

Low Molecular Weight Heparin (LMWH) Guidelines – Thrombosis Treatment and Prevention

Background:

This guideline is intended to define a systematic organized approach to effectively and safely manage pediatric patients who are prescribed Low Molecular Weight Heparin (LMWH). Enoxaparin is the OLOL formulary LMWH. The goal is to standardize practice to include appropriate laboratory orders and subsequent monitoring of these parameters as well as thoroughly educating the patient and patient's family in order to provide the safest and most effective patient care possible.

It is suggested that pediatric hematologists with experience in thromboembolism be consulted to assist with the management of pediatric patients with thromboembolism.

Indications:

1. Treatment of venous and arterial thromboembolic events
2. Primary and secondary prophylaxis of thromboembolic events
3. Prophylaxis for mechanical and biological prosthetic heart valves

Contraindications:

1. Patients with previously documented heparin induced thrombocytopenia
2. Active major bleeding
3. Epidural or spinal anesthesia or spinal puncture and other procedures with potential for uncontrollable bleeding [Black Box Warning]

Precautions

1. Avoid use of other anticoagulants or antiplatelet medications (NSAIDS, aspirin)
2. Platelet count <50,000
3. High risk for bleeding
4. Renal impairment (CrCl < 30ml/min)

Indications to Stop LMWH Prior to Procedures:

Orders to hold enoxaparin prior to procedures as well as orders documenting the date and time to resume enoxaparin after procedures should be clearly documented in the patient's medical record.

- **Minor Procedures:** Hold the dose of LMWH at least 12 hours prior to the procedure. Restart the LMWH 12 hours or later after the procedure if there are no bleeding complications.

In minor surgery, major body cavities are not opened. Minor Procedures include the following:

- Bone marrow biopsy and aspirate
- Central venous catheter placement
- Removal of skin lesions
- Biopsy of growths
- Placement of ear tubes
- Hernia repairs
- Correction of bone fractures
- Dental procedures - single or multiple tooth extractions and endodontic (root canal) procedures
- Dermatologic procedures - excisions of basal and squamous cell carcinomas, actinic keratoses, and malignant or premalignant nevi

- **Lumbar Puncture/Intrathecal Injection:** Give last dose of LMWH 24 hours prior to procedure. Hold on the day of procedure, and restart 24 hours after procedure if the patient is not bleeding.

- **Major Procedures:** Give last dose of LMWH 24-48 hours before the procedure. Hold on the day of the procedure and restart 48-72 hours or later after the procedure if the patient does not have epidural anesthesia and is not bleeding.

Major surgery often involves opening one of the major body cavities—the abdomen (laparotomy), the chest (thoracotomy), or the skull (craniotomy). Major Procedures include the following:

- Removal of brain tumors or other solid tumors
- Correction of bone malformations of the skull and face
- Orthopedic surgery
- Repair of congenital heart disease; other cardiac surgery
- Transplantation of organs
- Repair of intestinal malformations

- Correction of spinal abnormalities; intracranial or spinal surgery
- Treatment of injuries sustained from major blunt trauma
- Vascular surgery
- Reconstructive plastic surgery
- Prostate and bladder surgery

LMWH Dosing and Monitoring Guidelines:

The formulary LMWH is enoxaparin. Do **not** administer LMWH if the patient has had a previous episode of heparin-induced thrombocytopenia.

If the patient has renal insufficiency and the creatinine clearance is suspected to be less than 30 mL/min/1.73 m², consult a clinical pharmacist or pediatric hematology for dosing adjustments of the enoxaparin dose.

- Obtain a baseline platelet count at initiation or re-initiation of therapy
- Day 1 dosing of enoxaparin:
 - Treatment Dosing: Several recent studies suggest that higher initial doses are indicated especially for younger patients. Ranges represent dosing recommendations from multiple sources. Clinical judgment should be used to select higher or lower end of the range for an individual patient.
 - 1-3 months: 1.5-1.7 mg/kg/dose q12hrs SUBQ
 - 3-12 months: 1-1.5 mg/kg/dose q12hrs SUBQ
 - 1-5 years: 1-1.2 mg/kg/dose q12hrs SUBQ
 - 6-18 years: 1-1.1 mg/kg/dose q12hrs SUBQ
 - Prophylaxis Dosing
 - Younger than 12 months: 0.75 mg/kg/dose q12hrs SUBQ
 - Greater than 12 months: 0.5 mg/kg/dose q12hrs SUBQ up to a max of 30 mg BID
- For adult dosing please refer to the CHEST guidelines.

- Goal anti-factor Xa range is 0.5 – 1 unit/mL when enoxaparin is used for treatment of thromboembolic events.
- Anti-Xa levels must be drawn 4 to 6 hours after the 2nd-4th dose following initiation and then again 1-2 doses after a dose change. .
- Anti-factor Xa levels need to be drawn in a light blue top (sodium citrate) tube from a **fresh stick**, not through the patient's existing line.
- Dose adjustment of enoxaparin for **treatment** of thromboembolic events (for a goal anti-factor Xa of 0.5 -1 units/mL):

Anti-Factor Xa	Hold Next Dose?	Dose Change?	Repeat Anti-Factor Xa?
<0.35 units/mL	No	Increase by 25%	4 hr after the next AM dose
0.35-0.49 units/mL	No	Increase by 10%	4 hr after the next AM dose
0.5-1 units/mL	No	No change	Next day, then 1 week later, and monthly thereafter while receiving treatment
1.1-1.5 units/mL	No	Decrease by 20%	4 hr after the next AM dose
1.6-2 units/mL	Yes 3 hours	Decrease by 30%	4 hr after the next AM dose
>2 units/mL	Yes, until anti-Xa <0.5 units/mL	Decrease by 40%	Measure Q12-24 hrs until the anti-factor Xa level is <0.5 units/mL

- Note: There are currently no dose adjustment tables for enoxaparin if a patient is receiving prophylactic therapy. A prophylactic level of 0.2 – 0.4 units/mL has been reported; however, routine levels are not recommended.
- Once the patient's anti-factor Xa is therapeutic and stable, repeat follow-up anti-factor Xa levels every 2 to 8 weeks as clinically indicated.

Enoxaparin Education Material:

Patient information card at www.stjude.org >>caregiver educational resources>>A-Z medications

References:

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