UCONN HEALTH

UCONN JOHN DEMPSEY HOSPITAL

Guidance for Management of HOSPITALIZED Patients with COVID-19 Infection

This guidance are for the management of HOSPITALIZED patients with a clinical syndrome consistent with COVID-19

AND

CONFIRMED POSITIVE SARS-CoV-2 infection (via PCR)

Version #7 – Release Date 8/10/2020

[Details on this document history, versions, and revisions to this guidance document can be found on the last page]

Version #7 – 8/10/2020

IMPORTANT NOTES ABOUT THIS GUIDANCE DOCUMENT AND INPATIENT TREATMENT OF COVID-19 INFECTED PATIENTS:

1. **ALL** patients should receive general supportive care measures.
2. **COVID-19 Specific Laboratory & Other Monitoring:** There are comprehensive lists of recommended tests to order in our COVID-19 EPIC order sets. A list of the commonly-recommended tests and their ordering frequency can be found on **Page 8** at of the guidance document.
3. At this time, there are **no FDA-approved treatments for COVID-19 infection**. Treatments recommended in this guidance document are based on rapidly evolving scientific evidence in the time of a pandemic. Evidence for possible benefits/risks of current and new therapies are discussed at the regularly-occurring UConn Health Think Tank committee meetings. Members of this committee frequently review & discuss the primary scientific literature on COVID-19 treatment as well as COVID-19 treatment guidelines issued by the NIH (https://www.covid19treatmentguidelines.nih.gov/) and IDSA (https://www.idsociety.org/practice-guideline/covid-19-guideline-treatment-and-management/)
4. With this in mind, each primary care team should use sound clinical judgement when initiating any treatments. A detailed consideration of the potential risks of each recommended medication should be performed frequently in the context of the current status of each individual patient with COVID-19 infection. It may be appropriate to deviate from the recommendations in certain circumstances for individual cases.
5. Formal Consultation with Infectious Diseases (ID) is **not required** for COVID-19 patients with **MILD** or **MODERATE** symptoms (i.e. patients **NOT** in the ICU). If desired, primary care teams should order an "**E-Consult**" with the ID Consult Service.
6. Formal Consultation with ID is **REQUIRED** for: (1) Any COVID-19 patients with **SEVERE** symptoms (i.e., in the ICU) and (2) Any patient for which use of **Remdesivir** or **Convalescent Plasma therapy** is being considered. Please see Page 8 for details about use of Convalescent Plasma Therapy at UConn Health.
7. There is now evidence from the UK RECOVERY trial that the use of **Dexamethasone** (Regimen: 6mg PO or IV once-daily for 10 days) can improve clinical outcomes/reduce mortality in patients who require **ANY** supplemental oxygen therapy. This effect appears most significant for **critically-ill patients who require mechanical ventilation**. However, a trend towards **increased mortality** was noted when dexamethasone was given to patients who did not need supplemental oxygen therapy.
    - At this point, dexamethasone is recommended for use at UConn Health only in patients who require any type of supplemental oxygen therapy.
    - However, because the RECOVERY trial did not report or analyze effects in patients with varying types of non-invasive oxygen therapy (e.g., 2L low-flow via nasal cannula versus higher-volume, higher flow therapy), the Think Tank suggests that prior to initiating dexamethasone in non-ICU and non-IU patients, hospitalists should discuss the benefits/risks of using dexamethasone with the patient/family/POA and obtain verbal consent prior to use. Please document this discussion in the patient's EMR
        - **Potential benefits include**: reduced chance of dying from COVID-19 infection
        - **Potential risks include**: higher risk of bacterial/other non-COVID-19 infections, higher risks of blood sugar alterations requiring treatment, higher risk of death in some patients
8. Per the **NIH COVID-19 Treatment Guidelines**, patients who are taking ACE inhibitors, Angiotensin-Receptor Blockers (ARBs), and/or statin medications prior to inpatient care should be continued on these medications as long as there are no acute contraindications to their use (e.g., hypotension, acute significant elevations in LFTs, etc.).
9. This guidance document was jointly-developed with input from clinicians across multiple departments. We expect it will be updated frequently as new data emerge. Please contact Jeff Aeschlimann (Pharmacy / Infectious Diseases) at aeschlimann@uchc.edu for questions or suggestions about content.

Table 1. Treatment for PCR-Confirmed COVID-19 patients with MILD or MODERATE Symptoms (NOT admitted to the ICU):

Pharmacotherapy	Treatment Considerations

In patients who require **supplemental oxygen therapy**:
 	
Remdesivir 200mg IV X 1 on Day #1, then 100mg IV Q24h X 4 days (OR until day of discharge from inpatient care, if < 5 day LOS)
 	
• See "**Treatment Considerations**" for other details on use
 	
AND
 	
Dexamethasone 6mg PO or IV X 10 days
 	
• See "**Treatment Considerations**" for other details on use
 	
AND
 	
For **ALL** patients: Consider enrollment of patient in **Convalescent Plasma (Mayo Protocol) study** or in a clinical trial (more information on **Page #7**). Consider using 2 units of Convalescent Plasma.
 	
AND
 	
Start **ALL** patients on anticoagulation medication (**Enoxaparin** or **Heparin**) if no contraindications:
• See "*Treatment Considerations*" section in this table for details
• See **Table 3** for specific guidance and details on medications and doses based on patient factors
	• Infectious Diseases **MUST** be consulted if you are considering Remdesivir use
	
	• Because Remdesivir supplies are limited, it should be prioritized for use in non-CMO patients with:
	  • documented or strongly-suspected COVID-19 infection,
	  • CLcr > 30 ml/min and AST/ALT <5x ULN, (3)
	  • requiring supplemental oxygen but who are not on high-flow oxygen, non-invasive ventilation, or mechanical ventilation
	  ○ *If a patient on supplemental oxygen receiving remdesivir progresses to needing high-flow oxygen or non-invasive/invasive mechanical ventilation, the course of treatment should be continued & completed*
	
	• Information included in the EUA "***Fact Sheet for Patients and Parents/Caregivers***" must be communicated to the patient, parent, or caregiver prior to initiation of remdesivir.
	
	• The following also must be done under the terms of the EUA:
	  • Document in the patient's medical record that the patient/caregiver has been (1) Given the Fact Sheet for Patients and Parents/Caregivers, (2) Informed of alternatives to receiving remdesivir, and (3) Informed that remdesivir is an unapproved drug that is authorized for use under EUA.
	
	• Monitor Scr, CLcr, and AST/ALT daily while patient is receiving Remdesivir
	
	• Dexamethasone **SHOULD NOT** be given to patients who **do not require supplemental oxygen therapy** as there was a trend towards **increased mortality** in the UK RECOVERY trial
	• Prior to initiating dexamethasone in non-ICU and non-IU patients, hospitalists should discuss the benefits/risks of using dexamethasone with the patient/family/POA and obtain verbal consent prior to use. Please document this discussion in the patient's EMR.
	  • Potential benefits include: reduced chance of dying from COVID-19 infection
	  • Potential risks include: higher risk of bacterial/other non-COVID-19 infections, higher risks of blood sugar alterations requiring treatment, higher risk of death in some patients
	
	• Despite abnormal coagulation tests (PT, PTT, and/or INR), thromboprophylaxis with enoxaparin or heparin should be started in **ALL** patients in the absence of active bleeding. Do not start or continue therapy **ONLY** IF:
	  • Platelet counts are less than 25 x 10^9/L, or Fibrinogen less than 0.5 g/L.
	  • Mechanical thromboprophylaxis should be used when pharmacological thromboprophylaxis is contraindicated. Do not use both.

	• See detailed information on **Page 9** of the document for considerations for use of medications in **Pregnancy**

Table 2. Treatment for PCR-Confirmed COVID-19 patients with SEVERE Symptoms (Receiving care in the ICU):

Pharmacotherapy	**Treatment Considerations**

Dexamethasone 6mg PO or IV X 10 days
• See "**Treatment Considerations**" for details on use
 	
AND
 	
Consider
 	
Remdesivir 200mg IV X 1 on Day #1, then 100mg IV Q24h X 4 days
• See "**Treatment Considerations**" for details on use
 	
AND
 	
Consider enrollment of patient in **Convalescent Plasma (Mayo Protocol) study** or in a clinical trial (more information on **Page #7**). Consider using 2 units of Convalescent Plasma.
 	
AND
 	
Start **ALL** patients on anticoagulation medication (**Enoxaparin** or **Heparin**) if no contraindications:
• See "*Treatment Considerations*" section in this table for details
• See **Table 3** for specific guidance and details on medications and doses based on patient factors
	• Dexamethasone **SHOULD NOT** be given to patients who **do not require supplemental oxygen therapy** as there was a trend towards **increased mortality** in the UK RECOVERY trial
	
	• Remdesivir use generally should be **avoided** in ICU patients because:
	  • It is currently uncertain whether it offers benefits to patients who require high-flow oxygen or noninvasive/invasive mechanical ventilation,
	  • its supplies are limited, and
	  • its cost (~$3100 per 5-day treatment course)
	
	• Infectious Diseases **MUST** be consulted if you are considering Remdesivir use
	
	• Despite abnormal coagulation tests (PT, PTT, and/or INR), thromboprophylaxis with enoxaparin or heparin should be started in **ALL** patients in the absence of active bleeding. Do not start or continue therapy **ONLY** IF:
	  • Platelet counts are less than 25 x 10^9/L, or Fibrinogen less than 0.5 g/L.
	  • Mechanical thromboprophylaxis should be used when pharmacological thromboprophylaxis is contraindicated. Do not use both.
	
	• See detailed information on **Page 9** of the document for considerations for use of medications in **Pregnancy**

Version #7 – 8/10/2020

Version #7 – 8/10/2020

Table 3. Approach to Anticoagulation for PCR-Confirmed COVID-19 patients based on location of care

Important Considerations for ALL patients:

- **Please get full coagulation panel** which includes: PT, PTT, fibrinogen, thrombin time, d-dimer when abnormalities persist and trying to make an anticoagulation decision
- **Physical Exam notes:** Clearly report in physical exam any pertinent positive or negative relationship to bleeding. Any petechiae, any mucosal bleeding like in the mouth, any purpura, any bleeding from lines, or placement of lines. Also please comment on presence or absence of non-uniform swelling in arms or legs as it relates to thrombosis
- **When liver dysfunction or vitamin K deficiency** is suspected replete with 1 mg IV vitamin K x 3 days and monitor
- Even in the presence of **abnormal coagulation studies**, anticoagulation can be given depending on the circumstance
- All patients **admitted to the ICU** should have lower extremity dopplers performed and then repeated as clinically indicated.
- If Suspected or Confirmed DVT or PE - Initiate **FULL-DOSE** anticoagulation:
- If CLcr > 30 ml/min: Enoxaparin 1 mg/kg (dose rounded to nearest 10mg increment) SQ every 12h **OR** High-Intensity IV heparin infusion (per Nomogram)
- If CLcr < 30 ml/min: Enoxaparin 1 mg/kg (dose rounded to nearest 10mg increment) SQ every 24h **OR** High-Intensity IV heparin infusion (per Nomogram)

Patients in the ED and all floors EXCEPT the ICU:

If D-dimer is less than 1,000 ng/ml - Regular thromboprophylaxis is indicated (*as per standard UConn Health Pharmacologic VTE Prophylaxis Guidelines*):

- If CLcr > 30 ml/min: Enoxaparin 40 mg SC Q24H **OR** heparin 5000 units SC Q8H (**If Age ≥ 75 years old: Heparin 5000 units SC Q12H)
  - **If Weight >100kg and/or BMI >40: Consider Enoxaparin 40 mg SC Q12H **OR** Heparin 7500 units SC q8h
- If CLcr < 30 ml/min: Enoxaparin 30 mg SC once-daily **OR** heparin 5000 units SC Q8H

If D-dimer is above 1,000 ng/ml, *OR* increases above that level on follow-up – Change to INTERMEDIATE-DOSE treatment/prophylaxis:

- If CLcr > 30 ml/min: Enoxaparin 0.5 mg/kg (dose rounded to nearest 10mg increment) SQ every 12 hours **OR** Low-Intensity IV Heparin Infusion (per Nomogram)
- If CLcr < 30 ml/min: Low-Intensity IV Heparin Infusion (per Nomogram)

Patients in the ICU:

Start INTERMEDIATE-DOSE prophylaxis/treatment:

- If CLcr > 30 ml/min: Enoxaparin 0.5 mg/kg (dose rounded to nearest 10mg increment) SQ every 12 hours **OR** Low Intensity IV Heparin Infusion (per Nomogram)
- If CLcr < 30 ml/min: Low-Intensity IV Heparin Infusion (per Nomogram)

OR, CONSIDER immediate initiation of FULL-DOSE anticoagulation:

- If CLcr > 30 ml/min: Enoxaparin 1 mg/kg (dose rounded to nearest 10mg increment) SQ every 12h **OR** High-Intensity IV heparin infusion (per Nomogram)
- If CLcr < 30 ml/min: Enoxaparin 1 mg/kg (dose rounded to nearest 10mg increment) SQ every 24h **OR** High-Intensity IV heparin infusion (per Nomogram)

Based on improvements of clinical, laboratory, and/or other markers of coagulation status, can consider de-escalation to intermediate-dose treatment during ICU care and/or to regular thromboprophylaxis upon transfer out of the ICU (See #2 above)

Anticoagulation on Discharge from the Hospital:

- This is a medicine team decision and should be conveyed to outpatient provider if decision for continued prophylaxis is made.
- Should be based on the patients' clinical course and not D-dimer values. In the absence of evidence of DVT, PE, or other significant clotting event, consider:
  - Apixaban 2.5mg PO BID or rivaroxaban 10mg PO QD, or Enoxaparin 40mg SQ once daily
- Duration should be determined by the primary provider but should not exceed 3 months unless other patient factors support extended duration of prophylaxis

Version #7 – 8/10/2020

UConn Health Information & Contacts for Discussion of Enrollment of Patients in Clinical Trials for COVID-19 Treatment and Use of Convalescent Plasma Therapy:

Convalescent Plasma Therapy:

- UConn Health is now a registered site for the **Mayo Clinic protocol**; the ID and ICU providers have been enrolled online.
- We also can still apply to the FDA for eINDs for individual patients if needed, but the preference is to go through the Mayo Clinic protocol.
- Links for the protocol, consent, and general information are below:

  Link for detailed protocol (Mayo): https://www.uscovidplasma.org/pdf/20-003312%20COVID-19%20Plasma%20EAP%20Version%202.0.pdf
  Link to consent form: https://www.uscovidplasma.org/pdf/EAP%20CP%20English%20Consent%2020.00331200.pdf
  General information page: https://www.uscovidplasma.org/

TOLD Study:

[A randomized, open-label study of the vascular and microbiologic efficacy of dipyridamole (DIP) plus standard care vs. standard care in hospitalized COVID19 patients.]

- UConn Health is the sole site for this Phase 2a Proof-of-Concept investigation sponsored by the UConn School of Medicine
- Primary outcome: Evaluate the effect of DIP on 2 biomarkers- D-dimer and platelet count in those treated with DIP plus standard care vs. those treated with standard care
- UConn Health Clinical Research Center (CRC) will be actively screening COVID-19 infected inpatients each day for possible entry into this study and will contact primary care teams if patients meet inclusion/exclusion criteria

Version #7 – 8/10/2020

COVID-19 – Specific Common Suggested Laboratory & Other Monitoring Parameters (This list is NOT comprehensive…Refer to data in EPIC Ordering Sets for Comprehensive Lists):

PCR-Confirmed COVID-19 patients with MILD or MODERATE Symptoms (NOT admitted to the ICU):[1]	
Labs: Draw at **Baseline ONLY**: • HIV-1/HIV-2 antibody/antigen • G6PD test[2] • Interleukin-6 (IL-6) Draw at **Baseline and Daily**: • CHEM-7, CBC with Differential, Retic count, D-dimer Draw at **Baseline and every 72 hours**: • AST/ALT, Bili, CRP, Ferritin, LDH, Procalcitonin, Troponin, D-dimer, Fibrinogen, PT/PTT, Serum Triglycerides, Thrombin Time, • Complete automated urinalysis testing with microscopic urine sediment examination, urine protein creatinine ratio, urine microalbumin-creatinine ratio	**Other Testing/Monitoring:** • Baseline ECG (QTc interval) & continuous telemetry ***while on therapy*** • Obtain QTc daily, calculate and record in daily progress note ○ Refer to **Pages 6-7** for approach to monitoring in setting of limited resources/ quarantines • Continuous O2 monitoring
PCR-Confirmed COVID-19 patients with SEVERE Symptoms (Admitted to the ICU):[1]	
Labs: Draw at **Baseline ONLY**: • HIV-1/HIV-2 antibody/antigen • G6PD test[2] • Interleukin-6 (IL-6) • Blood type & screen Draw at **Baseline and Daily**: • CHEM-7, CBC with Differential, Retic count, D-dimer Draw at **Baseline and every 72 hours**: • Interleukin-6 (IL-6) • AST/ALT, Bili, CRP, Ferritin, LDH, Procalcitonin, Troponin, D-dimer, Fibrinogen, PT/PTT, Serum Triglycerides, Thrombin Time, • Complete automated urinalysis testing with microscopic urine sediment examination, urine protein creatinine ratio, urine microalbumin-creatinine ratio	**Other Testing/Monitoring:** • Baseline ECG (QTc interval) & continuous telemetry ***while on therapy*** • Obtain QTc daily, calculate and record in daily progress note ○ Refer to **Pages 6-7** for approach to monitoring in setting of limited resources/ quarantines • Continuous O2 monitoring

Table Notes:

1 – These are in addition to any other daily laboratory tests considered part of "routine supportive care" (i.e., basic metabolic panel, CBC w/ diff, etc.). There will be a COVID-19 – specific lab ordering bundle set up in EPIC in the near future to assist with ordering these recommended labs.

2 – G6PD testing is suggested (but not required) for use of HCQ in patients of Asian, African, or Mediterranean descent. *Do not delay start of therapy* awaiting this test if it is ordered

Version #7 – 8/10/2020

Considerations for Use of COVID-19 Treatments in Pregnancy:

Hydroxychloroquine: Limited human data, but appears to be safe.

Frequency of congenital anomalies was no higher among pregnant women who were treated with hydroxychloroquine during the first trimester of pregnancy compared with the general population (1,2)

Lopinavir/ritonavir: Human pregnancy experience suggest that the risks of use are low (1,3).

The Antiretroviral Pregnancy Registry (APR) has received prospective reports of over 3,000 exposures to lopinavir-containing regimens, including over 1,000 first trimester exposures, and over 5,000 exposures to ritonavir-containing regimens, including over 2,000 first trimester exposures. No association between lopinavir or ritonavir and increases in birth defects overall have been observed in data collected from the APR. Prevalence of birth defects associated with maternal first trimester lopinavir use was 2.1% and prevalence of birth defects associated with maternal second and third trimester lopinavir use was 3%. Prevalence of birth defects associated with maternal first trimester ritonavir use was 2.2% and prevalence of birth defects associated with maternal second and third trimester ritonavir use was 2.9%. The background rate of birth defects in the United States reference population for pregnant women is 2.7%

Azithromycin: Limited human data, but appears to be safe.

Data regarding the use of azithromycin during pregnancy, including information from published observational studies, case series, and case reports, have not shown an association between the agent and an increased risk for major birth defects, miscarriage, or adverse maternal or fetal outcomes. Limitations of these studies include the lack of randomization and inability to control for confounders, such as underlying maternal disease and concomitant medications (1,4)

Tocilizumab: Limited human data. Consider risks versus benefits.

There are no adequate and well-controlled studies of tocilizumab use during pregnancy. Monoclonal antibodies, like tocilizumab, are increasingly transported across the placenta as pregnancy progresses, with most occurring during the third trimester of pregnancy. This may affect immune response in the in utero exposed infant. In a retrospective review of 61 pregnancies in women with RA who received tocilizumab, the outcomes were known in 50 of those pregnancies with 36 live births. Of the 36 live births no congenital abnormalities were reported. However, 6 neonatal abnormalities were observed and included 5 cases of low birth weight (ie, less than 2500 g) which was thought to be related to fetal growth restriction and one newborn developed neonatal asphyxia that was reported as postnatal death. In studies of cynomolgus monkeys, administration of IV tocilizumab (doses 1.25 times and higher the maximum recommended human dose) during organogenesis resulted in an increased incidence of abortion and embryofetal death, but no evidence of teratogenicity at any dose. (1,5,6)

Remdesivir: Unknown. Consider risk versus benefits.

Pregnancy Use References:

1.) Micromedex (IBM Micromedex). Accessed 3/24/2020.
2.) Costedoat-Chalumeau N, Amoura Z, Duhaut P, et al: Safety of hydroxychloroquine in pregnant patients with connective tissue diseases. Arthritis Rheum 2003; 48(11):3207-3211.
3.) Product Information: KALETRA(R) oral tablets, oral solution, lopinavir ritonavir oral tablets, oral solution. AbbVie Inc (per manufacturer), North Chicago, IL, 2017.
4.) Product Information: ZMAX(R) oral extended-release suspension, azithromycin oral extended-release suspension. Pfizer Inc (per FDA), New York, NY, 2019.
5.) Product Information: ACTEMRA(R) intravenous, subcutaneous injection, tocilizumab intravenous, subcutaneous injection. Genentech (per FDA), South San Francisco, CA, 2018.
6.) Nakajima K , Watanabe O , Mochizuki M , et al: Pregnancy outcomes after exposure to tocilizumab: a retrospective analysis of 61 patients in Japan. Mod Rheumatol 2016; 26(5):667-671.

Version #7 – 8/10/2020

Document History:

Guidance Document: Guidance for Management of HOSPITALIZED Patients with COVID-19 Infection	
CATEGORY: Clinical	**Date Originated:** 03/25/2020
Page 10 of 10	**Last Reviewed:** 07/31/2020
Owner: Dept. of Pharmacy, Div. of Infectious Diseases, Depts. of Critical Care, Pulmonology, Internal Medicine	**Last Revised:** 07/31/2020
Approved by:	**Retired:**
Document Revision History:	
3/25/2020	Production & distribution of Version #1
4/1/2020	-Adjusted recommendations on corticosteroid use, Removed recommendations for use of lopinavir/ritonavir -Adjusted recommendations on ordering G6PD testing related to hydroxychloroquine -Added details about considerations for use of Tocilizumab and recommendation for ordering IL-6 levels in COVID-19 infected patients -Adjusted screening methods and guidelines for use of Tocilizumab -Modified list of labs to order in COVID-19 – positive patients -Added summary of FDA's *Emergency Use Authorization* for use of hydroxychloroquine during the COVID-19 pandemic and FDA information about eIND for Convalescent Plasma use -Added section on *Approach to Use of Hydroxychloroquine +/- Azithromycin and Consideration of Risk for Drug-Associated QTc Prolongation*
4/10/2020	-Adjusted recommendations on labs and other diagnostic tests to order and evaluate (types & frequencies); added ABO blood typing, decreased frequencies of ordering for tests such as IL-6, ferritin, D-dimer, etc. -Added information promoting use of oral azithromycin in patients who can take PO medications -Added recommendation that clinicians can consider starting HCQ +/- AZI in a patient who has a clinical presentation consistent with COVID-19 but who does not yet have PCR confirmation of COVID-19. -Adjusted recommendations for ID consultation for non-ICU and ICU patients, as well as for added requirement for ID consult for patients where consideration may be made for use of convalescent plasma -Added/adjusted wording for QTc monitoring recommendations and added guidance for approach to discharge of patients who have received HCQ +/- AZI
4/26/2020	-Revised information about lack of proven therapies for treatment of COVID-19 infection to represent statements from the IDSA and NIH guidelines -Revised information and recommendations concerning the use of HCQ +/- AZI in both the "Important Notes" section and the Tables sections of the guidance document -Added recommendations about continuing ACE inhibitors, Angiotensin-Receptor Blockers (ARBs), and statin medications if patients were taking these medications prior to inpatient care and if there are no acute contraindications to their use -Removed laboratory testing recommendations from the Treatment tables (put at end of document as a supplement) -Added in detailed guidance and recommendations for Anticoagulation prophylaxis / treatment for both ICU and non-ICU patients with COVID-19 infection
5/22/2020	-Added information about EUA Remdesivir use in COVID-19 infected patients -Modified information about corticosteroid use in COVID-19 infected patients -Deleted recommendations for use of hydroxychloroquine +/- azithromycin and associated supporting information
6/19/2020	-Revised corticosteroid use recommendations (added specifics about use of dexamethasone)

Version #7 – 8/10/2020

8/10/2020	-Further revised corticosteroid recommendations (added specifics about use of dexamethasone, obtaining verbal consent before use) -Revised information about use of Remdesivir -Removed recommendations for use of Tocilizumab