Therapeutic Dosing of Unfractionated Heparin – Adults – Inpatient Consensus Care Guideline Summary

Target Population: adult patients receiving therapeutic heparin infusions

Link to Full Guideline: Therapeutic Dosing of Unfractionated Heparin – Adult – Inpatient/Emergency Department

Guideline overview

- Anticoagulation dosing nomograms are defined by time to achieve therapeutic range
  - Gradual nomogram: within 24-36 hours
  - Rapid nomogram: within 18-24 hours
- Therapeutic heparin infusions must be ordered with the Heparin Anticoagulation Supplemental order set
- Baseline labs necessary prior to initiation of infusion are defined
- The indication for use determines the anti-Xa target goal, the initial bolus dose, and initial infusion rate
- The administration instructions for heparin infusion orders specify the titration nomogram to use
- Instructions for management of heparin infusions within 48 hours of direct Xa inhibitor (apixaban, rivaroxaban) administration are provided
- Bolus doses and infusion rate changes are based on heparin levels by anti-Xa and include nomograms for: gradual, rapid, treatment of acute coronary syndrome with GP IIb/IIIa inhibitors, and direct Xa inhibitor in previous 48 hours and elevated baseline heparin anti-Xa doses
- Recommendations for timing of laboratory monitoring are provided
  - Heparin levels by anti-Xa should be measured 6 hours after initiation or change in infusion rate
- Instructions for transitioning between nomograms and to other anticoagulants is provided
- References

Gradual Anticoagulation Nomogram – Initiates unfractionated heparin at a lower initial infusion rate with the intent to achieve a therapeutic range within 24-36 hours. This nomogram is typically reserved for patients receiving concomitant thrombolytics, who have a new mechanical valve during current admission or when concerns for bleeding outweigh the need for quickly reaching a therapeutic goal.

Rapid Anticoagulation Nomogram – Initiates unfractionated heparin with the intent to achieve a therapeutic range within 18-24 hours. This nomogram is typically reserved for venous or atrial thrombosis, acute coronary syndrome, history of mechanical valves or when therapeutic anticoagulation is needed quickly.

Table 1. Initial UFH Dosing Based on Indication

Indication	Anti-Xa Target Goal	Initial Bolus	Initial Infusion Rate
Anticoagulation for COVID (Rapid Nomogram unless high bleed risk)	0.3-0.7 IU/mL	80 units/kg (max 10,000 units)	18 units/kg/hr
Venous Thromboembolism/ Atrial Thrombosis (Rapid Nomogram unless high bleed risk)	0.3-0.7 IU/mL	80 units/kg (max 10,000 units)	18 units/kg/hr
Mechanical Heart Valve (historical) (Rapid Nomogram unless high bleed risk)	0.3-0.7 IU/mL	80 units/kg (max 10,000 units)	18 units/kg/hr
Mechanical Heart Valve (new during admission) (Gradual Nomogram)	0.3-0.7 IU/mL	None	12 units/kg/hr
Therapeutic anticoagulation with elevated bleeding risk (Gradual Nomogram)	0.3-0.7 IU/mL	None	12 units/kg/hr
Systemic thrombolytics used in previous 24 hours (Gradual Nomogram)	0.3-0.7 IU/mL	None	12 units/kg/hr
Acute Coronary Syndrome with GP IIb/IIIa inhibitor (e.g. eptifibatide) (Gradual Nomogram)	0.1-0.3 IU/mL	None	12 units/kg/hr (max 1,000 units/hr)

Acute Coronary Syndrome without GP IIb/IIIa inhibitor (Rapid Nomogram unless high bleed risk)	0.3- 0.7 IU/mL	60 units/kg (max 4,000 units)	12 units/kg/hr (max 1,000 units/hr)

Initial boluses and infusion rates are based on actual body weight

Table 2. Gradual Anticoagulation Nomogram (e.g., Therapeutic anticoagulation with elevated bleeding risk, systemic thrombolytics used in past 24 hours, mechanical heart valve (new during admission), acute coronary syndrome with GP IIb/IIIa inhibitor)

Heparin Level by Anti-Xa (IU/mL)	Bolus/Hold	Infusion Rate Change
<0.1	Bolus 20 units/kg & inform MD (max 5,000 units)	increase by 2 units/kg/hr
0.1 – 0.29	None	increase by 1 units/kg/hr
0.3 – 0.7	None	NO CHANGE; Therapeutic Range
0.71 – 0.8	None	decrease by 1 units/kg/hr
0.81 – 1.7	Hold infusion 1 hr	decrease by 2 units/kg/hr
>1.7	Hold infusion 1½ hr & inform MD	decrease by 3 units/kg/hr

Table 3. Rapid Anticoagulation Nomogram (e.g., Anticoagulation for COVID, venous thromboembolism, atrial thrombus, mechanical heart valve (historical), acute coronary syndrome without GP IIb/IIIa inhibitor)

Heparin Level by Anti-Xa (IU/mL)	Bolus/Hold	Infusion Rate Change
<0.1	Bolus 40 units/kg & inform MD (max 10,000 units)	increase by 3 units/kg/hr
0.1 – 0.19	Bolus 20 units/kg & inform MD (max 5,000 units)	increase by 2 units/kg/hr
0.2 – 0.29	None	increase by 1 units/kg/hr
0.3 – 0.7	None	NO CHANGE; Therapeutic Range
0.71 – 0.8	None	decrease by 1 units/kg/hr
0.81 – 1.7	Hold infusion 1 hr	decrease by 2 units/kg/hr
>1.7	Hold infusion 1½ hr & inform MD	decrease by 3 units/kg/hr

Table 4. Nomogram for Treatment of Acute Coronary Syndrome with GP IIb/IIIa inhibitor

Heparin Level by Anti-Xa (IU/mL)	Bolus/Hold	Infusion Rate Change
< 0.1	Bolus 20 units/kg & inform MD (max 5,000 units)	increase by 3 units/kg/hr
0.1 – 0.3	None	NO CHANGE; Therapeutic Range
0.31 – 0.5	None	decrease by 1 units/kg/hr
0.51 – 0.8	None	decrease by 2 units/kg/hr
> 0.8	Hold infusion 1 hr & inform MD	decrease by 3 units/kg/hr

Table 5. Nomogram for Direct Xa Inhibitor in Previous 48 hours and Elevated Baseline Heparin Anti-Xa

Heparin Level by Anti-Xa (IU/mL)	Bolus/Hold	Infusion Rate Change
< 0.1	Bolus 40 units/kg & inform MD (max 10,000 units)	increase by 3 units/kg/hr
0.1 – 0.39	Bolus 20 units/kg & inform MD (max 5,000 units)	increase by 2 units/kg/hr
0.4 – 0.69	None	increase by 1 units/kg/hr
0.7 – 1.0	None	NO CHANGE; Therapeutic Range
1.1 – 1.4	None	decrease by 1 units/kg/hr
1.5 – 1.7	Hold infusion 1 hr	decrease by 2 units/kg/hr
> 1.7	Hold infusion 1½ hr & inform MD	decrease by 3 units/kg/hr

Table 6. Laboratory monitoring for UFH infusion

Lab	Initiation/Titration	Maintenance
Heparin level by anti-Xa	6 hours after initiation or resumption of infusion following a hold 6 hours after any rate change	Once 3 consecutive levels are in target range, then check daily
Hemoglobin	24 hours after initiation	Every other day for up to 14 days
Platelets	24 hours after initiation	Every other day for up to 14 days

Table 7. Transitioning between UFH and other anticoagulants

Gradual to Rapid Rapid to Gradual	Continue current infusion rate When next level results titrate with new nomogram
Heparin to Enoxaparin	Stop heparin Administer enoxaparin 2-4 hours later
Heparin to DOAC	Stop heparin Give oral anticoagulant at the same time
Heparin to Fondaparinux	Stop heparin Administer fondaparinux 2-4 hours later

References

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