PROTOCOL FOR ENOXAPARIN THERAPY

- Enoxaparin is the only low molecular weight heparin (LMWH) on formulary at C&W
- Obtain baseline INR, aPTT, fibrinogen, CBC and creatinine

Dosing: Use with caution in patients with renal impairment as dose may need to be adjusted

	Age ≤ 2 months	**Age > 2 months**
Enoxaparin treatment dose	1.5 mg/kg/dose SC Q12H	1 mg/kg/dose SC Q12H May consider maximum starting dose 100 mg Q12H
Enoxaparin prophylaxis dose	0.75 mg/kg/dose SC Q12h May consider 1.5 mg/kg/dose SC Q24h if no prohibitive bleeding risk	0.5 mg/kg/dose* SC Q12H May consider 1 mg/kg/dose* SC Q24h if no prohibitive bleeding risk

*No maximum dose

- **Round up to nearest whole number of mg (eg. 6 mg NOT 5.5 mg)**
- 30 unit insulin syringes can be used to measure small doses; **with insulin syringes 1 mg = 1 unit**
- Prior to invasive procedures such as lumbar punctures, omit enoxaparin for 24 hours prior (2 doses if twice daily dosing, 1 dose if once daily dosing)

Monitoring (for treatment dosing)

- Therapeutic range of low molecular weight heparin level (anti Xa): 0.5 – 1 unit/mL
- Low molecular weight heparin (anti Xa) levels should be drawn on day 2 of treatment, 4 hours after the morning dose, and on day 2 following a dose change 4 hours after morning dose
- Draw level via venous sample
- If a venous draw is not feasible and sample is drawn from a heparinized line, draw aPTT to rule out contamination. If patient is well and PTT is prolonged, redraw Anti Xa via peripheral route
- If the patient is unwell (febrile, new infection <within two weeks> or MD discretion), draw an INR & fibrinogen along with the PTT as an increase in PTT might be due to coagulopathy and not heparin contamination

LMWH (anti Xa) level at 4 hours (units/mL)	Dose change	Obtain Next Level
< 0.35	Increase by 25%	4 hours post 2-3 doses after change
0.35 - 0.49	Increase by 10%	4 hours post 2-3 doses after change (after next AM dose)
0.5 - 1.0	0	4 hours post AM dose once weekly
1.1 - 1.5	Decrease by 20%	4 hours post 2-3 doses after change (after next AM dose)
1.6 – 2.0	Hold dose for 3hr; decrease by 30%	Trough level before next dose, then 4 hours post 2-3 doses after change (after next AM dose)
> 2.0.	Hold until heparin level 0.5 then decrease by 40%	Trough level before next dose and if not <0.5 U/mL continue to hold and repeat before each dose is due

Monitoring (for prophylaxis dosing)

- Monitoring is not usually required for prophylaxis but may be considered in patients with obesity, high bleeding risk, or abnormal renal function
- Therapeutic range of low molecular weight heparin level (anti Xa) for prophylaxis is not well established: peak 0.2 – 0.49 unit/mL, or trough level ≥0.1
- Consult pharmacist and/or hematology for dose adjustments based on levels

Conversion between low molecular weight heparin (LMWH) and unfractionated heparin (UFH)

1. LMWH to UFH
    - No heparin bolus
    - Start UFH infusion 8 - 12 hours after last LMWH dose
    - Measure aPTT 6 hours after start of UFH infusion and monitor as per unfractionated heparin guidelines

2. UFH to LMWH
    - Stop UFH infusion
    - Give LMWH at the same time as stopping infusion

ADDITIONAL INFORMATION

Mechanism of Action

- Enoxaparin binds to antithrombin and inhibits Xa. Unlike unfractionated heparin, enoxaparin has reduced effect on anti IIa and does not prolong aPTT

Pharmacokinetics

- Enoxaparin is excreted mainly by the kidneys so a reduced dose or increased dosing interval is required in renal impairment – discuss with Pharmacist and Hematology
- Enoxaparin does not bind to plasma proteins, therefore has a longer half-life (2-3 hours) with predictable pharmacokinetics, compared to unfractionated heparin
- Absorption may be variable in neonates with inadequate adipose tissue
- Maximum effect after SC dose is seen in 3 to 5 hours; duration is 12 hours
- Pharmacokinetics may be altered in critically ill children and obese children

Administration

- Monitor injection sites closely for hematoma. The dose can be administered via the subcutaneous route using an ultrafine needle to minimize pain
- Vials should be stored at room temperature with a 28 day expiry date once opened

Precautions

- Hypersensitivity to enoxaparin or heparin
- Use with caution in patients with increased risk of bleeding, active bleeding, refractory/severe thrombocytopenia, coagulopathies, recent surgery, concomitant antiplatelet therapy or NSAIDs (ASA, ibuprofen or ketorolac) or recent epidural/spinal punctures
- Aim to keep platelets above 50 x 10^9/L while on therapeutic dosing of enoxaparin (or adjust dose in discussion with hematology when platelets <50)
- Avoid IM injections and arterial punctures

- Protamine does not completely neutralize the anti-Xa activity of enoxaparin. If the last dose of enoxaparin is given within 8 hours, give 1 mg of protamine per mg of enoxaparin, by slow IV infusion. Protamine may cause anaphylaxis and hypotension

Discharge considerations

- Pharmacare Special Authority needs to be obtained for patients being discharged on enoxaparin
- A teaching package is available for patients being discharged on enoxaparin. Teaching will be done by the ward pharmacist and inpatient bedside nurses

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