PROTOCOL FOR HEPARIN THERAPY

For patients > 1 month of age

- Obtain baseline INR, aPTT, fibrinogen, CBC, urea, creatinine before starting therapy
- Once aPTT is in the therapeutic range, repeat aPTT daily; CBC twice weekly
- Requires a dedicated line. Blood for aPTT should NOT be drawn from the extremity infusing heparin

LOADING DOSE:

75 units/kg (maximum: 5000 units/dose)
Infuse IV over 10 minutes by syringe pump

INITIAL MAINTENANCE DOSE:

≤ 1 year of age:	28 units/kg/h
> 1 year of age:	20 units/kg/h
Adolescents and adults	18 units/kg/h (maximum starting dose: 1000 units/h)

-Obtain aPTT 4 hours after loading dose and adjust dose according to nomogram.
-Titrate according to table. For patients not responding as predicted or with a high initial aPTT measure unfractionated heparin level (goal: 0.35 – 0.7 units/mL). Hematology or Hematopathology consult recommended

APTT (sec.)	Bolus (units/kg)	Hold time (min.)	Rate Change	Repeat APTT
<50	50	0	↑ 20%	4 hr
50-59	0	0	↑ 10%	4 hr
60-85	0	0	0	24 h
86-95	0	0	↓ 10%	4 hr
96-120	0	30	↓ 10%	4 hr
>120	0	60	↓ 15%	4 hr

USUAL CONCENTRATION FOR MAINTENANCE HEPARIN:

- 50 units/mL for majority of patients
- 100 units/mL for patients who are severely fluid restricted
- Use D5W (but also compatible with saline)

CORRECT WRITING OF ORDERS:

Write orders as:

"Heparin infusion (50 units/mL) in D5W; infuse IV at ____ units/kg/h"

ADDITIONAL INFORMATION:

Mechanism of Action

Heparin binds to antithrombin which enhances the inactivation of thrombin (IIa) and factor Xa (as well as activated coagulation factors IX, X, XI, XII) and prevents the conversion of fibrinogen to fibrin.

Pharmacokinetics

- Heparin is not absorbed via the oral route, therefore intravenous (continuous infusion) and subcutaneous (intermittent) routes are necessary
- For immediate anticoagulation an intravenous bolus followed by a continuous infusion is given since there is a delay in absorption/onset via the SC route
- The half-life of heparin is dose-dependent (in the therapeutic range, the half-life is about 1 hour)
- aPTT reaches a steady state in approximately 4 hours in children

Adverse Effects

- The risk of heparin-induced thrombocytopenia is greater after the first 5 days, though it is sooner in patients with prior heparin exposure (e.g. heparin in cardiac bypass solutions)
- Hypersensitivity to heparin or any component (some preparations contain sulfites or benzyl alcohol which can be sensitizing)

Contraindications

- Severe/refractory thrombocytopenia, suspected intracranial hemorrhage, severe hypotension or uncontrolled bleeding

Precautions

- Avoid IM injections, arterial punctures and, where possible, antiplatelet agents such as ASA, NSAIDs (eg ketorolac)
- Stop heparin 4 hours prior to invasive procedures such as lumbar puncture or pacer wire removal
- Platelet count should be maintained above 50 x 10 ^9/L during therapy
- Obtain CBCs twice weekly. If there is an abrupt decrease in the platelet count (e.g. 50% decrease) suspect heparin-induced thrombocytopenia (HIT)
- If transitioning to oral anticoagulation, start on day 1 of heparin and overlap for 5 days. Post-op cardiac patients can be initiated on oral anticoagulation once pacer wires are out

Antidote: Protamine 1 mg/100 units of heparin received in previous 30 minutes. Refer to protamine monograph for further information about dosing beyond 30 minutes