infected cells normally produce type 1 interferons to help the immune system fight pathogens, especially viruses. Interferon beta has both antiviral and anti-inflammatory properties. • A randomized, controlled clinical trial evaluating the safety and efficacy of a treatment regimen consisting of the antiviral remdesivir plus the immunomodulator interferon beta-1a in patients with coronavirus disease 2019 (COVID-19) has begun. The study, called the Adaptive COVID-19 Treatment Trial 3 (ACTT 3), is anticipated to enroll more than 1,000 hospitalized adults with COVID-19 at as many

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Updates since the June 22, 2022 version are noted by the red font color

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	as 100 sites in the US and abroad. <u>Clinical trial is the only way to obtain drug.</u> The closest site in NC is Duke. More data can be found here: https://clinicaltrials.gov/ct2/show/NCT04492475
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General COVID-19 Information:

1. COVID-19 is the disease caused by SARS-Coronavirus-2 or SARS-CoV-2.
2. Incubation period ~5 days (ranges from 2-14 days).
3. Frequently signs and symptoms at illness onset include fever (83-98%), dry cough (76-82%), and myalgia/fatigue (11-44%). GI symptoms have also become a common occurrence (anorexia, diarrhea, vomiting, abdominal pain, anosmia, dysgeusia). In one report, 10% (n=20) presented without digestive or respiratory symptoms, 3% (n=7) with digestive symptoms but without respiratory symptoms (all except 1 did have fever), 42% (n=85) with respiratory symptoms but without digestive symptoms, and 45% (n=92) with both respiratory and digestive symptoms.
4. CXR have shown bilateral involvement in most patients. CT patterns have revealed patchy infiltrate, bilateral disease, and have been consistent with viral infection.
5. Potential for clinical deterioration during second week of illness.
6. Co-infection of COVID-19 with other viruses and bacteria is possible.
7. False negative COVID-19 results are possible. Poor quality of specimen can be a reason for false negative.

Recommended Labs and Monitoring:

1. Daily: CBC with differential (follow lymphopenia) and complete metabolic panel (includes LFTs)
2. To help rule out bacterial co-infection: Procalcitonin
3. For risk stratification and worry of cytokine release syndrome: LDH, troponin, CPK, D-dimer, CRP, ESR, triglycerides, ferritin, and fibrinogen. May consider trending these as appropriate.
 - a. Ideally would obtain IL-6 levels but this lab is a send out that will take 4-7 days to result so we are not currently recommending it.
4. Pregnancy test
5. Vitamin D, total (VITDT)

General Drug Considerations:

1. There are clinical trials of HCQ that include supplemental zinc, vitamin C, and vitamin D. For all COVID-19 positive patients suggest 14 days of the following nutritional supplements:
 - a. **Multivitamin with minerals** (Theragran-M tablet) twice daily. The preference is to use the Theragran-M tablet product, even if need to crush finely and administer per tube, due to the copper concentration in this vitamin (2 mg/tab) vs Centrum liquid (0 mg). If absolutely needed, can

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use the Centrum liquid multivitamin with iron-minerals. But, the copper supplementation may be important due to Zinc binding copper absorption.

- b. **Zinc sulfate** 220 mg capsule daily (50 mg elemental zinc) or oral suspension if need liquid (220 mg/5mL). Zinc has anti-viral activity, including inhibition of viral RNA dependent RNA polymerase (like remdesivir). Zinc deficiency is common in elderly people and is associated with anosmia (an early sign of COVID-19 disease).
 - c. **Ergocalciferol** 50,000 IU twice weekly or ergocalciferol drops if liquid needed (50,000 IU/6.25 mL). Need for further supplementation should be based on vitamin D level results. Vitamin D is a known immunomodulator and deficiency is more common in African Americans, who are at higher risk for severe disease. Vitamin D inhibits proinflammatory cytokines, including IL-6. We are giving ergocalciferol over cholecalciferol based on the high dose and available supplies. The shorter half-life of the ergocalciferol also will help to see effects earlier and reach steady state more quickly.
2. The ECU Health **anticoagulation** subcommittee has developed a guideline for inpatient prophylaxis, discharge prophylaxis, and treatment of VTE in COVID-19 patients. Please see their separate document.
 3. **Dexamethasone 6 mg IV or PO for 10 days (or until discharge if earlier)**. An equivalent glucocorticoid dose may be substituted if dexamethasone unavailable. Equivalent total daily doses of alternative glucocorticoids to dexamethasone 6 mg daily are methylprednisolone 32 mg and prednisone 40 mg. IDSA guideline recommendations are as follows: Among hospitalized critically ill patients with COVID-19, the IDSA guideline panel recommends dexamethasone rather than no dexamethasone (Strong recommendation, moderate certainty of evidence). Critical illness is defined as patients on mechanical ventilation and ECMO. Critical illness includes end organ dysfunction as is seen in sepsis/septic shock. In COVID-19, the most commonly reported form of end organ dysfunction is ARDS. Among hospitalized patients with severe, but non-critical COVID-19 the IDSA guideline panel suggests dexamethasone rather than no dexamethasone (Conditional recommendation, moderate certainty of evidence). Severe illness is defined as patients with SpO₂ ≤ 94% on room air, including patients on supplemental oxygen. Among hospitalized patients with non-severe COVID-19 without hypoxemia requiring supplemental oxygen, the IDSA guideline panel suggests against the use of glucocorticoids. Non-severe illness is defined as patients with a SpO₂ >94% not requiring supplemental oxygen. See guideline for data summary.
 4. If no contraindications, continue **statins** or consider starting in those with a guideline indication for one.
 5. Do not need to stop home **ACEI/ARB** therapy, unless there is another compelling reason.
 6. Avoid starting new prescriptions for **NSAIDs**. Can see IDSA guideline for some discussion of NSAIDs.
 7. Use **inhalers** over nebulizers.
 8. Many institutions are noting that patients with COVID-19 tend to have higher than normal baseline triglyceride levels secondary to an HLH-type syndrome and many institutions are avoiding discontinuation of their **propofol** infusions in these patients until TG levels are closer to 750/1000 mg/dL. This would avoid having to change to an alternative/less desired sedative agent in these patients (ie: benzodiazepines which are less than ideal due to the longer elimination time and association with longer intubation times). It is recommended to continue to monitor these patients closely for any signs and symptoms of PRIS while on propofol therapy.
 9. Due to the frequency of every one hour blood glucose checks for patients who are receiving intravenous **insulin** with Endotool, it would be preferred to manage these patients with basal/bolus regimen of insulin if possible or tolerate a blood glucose that is slightly above our goal. This will aide in decreasing

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the number of times the nurse has to enter the room to obtain a finger stick for insulin drip titrations. See separate document for subcutaneous insulin management of mild/moderate DKA in the COVID-19 patient.

10. In patients who are intubated **scheduled eye care** is administered in the form of Clear Eyes solution and petrolatum ointment both given every 4 hours alternating which results in an eye drop being administered every 2 hours to aide in lubrication secondary to dryness that results from the ventilator. In an effort to reduce nursing exposure and since most patients should be maintained at a light level of sedation, it is recommended to omit the petrolatum ointment and use only the Clear Eyes solution in these patients with a frequency of ‘four times day’ or ‘three times a day’ with the specific times correlating with other medication administration times.
11. In an effort to **minimize aerosolization during extubation** consider strategies of prevention of post extubation coughing and gagging. IV lidocaine 1 mg/kg (max 100 mg) can be given 3-5 minutes prior to extubation or 1 mg/kg of 2% lidocaine solution can be instilled intratracheally into the outer aperture of the ETT 5 minutes prior to extubation to blunt the post extubation cough response. In patients with heart block/bradycardia without a pacemaker AVOID IV lidocaine administration and can consider utilization of 0.5 mg/kg of 2% lidocaine solution via the ETT in these patients.
12. Anecdotal reports from China suggest that patients infected with coronavirus who were receiving **famotidine**, a H2 receptor antagonist to treat conditions such as acid reflux and peptic ulcer disease, had improved survival vs those receiving proton pump inhibitors. This post hoc finding has led to interest in the drug, though no predominant theory describing a mechanism for its efficacy yet exists. One theory is that famotidine, like many other compounds, binds and therefore inhibits the coronavirus main protease, 3C-like main protease (3Clpro). **Among hospitalized patients with severe COVID-19, the IDSA panel suggests against famotidine use for the sole purpose of treating COVID-19 (conditional recommendation, low certainty of evidence).** See guideline for data summary. If stress ulcer prophylaxis is indicated, consider choosing famotidine over PPIs. This is already in agreement with current MICU practices for critically ill intubated patients.

References:

1. Gautret P, Lagier JC, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of COVID19: results of an open-label non randomized clinical trial. International Journal of Antimicrobial Agents. In Press 17 March 2020. DOI: 10.1016/j.ijantimicag.2020.105949
2. Michigan Medicine: University of Michigan. Inpatient guidance for diagnosis and treatment of covid-19 in adults and children. March 2020 but updated regularly.
3. UW Medicine Interim Treatment Guidelines for SARS-CoV-2 Infection/COVID-19. UW Medicine 3/17/2020, V 1.3.
4. Interim clinical guidance for patients suspected of/confirmed with COVID-19 in Belgium - 16 Mar 2020; Version 3.
5. Yao X, Ye F, Zhang, M, et al. In Vitro Antiviral Activity and Projection of Optimized Dosing Design of Hydroxychloroquine for the Treatment of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), *Clinical Infectious Diseases*, , ciaa237, <https://doi.org/10.1093/cid/ciaa237>
6. Live CME Webcast March 25, 2020 by Contagion Infectious Diseases Today.
7. McCreary EK and Pogue JM. COVID-19: Treatment: A Review of Early and Emerging Options. Accepted manuscript Open Forum Infectious Diseases, <https://doi.org/10.1093/ofid/ofaa105>
8. McCreary EK and Pogue JM. Updates March 19-24, 2020.
9. Xu X et al. Effective treatment of severe COVID-19 patients with tocilizumab. Pre Print.
10. Cao B, Wang Y, Wen W, et al. A trial of lopinavir-ritonavir in adults hospitalized with severe COVID-19. NEJM 2020. DOI: 10.1056/NEJMoa2001282
11. Mehta P, McAuley DF, Brown M, et al. Correspondence: COVID-19: Consider cytokine storm syndromes and immunosuppression. Published online March 13, 2020. [https://doi.org/10.1016/S0140-6736\(20\)30628-0](https://doi.org/10.1016/S0140-6736(20)30628-0)
12. Nicastrì E, Petrosillo N, Bartoli TA, et al. National Institute for the ID “L. Spallanzani”, IRCCS. Recommendations for COVID-19 clinical management. Infectious Diseases Reports 2020; volume 12:8543.
13. Chen Z, Hu J, Zhang, et al. Efficacy of hydroxychloroquine in patients with COVID-19: results of a randomized clinical trial. Preprint. <https://doi.org/10.1101/2020.03.22.20040758>

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14. Bhimraj A, Morgan RL, Shumaker AH, et al. IDSA Guidelines on the Treatment and Management of Patients with COVID-19 Infection. Published April 11 2020 but last updated Jan 20, 2023. www.idsociety.org/COVID19guidelines
15. Sanders JM, Monogue ML, Jodlowski TZ, et al. Pharmacologic treatments for Coronavirus disease 2019 (COVID-19) a review. JAMA. Published online April 13, 2020. doi:10.1001/jama.2020.6019
16. Muscogiuri G, Barrea L, Savastano S, et al. Nutritional recommendations for COVID-19 quarantine. European Journal of Clinical Nutrition. Published online April 14, 2020. <https://doi.org/10.1038/s41430-020-0635-2>
17. Grant WB, Lahore H, McDonnell SL, et al. Evidence that vitamin D supplementation could reduce risk of influenza and COVID-19 infections and death. Nutrients. Published online April 2, 2020. doi:10.3390/nu12040988
18. NIH COVID-19 Treatment Guidelines. Last updated Aug 25, 2021. <https://covid19treatmentguidelines.nih.gov/introduction/>
19. Freedberg DE, Conigliaro JC, Sobieszczyk ME, et al. Famotidine use is associated with improved clinical outcomes in hospitalized COVID-19 patients: A propensity score matched retrospective cohort study. Posted May 8, 2020. Preprint: <https://doi.org/10.1101/2020.05.01.20086694>