Anticoagulation Guidelines for COVID-19 Patients

COVID-19 pneumonia is associated with significant acute phase response. Several pro-coagulant factors are markedly elevated resulting in an increased risk for thrombosis. Standard prophylactic strategies are likely suboptimal. Additionally, the hematology societies are concerned about higher risk for developing DIC and thrombosis. Therefore, anticoagulant management needs to be tailored to the degree of coagulation activation observed in the patient upon presentation and during course of disease. It is a dynamic process. An approach to anticoagulation prophylaxis and management follows:

Step I – Calculate a DIC score –

On admission, please measure PT, aPTT, fibrinogen, D-dimer, and platelet count on all patients. High fibrinogen alone increases risk for thrombosis.

ISTH Criteria for DIC - 5 points are needed for DIC Diagnosis		
Platelets	50-100 K	1 point
	< 50 K	2 points
D-Dimer	1000-3000 ng/ml	1 point
	> 3000 ng/ml	3 points
Fibrinogen	< 100 mg/dl	1 point
Prolonged PT	3-6 seconds	1 point
	> 6 seconds	2 points

- if greater or equal to 5 → DIC is present Hematology Consult will be obtained
- If score is less than 5 go to **Step II**

Step II – Assess for the presence of venous or arterial thromboembolic disease

- Imaging confirmed thromboembolism or high clinical suspicion for thromboembolism – treat as follows
    1. In the absence or renal failure or morbid obesity use enoxaparin 1 mg/kg every 12 hours
    Or
    2. Unfractionated Heparin – using the "Hi Intensity" Order-Set in UHCare (80 Units/kg bolus, 18 Units/kg/hr continuous infusion)

Patients with high clinical suspicion should proceed to imaging with CTA or duplex ultrasound for venous thromboembolic disease. Suspected arterial thromboembolism should be confirmed and managed as clinically appropriate.

- If No thromboembolism is identified proceed to **Step III**

STEP III – If there is no evidence of thromboembolism, then prophylaxis can be applied as per the following table

D- Dimer ng/ml	Weight (kg)	Drug target Heparin Assay, Lovenox is 0.3 – 0.5 IU/mL
< 1000	< 100	Enoxaparin 40 mg daily
	100-150	Enoxaparin 40 mg bid
	> 150	Enoxaparin 60 mg bid
	▪ Enoxaparin should be timed for 0900 and 2100 if BID ▪ "Heparin Assay, Lovenox" should be drawn 3.5-4 hours after the second dose, then as needed based on level and renal function ▪ **Aim: target Lovenox assay 0.3-0.5 IU/mL** o Adjust doses in increments of 10-20 mg depending on level and renal function ▪ If on CRRT or HD, o use heparin 5,000 Units Q8H when weight < 150 Kg o use heparin 7,500 Units Q8H when weight > 150 Kg	

D- Dimer ng/ml	Weight (kg)	Drug target Lovenox or UFH levels (See Below)
1000 - 3000	< 100	Enoxaparin 40 mg bid
	100-150	Enoxaparin 80 mg bid
	> 150	Enoxaparin 120 mg bid
	For patients requiring doses ≥ 80 mg, recommend using the "Enoxaparin Therapeutic Anticoagulation" UHCare orderset for ease of ordering o Enoxaparin should be timed for 0900 and 2100 o "Heparin Assay, Lovenox" should be drawn 3.5-4 hours after the second dose, then as needed based on level and renal function. o **Aim: target Lovenox assayl 0.3-.0.5 IU/mL** ▪ Adjust doses in increments of 10 – 20 mg depending on level and renal function ▪ If on CRRT or HD, use Low Intensity Heparin drip as per EMR (60 Units/kg IV bolus, followed by 12 Units/kg/hr constant IV infusion). Monitor with "Heparin Assay" ▪ **Aim: target Heparin level 0.2-0.3 IU/mL**	

D- Dimer ng/ml	Weight (kg)	Note: Lovenox & UFH Assay have different therapeutic levels
> 3000	▪ In absence or renal failure and morbid obesity use enoxaparin 1 mg/kg every 12 hr ▪ Monitor "Heparin Assay, Lovenox", should be drawn 3.5-4 hours after the second dose then at least once daily ▪ **Aim : target Lovenox assay: 0.6-1.0 IU/mL** ▪ Adjust dose in increments of 10-20 mg depending on levels **OR** ▪ Start high intensity unfractionated Heparin drip as per EMR (80 Units/kg IV bolus, followed by 18 Units/kg/hr constant IV infusion). Monitor "Heparin Assay" every 6 hr ▪ **Aim: target UFH assay: 0.3-0.7 IU/ml until stable and then once daily** ▪ If no improvement in D-Dimer in 24-48 hrs consult Hematology and/or Vascular Medicine	

Note: patients may increase or decrease COVID COAGULOPATHY parameters during the course of their illness. Upgrading or downgrading anticoagulation based upon changing lab parameters and adjusting anticoagulation as above is required throughout admission.

STEP IV. Discharge Planning

Improving or recovered patients are at risk for post-hospitalization VTE. Peak incidence occurs 18-21 days post discharge. This fact is especially true for patients with high d-dimer and elevated fibrinogen.

Recommended VTE prophylaxis at discharge

Cr Clearance mL/min	Weight (kg)	Drug
>30	< 100	Enoxaparin 40 mg subcutaneous daily
	100-150	Enoxaparin 60 mg subcutaneous daily
	> 150	Enoxaparin 80 mg subcutaneous daily
< 30	< 150	Unfractionated Heparin 5000 units subcutaneous every 12 hours
	> 150	Unfractionated Heparin 7500 units subcutaneous every 12 hours

- Maintain this prophylaxis for 30 days after discharge home
- If discharged to LTACH, SNF or rehabilitation – maintain prophylaxis longer till ambulation is back to baseline