Anesthesia Considerations

Optimal implementation of an obstetric VTE prophylaxis strategy will require close collaboration between obstetric and anesthesia providers. Given that no high-quality data supports a single best approach, society guidelines make varying recommendations, and anesthesia guidelines are evolving, anesthesia and obstetric leadership for each maternity unit should work to reach consensus on a standardized approach to prophylaxis. Ideally each hospital should develop a standardized protocol that addresses prophylaxis for all patients with VTE risk. The CMQCC Maternal VTE Task Force further recommends perioperative discussion with anesthesia (e.g. during time out) to ensure protocol adherence and patient safety. Critical discussion points should include:

- Postpartum medication choice (LMWH versus UFH), dose, and time of first dose
- Whether neuraxial anesthesia administration involved a difficult or bloody procedure or other complication
- Whether Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) will be used in combination with postpartum anticoagulation

Recommendations for anesthesia in relation to anticoagulation

The following recommendations are based on:

(i) Anesthesia leadership society recommendations including ASRA and the European Society of Anaesthesiology (ESA)

(ii) The NPMS VTE Bundle

(iii) Pharmacokinetic data from the anesthetic and obstetric literature

(iv) Expert opinion from the Society for Obstetric Anesthesia and Perinatology (SOAP)

The CMQCC Maternal VTE Task Force notes that both ASRA and ESA both last published official guidelines in 2010. ASRA is currently completing a guideline revision, a preliminary version of which is available as an iPhone app. In this Toolkit, the CMQCC Maternal VTE Task Force refers to the recommendations from the ASRA iPhone app, where applicable. In the absence of iPhone app recommendations, the CMQCC Maternal VTE Task Force refers to the 2010 ASRA and ESA guidelines. The CMQCC Maternal VTE Task Force notes that SOAP is currently developing guidelines for anticoagulated obstetric patients. The CMQCC Maternal VTE Task Force encourages using the SOAP guidelines to update hospital anesthesia and obstetric VTE protocols as appropriate.
Recommendations for time-interval between the last dose of UFH/LMWH and neuraxial anesthesia

See Table 10 for summary of these recommendations.

**Low Molecular Weight Heparin (LMWH)**
ASRA and ESA recommend a minimum of 10-12 hours after prophylactic LMWH and a minimum of 24 hours after therapeutic LMWH before performing neuraxial blockade.

**Unfractionated Heparin (UFH)**
Low dose UFH: The NPMS bundle supports administration of low-dose UFH at any time in relation to neuraxial anesthesia based on long-standing recommendations and routine clinical practices within the United States. The preliminary 2016 ASRA app guidelines recommend a time interval of at least 4 hours (and preferably 6 hours) between a 5000 units dose of subcutaneous UFH and neuraxial blockade for women receiving a maximum of 10,000 units over a 24-hour period.

The CMQCC Maternal VTE Task Force notes that ASRA recommendations do not account for the pharmacokinetic differences of UFH between pregnant and non-pregnant women. The Society for Obstetric Anesthesia and Perinatology (SOAP) have issued consensus recommendations that support decision-making incorporating the competing risks/benefits of neuraxial versus general anesthesia, obstetric pharmacokinetic data, and relevant data on complications.  

**High dose UFH**
Recommendations for neuraxial anesthesia in relation to higher doses of UFH are unclear. The 2016 ASRA app guideline does not classify what constitutes a “therapeutic” dose of UFH. The 2010 ASRA guideline states that the safety of neuraxial blockade is not established for patients receiving more than twice daily dosing or > 10,000 units of UFH daily; anesthesia recommendations for women receiving these doses are not provided. ESA guidelines define “prophylactic” UFH as ≤ 15,000 units per day. For women receiving “treatment” dose UFH (which the CMQCC Maternal VTE Task Force interprets as > 15,000 units per day), ESA recommends that 8-12 hours between last UFH dose and neuraxial blockade. The CMQCC Maternal VTE Task Force recommends waiting 6 hours after the last dose of UFH prior to neuraxial blockade then check aPTT. If aPTT is within normal limits, block may be considered. If aPTT is elevated, delay block 1 hour then recheck aPTT. Given the inconsistency in society recommendations, the CMQCC Maternal VTE Task Force recommends that obstetric providers create local protocols with input for hematologists as necessary.
Recommendations for First Postpartum Anticoagulation Dose After Neuraxial Blockade or Epidural Catheter Withdrawal

See Table 10 for detailed summary about these recommendations.

i. **LMWH 24-hour dosing (e.g., Enoxaparin 40 mg every 24 hours):** According to 2016 app guidelines, ASRA recommends a minimum of 12 hours after uncomplicated neuraxial block before administering LMWH. For patients receiving post-cesarean epidural analgesia, ASRA recommends that waiting at least 4 hours after epidural catheter withdrawal and 12 hours after surgery before initiating prophylactic LMWH.

ii. **LMWH 12-hour dosing (e.g., Enoxaparin 40 mg every 12 hours):** According to 2016 app guidelines, ASRA recommend a minimum of 12 hours after uncomplicated neuraxial block before initiating LMWH. For patients receiving post-cesarean epidural analgesia, ASRA recommends that waiting at least 4 hours after epidural catheter withdrawal and 12 hours after surgery before initiating prophylactic LMWH. ASRA recommends removal of indwelling catheters before the first dose of 12-hour dosing of prophylactic LMWH.

iii. **Therapeutic postpartum LMWH:** The CMQCC Maternal VTE Task Force recommends waiting 24 hours after neuraxial block or epidural catheter removal before initiating therapeutic LMWH (e.g., enoxaparin 1mg/kg every 12 hours or 1.5mg/kg every 24 hours). The CMQCC Maternal VTE Task Force also recommends avoiding concomitant NSAIDs for patients receiving therapeutic dose LMWH or therapeutic dose IV UFH. These recommendations are consistent with the 2010 ASRA guidelines. Of relevance to patients who require post-cesarean epidural analgesia, ASRA also recommends indwelling catheters be removed before the first dose of therapeutic LMWH.

**UFH:** The 2016 ASRA app supports administration of heparin 5,000 units every 12 hours immediately after neuraxial block or epidural catheter removal. Given special considerations for postpartum obstetric patients, The CMQCC Maternal VTE Task Force recommends that the first dose of prophylactic UFH be administered at the end of the recovery period in the postop anesthetic care unit (PACU) or on discharge to the postpartum floor. For the vast majority of patients, at least one hour will have elapsed between the time of neuraxial blockade or epidural catheter removal (at the end of surgery or after delivery) and PACU discharge or transfer (See Table 10).
### Antepartum/Intrapartum

Minimum time periods between discontinuing antepartum anticoagulation and performing neuraxial blockade, defined here as any of the following: single shot spinal, epidural, or combined spinal-epidural

<table>
<thead>
<tr>
<th>Anticoagulation Dose</th>
<th>Minimum Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFH dose ≤ 10,000 units/day</td>
<td>No contraindications to timing of heparin dose and performance of neuraxial blockade</td>
</tr>
<tr>
<td>UFH dose &gt; 10,000 units/day</td>
<td>Wait 6 hours after the last dose of UFH prior to neuraxial blockade then check aPTT. If aPTT within normal limits – block may be considered. IF aPTT elevated, delay block 1 hour then recheck aPTT</td>
</tr>
<tr>
<td>LMWH prophylactic dose</td>
<td>Wait ≥ 12 hours post last dose prior to neuraxial blockade</td>
</tr>
<tr>
<td>LMWH therapeutic dose</td>
<td>Wait ≥ 24 hours post last dose prior to neuraxial blockade</td>
</tr>
</tbody>
</table>

### Postpartum

Minimum time periods between neuraxial block or epidural catheter removal and first postpartum dose of anticoagulant

<table>
<thead>
<tr>
<th>Anticoagulation Dose</th>
<th>Minimum Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFH prophylactic dose ≤ 10,000 units/day</td>
<td>Wait ≥ 1 hour after epidural catheter removal or spinal procedure</td>
</tr>
<tr>
<td>UFH therapeutic dose &gt; 10,000 units/day</td>
<td>Wait ≥ 1 hour after epidural catheter removal or spinal procedure</td>
</tr>
<tr>
<td>LMWH prophylactic dose</td>
<td>After neuraxial blockade: wait ≥ 12 hours before first dose of LMWH</td>
</tr>
<tr>
<td>e.g. Enoxaparin 40 mg every 24 or every 12 hours</td>
<td>For patients receiving post-cesarean epidural analgesia: wait ≥ 4 hours after epidural catheter removal (provided that 12 hours has elapsed since cesarean section)</td>
</tr>
<tr>
<td>LMWH therapeutic dose</td>
<td>After neuraxial blockade: wait ≥ 24 hours before first dose of LMWH.</td>
</tr>
<tr>
<td>e.g. Enoxaparin 1mg / kg every 12 hours or 1.5 mg /kg every 24 hours</td>
<td>Indwelling catheters should be removed before initiation of therapeutic LMWH. For patients receiving post-cesarean epidural analgesia: wait ≥ 24 hours after epidural catheter removal before first dose of LMWH</td>
</tr>
</tbody>
</table>
**NSAIDS and Heparin**

The CMQCC Maternal VTE Task Force supports the concurrent use of oral non-steroidal anti-inflammatory drugs (NSAIDs) and prophylactic heparin (UFH 5000 units twice daily or prophylactic enoxaparin 40mg once daily) after uncomplicated neuraxial anesthesia. The NPMS VTE bundle and SOAP also support this approach. 

Support for this management is based on clinical experience and the expert opinions of NPMS and SOAP committees. Given that high-quality research safety data on high dose NSAIDs in this clinical setting is not available, it may be reasonable to restrict regimens such as concurrent intravenous ketorolac and oral NSAIDs in the first 18 hours after neuraxial anesthesia in the setting of LMWH or UFH use.

The CMQCC Maternal VTE Task Force recommends avoidance of concomitant use of NSAIDs for patients receiving therapeutic dose LMWH or therapeutic dose intravenous UFH. The Task Force recommends the adoption of standardized approaches in each maternity unit in collaboration with anesthesia to address use of NSAIDs with UFH/LMWH after neuraxial anesthesia. SOAP is preparing an expert statement that will provide critical guidance on this subject.

**Bloody or Difficult Neuraxial Procedures**

Delayed initiation of LMWH for 24 hours is recommended for patients with bloody or complicated neuraxial procedure. The CMQCC Maternal VTE Task Force recommends that anesthesia providers discuss with obstetric providers whether the plan for anticoagulation requires modification. Once postpartum anticoagulation is initiated, the CMQCC Maternal VTE Task Force recommends close neurological monitoring so that symptoms and signs of epidural hematoma are detected early such as progression of sensory or motor block, or bowel/bladder dysfunction.

**Evolving Anesthesia Guidelines**

At the time of this publication, SOAP expert consensus opinion on antithrombotic therapy in the setting of neuraxial anesthesia are forthcoming. Until this information is available, the CMQCC Maternal VTE Task Force recommends that obstetric providers in each institution develop local, standardized approaches, in collaboration with anesthesia providers.