Updated 4-16-20

University of Colorado Hospital / University of Colorado Health Anticoagulation Subcommittee

ANTICOAGULATION RECOMMENDATIONS FOR HOSPITALIZED COVID-19 PATIENTS

I. GENERAL INFORMATION

- Patients infected with the COVID-19 virus are potentially at ***increased risk of venous thromboembolism*** due to hospitalization, immobilization/isolation, and likely the infection itself
- COVID-19 has been associated with a coagulopathic presentation that mimics DIC, which may be more pro-thrombotic than hemorrhagic
- Lab derangements may include elevated d-dimers, prolonged prothrombin time ratios, elevated fibrinogen, elevated ferritin and thrombocytopenia

II. RECOMMENDATIONS FOR SUBCUTANEOUS VTE PROPHYLAXIS

Floor Patients	**D-dimer <1500* AND** **TEG (MA) ≤ 70[&]** (Only if available, see info below)	**D-dimer > 1500* OR** **TEG (MA) > 70[&]** (Only if available, see info below)
Weight <100 kg	Enoxaparin 40 mg QD	Enoxaparin 30 mg BID
Weight 100-150 kg	Enoxaparin 30 mg BID	Enoxaparin 40 mg BID
Weight > 150 kg	Enoxaparin 40 mg BID	Enoxaparin 0.5 mg/kg BID
AKI (GFR<30 ml/min)[#]	UFH 5000 U TID	UFH 7500 U TID

ICU Patients	**D-dimer <1500* AND** **TEG (MA) ≤ 70[&]** (Only if available, see info below)	**D-dimer 1500* OR** **TEG (MA) > 70[&]** (Only if available, see info below)
Weight <100 kg	Enoxaparin 40 mg QD	Enoxaparin 40 mg BID
Weight 100-150 kg	Enoxaparin 40 mg BID	Enoxaparin 0.5 mg/kg BID
Weight > 150 kg	Enoxaparin 60 mg BID	Enoxaparin 0.5 mg/kg BID
AKI (GFR<30 ml/min)[#]	UFH 5000 U TID	UFH 7500 U TID

***** Based on scarce available mortality data and preliminary data from anti-Xa activity levels in UCH pts

& This guideline does not endorse performing Thromboelastography (TEG) to be routinely done in COVID-19 patients, particularly those on the floor, but use of results may be considered if it is performed. Available in data from other populations indicate hypercoagulability is present in patients with TEG MA values above 70, although no outcomes data in COVD-19 to date. In addition, no clear data to date to incorporate other markers of inflammation like fibrinogen or ferritin at this time to drive anticoagulation choices, but these have been noted to be elevated in severely sick COVID-19 patients

Considerations for patients with AKI:

- Patients on renal replacement therapy (HD, CRRT) may require more aggressive anticoagulation therapy in order to prevent clotting of the filter. Renal service should be consulted for final recommendation

- Estimated GFR should not be used alone to assess renal function as patients with AKI may still have estimated GFR > 30 ml/min.

III. ADDITIONAL CONSIDERATIONS FOR PR0PHYLACTIC OR THERAPEUTIC ANTICOAGULATION IN COVID-19 PATIENTS.

a. COVID-19 patients with a ***history of thromboembolic disease and/or on chronic anticoagulation prior to admit*** should continue home anticoagulation regimen if clinically appropriate, or transition to alternative agent (most cases IV UFH) for therapeutic anticoagulation.

b. COVID-19 patients who develop ***new arterial of venous thromboembolic events*** should be treated with therapeutic anticoagulation (UFH, LMWH) as standard of practice would dictate

c. ***For high clinical suspicion of new thromboembolic events***, consider empiric therapeutic anticoagulation using heparin gtt and order a truncated, lower extremity DVT protocol (POCUS) as a confirmatory test.
   i. Initiation of therapeutic anticoagulation without confirmed or high clinical suspicion of DVT/PE, is controversial and is ***not*** recommended by ***national/international guidelines (see below)***
   ii. In the setting of extremely high D-dimers (e.g. >3000 ng/ml), persistent clotting of lines and/or worsening clinical course, therapeutic anticoagulation may be considered and a multidisciplinary discussion with critical care attending, anti-thrombosis services and others (path, heme) is recommended

d. Primary teams are recommended to consult the inpatient anticoagulation service (metro) or pharmacy (North and South) ***to assist with dose optimization*** (AKI, drug-drug interactions, extremes of body weight, other) ***or therapeutic selection*** (appropriate heparin order set, use of alternative anticoagulants such as DOACS or injectable DTIs). Issues include
   i. For Enoxaparin: measure anti-Xa level 4 hours after 3rd dose. Goal = 0.3-0.5. Increase dose as needed guided by anti-Xa level. Consider using TEG.

e. When TEG monitoring available: Use Kaolin / heparinase

IV. AVAILABLE GUIDANCE ON ANTICOAGULATION IS AVAILABLE THROUGHT HE FOLLOWING ORGANIZATIONS:

a. International Society of Thrombosis and Haemostasis
b. American Society of Hematology
c. Anticoagulation Forum
d. American College of Cardiology