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DOCUMENT CONTROL PAGE

Title:	VTE Prophylaxis in Pregnancy and the Puerperium
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Supersedes:	Prevention of Venous Thromboembolism in Pregnancy and the Puerperium V1 (NAME CHANGE) and Legacy Guidelines Thromboprophylaxis in pregnancy and the Puerperium (ORC), Venous Thromboembolism in Obstetrics: Thromboprophylaxis in pregnancy and the puerperium (Wythenshawe) and VTE in Pregnancy & the Puerperium: Acute Management of Thromboembolic Disease (North Manchester)
Application:	All Staff

Originated /Modified By:	Dr Clare Tower (1), Dr Sorin Juverdeanu (2), Dr Meenu Sharma (3) / Dr Louise Simcox (4), Dr Montila Ghosh (5), Dr Kirsty Maclennan (6), Dr Louise Howarth (7), Noor Barotchi (8)
Designation:	(1, 2, 3, 4, 7) Consultant Obstetricians, (5) Specialty doctor, (6) Consultant Anaesthetist, (8) Specialist Clinical Pharmacist – Women and Children's Services
Ratified by:	Site Obstetric Quality and Safety Committee
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Responsibility of:	Clinical Governance Team Maternity

Minor Amendment (If applicable) Notified To:	Site Obstetric Quality and Safety Committee: Harmonised for use at North Manchester. Changes to processes in line with HIVE.
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EqIA Registration Number:	2022-118

1. Introduction

Venous thromboembolism (VTE) and specifically pulmonary embolism (PE) is a leading cause of direct maternal death (MBRRACE report 2019). The overall maternal death between 2015-2017 was 9.16 per 100,000 maternities and death related to blood clots accounted for 16% of these deaths. The highest risk is post-partum but VTE can occur at any stage in pregnancy. Those women with sufficient risk factors require thromboprophylaxis from the earliest opportunity (RCOG, 2015).

The Joint Obstetric Haematology Clinics (JOHC) at Oxford Road Campus (ORC) and Wythenshawe Hospital (WH), and the Obstetric Clinic with specialist haematology involvement (North Manchester) provide multidisciplinary care for women with risk factors for VTE and/or previous history of VTE.

2. Scope

This guideline aims to provide information, based on clinical evidence where available, regarding the prevention and immediate investigation and management of VTE in all women during pregnancy and the puerperium.

3. VTE Assessment

As a minimum, women should have a VTE risk assessment performed:

- At booking
- On any admission
- Intrapartum or immediately following birth

Ongoing assessment

- Women may develop additional problems that may alter their risk profile e.g. inpatient stay or development of any intercurrent problems. VTE assessment should therefore be ongoing.
- Women admitted to hospital when pregnant (including to the gynaecology ward with hyperemesis gravidarum or ovarian hyperstimulation syndrome) should be offered thromboprophylaxis with a low molecular weight heparin (LMWH), unless there is a specific contraindication such as risk of labour or active bleeding.
- There should be a risk assessment for VTE after early pregnancy complications like miscarriages and ectopic pregnancy.
- Consider re-weighing women in the third trimester at the 36-week appointment to ensure appropriate assessment of VTE in the postnatal period and appropriate dosing of thromboprophylaxis if required

3.1 Referral to the Joint Obstetric haematology Clinic (JOHC)

The following women should be referred to the JOHC (via the HIVE in-basket) as early as possible via the specialist haematology midwives:

- Patients already anticoagulated for any indication, including metallic heart valve
- Previous history of VTE
- Family history of unprovoked or oestrogen provoked VTE in first-degree relative(s)
- Women with no objectively documented diagnosis of VTE but whose history include prolonged therapeutic anticoagulation for >6 weeks (in these cases assume a previous diagnosis of VTE)
- Antiphospholipid syndrome*
- Women with high risk hereditary thrombophilia:
    - Antithrombin III deficiency
    - Protein C deficiency
    - Protein S deficiency
    - Factor V Leiden(homozygous)
    - Compound Heterozygote for factor V Leiden & prothrombin gene mutation
- Women with essential thrombocytosis/thrombocythemia (platelet count>450). Please check ferritin, CRP and mid-steam urine (MSU) to exclude common causes of anaemia and infection before referral.

* Diagnosed by two positive antibody results 12 weeks apart of lupus anticoagulant and/or anticardiolipin and/or β_2-glycoprotein 1, with a moderate to high rise titre (i.e. at least IgM/IgG >20gpl). This correlates with absolute levels. High titre is ≥80gpl. Women with weakly positive results should be given low dose aspirin and compression stockings.

3.2 Antenatal Risk Factors for VTE and risk assessment

See Appendix 1 for the antenatal risk assessment and management

Also to note:

- Women with risks of bleeding should be discussed with a haematologist with expertise in thrombosis and bleeding in pregnancy.
- The MBRRACE report 2018, found a third of mortalities from VTE during pregnancy and the six weeks post-partum occurred mainly in patients with a BMI>30kg/m^2. Several morbidly obese women did not meet criteria for thromboprophylaxis as it was their only risk criteria. They should be informed about their increased risk of VTE. Accordingly, varying risk factors are assigned according to BMI antenatally- Appendix 1.
- The risks are not exhaustive. If unsure, discuss with the JOHC (see 3.1). For acute/urgent/out-of-hours advice, contact the on-call haematologist via switchboard.

3.3 Compression stockings

Indications for the use of compression stockings (below-knee graduated compression stockings Class 1 or 2) is detailed in Appendices 1 & 2.

Measurement for anti-embolism stockings

- If the measurement of each ankle differs, use the larger measurement to dictate what stocking size is used.
- Measurement needs to consider calf size; a large calf may require sizing up. Women should be given clear advice about the length of time that anti-embolism stockings should be worn.

Supply of anti-embolism stockings

If required, the stockings will be supplied from the hospital

3.4 Low Molecular Weight Heparin (LMWH)

See appendix 1&2 for LMWH dosing

Monitoring of LMWH

- Women commencing only on thromboprophylaxis do not require FBC monitoring other than routine booking bloods and 28-week bloods.
- There is no need for routine anti-Xa monitoring in high BMI women or women needing thromboprophylaxis for other risk factors.
- In some women with medical comorbidities, a clinical decision (regardless of BMI) is made that anti-Xa monitoring is needed (e.g. renal disease). If this is the case, they should be commenced on the appropriate weight-based dose of dalteparin. In these women, 2-4 hours post-dose anti-Xa levels are checked weekly and the dose is adjusted until levels are within the desired range (0.4 – 0.6 units/L).

Supply

- Patients may receive a supply of LMWH from a prescription for up to 3 months at a time. In women who require anti-Xa monitoring, the correct dose should be established prior to supplying for longer periods.
- All supplies of LMWH will be made by the hospital
- Women requiring postnatal LMWH should leave the hospital with the entire supply necessary to ensure continuous therapy, as patients cannot obtain this from the community. A sharps bin should be issued by the ward.
- Advice to patients on sharps bin disposal will be provided by the clinic or community midwives

3.5 Information for patients on the risks of VTE and treatment with LMWH:

All women should be signposted to the online RCOG information leaflet:
https://www.rcog.org.uk/en/patients/patient-leaflets/reducing-the-risk-of-venous-thrombosis-in-pregnancy-and-after-birth/
The risk of VTE should be discussed along with individual recommendations.

The following risk factors associated with LMWH should be discussed:

- Heparin-induced thrombocytopenia (HIT) – paradoxical widespread clotting; complications are rare with prophylactic doses of LMWH.

- Local skin reaction – usually develops 4-6 weeks into therapy and may require change in LMWH and/or alternative dose or treatment. If mild, advise rotating injection site and/or antihistamines (chlorphenamine 4mg 6-8 hourly).
- Increased risk of osteoporosis +/- bone fracture. This is low risk with prophylactic doses but there is a recognised association with treatment doses

As LMWH does not cross the placenta, practitioners should reassure that there are no risks to the baby.

3.6 Intrapartum care for women on antenatal thromboprophylaxis

- An individualised care plan should be completed by 34 weeks.
- The impact of any delays to induction or planned caesarean should be considered by the clinical team for all who have been on thromboprophylaxis antenatally.
- Omit LMWH in cases of ruptured membranes at term, vaginal bleeding or signs of labour.
- Hydration and compression stockings should be used during labour.
- Regional anaesthesia (epidural/spinal) is safe more than 12 hours from the last dose of prophylactic LMWH for women on the standard prophylactic dose. Women on higher prophylactic doses who require anti-Xa level monitoring (post-dose target 0.4-0.6 units/L) require a 24-hour interval following the last dose of LMWH before they can receive a spinal or epidural.

3.7 Postnatal thromboprophylaxis

For those who deliver in theatre

- Thromboprophylactic measures should be documented on the WHO surgical checklist.
- Pneumatic compression stockings (Flowtrons) should be worn during the procedure.
- The LMWH should be prescribed (if required) while in theatre by the anaesthetist/surgeon in charge of the case.
- The first dose of prophylactic LMWH should be administered 4 hours post-op. Subsequent doses should be prescribed on the drug Kardex for 2100-2200. If the 4-hour post-op dose is later in the day than 0900, the subsequent dose should be prescribed for the next day at 2100-2200.

Postnatal VTE assessment

A postnatal VTE assessment should be completed by the midwife or doctor conducting the delivery and a management plan clearly documented in their medical records prior to leaving the delivery unit. This should be documented on the paper proforma as per Appendix 2.

Dose

As detailed in Appendix 2.

Women who have been taking LMWH during pregnancy should be restarted on the appropriate dose. If anti-Xa monitoring is required, it will be documented in the care plan. If the dose has been increased in pregnancy, this may require reduction and monitoring post-delivery. This can be discussed with the JOHC or Specialist Haematologist.

Duration

- The duration of postnatal thromboprophylaxis is determined by the risk assessment in Appendix 2.
- In those who have additional persistent (lasting more than 7 days postpartum) risk factors, such as prolonged admission or wound infection, consider extending the 10-day period of thromboprophylaxis for up to 6 weeks or until the additional risk factors are no longer present.

Timing

- LMWH can be safely administered 4 hours after spinal anaesthesia and 4 hours following the removal of an epidural catheter. This should be prescribed by the anaesthetist/obstetrician and administered by the midwife looking after the patient.
- Further details in Appendix 2
- In cases of PPH (>1000ml) or women with significant bleeding risk, administration should be delayed until the senior obstetrician and/or anaesthetist are confident that the risk of further haemorrhage has been diminished. Pneumatic compression stockings (Flowtrons) should be utilised in the interim. Decisions regarding thromboprophylaxis in these circumstances may involve the Haematologists.
- Where an epidural blood patch is required, LMWH must not be administered during the 12 hours before the procedure.

Considerations in the postnatal period

- The prothrombotic changes of pregnancy do not revert completely to normal until several weeks after delivery. The time of greatest risk for VTE is the early puerperium and, although most VTE occurs antenatally, the risk per day is greatest in the weeks immediately after delivery.
- Ensure that all postnatal readmissions, up to 6 weeks postpartum, have an updated VTE risk assessment as per Appendix 2. Applying clinical judgement, patients who initially scored as low risk might now be considered intermediate risk and therefore would require at least 10 days of thromboprophylaxis.

3.8 Cautions to LMWH

See appendix 1&2

3.9 Contraindications to LMWH

See appendix 1&2

- Any contraindications to LMWH should be documented. Pneumatic compression stockings (Flowtrons) need to be considered in these circumstances. Where there is doubt, advice may be sought from a member of the JOHC (see 3.2.2) or Specialist Haematologist.
- Heparin is a porcine derivative, and as such women may decline LMWH for religious or other cultural reasons. In this situation, Fondaparinux may be considered as an alternative, but must be discussed with the Obstetric Haematology team. NB: as the half-life of fondaparinux is longer than that of LMWH, intervals between spinals/epidurals will differ than with LMWH.

4. Communication and Documentation

All women with learning disabilities, visual or hearing impairments or those whose first language is not English must be offered assistance with interpretation where applicable, and where appropriate a telephone interpreter must be used. It is paramount that clear channels of communication are maintained at all times between all staff, the women and their families. Once any decisions have been made/agreed, comprehensive and clear details must be given to the woman thereby confirming the wishes of the women and their families.' The contents of any leaflet issued must be explained in full at the time it is issued. All communication difficulties (including learning difficulties) and language barriers must be addressed as outlined in the previous paragraph at the time the leaflet is issued. Ensure the provision and discussion of information of the risks and benefits with women during the antenatal, intrapartum and postnatal periods. All details surrounding discussion of the risks and benefits together with explicit details of proposed management must be documented contemporaneously in the maternity records.

5. Equality, Diversity and Human Rights Impact Assessment

This document has been equality impact assessed using the Trust's Equality Impact Assessment (EqIA) framework. The EqIA score fell into low priority (0-9); no significant issues in relation to equality, diversity, gender, colour, race or religion are identified as raising a concern.

6. Consultation, Approval and Ratification Process

This guideline has been approved and ratified in accordance with the agreed process.

7. Monitoring Compliance

This guideline will be audited in accordance with the divisional audit plan. The findings of the audit report will be presented to staff via and an action plan will be developed and monitored at the Site Obstetric Quality and Safety Committee.

8. References

Harris EN, Special report. The Second Anti-cardiolipin Standardisation Workshop/the Kingston Anti-phospholipid Antibody Study (KAPS) group. *Am J Clin Pathol*. 1990 Oct. 94(4):476-84.

Knight M, on behalf of UKOSS, Antenatal Pulmonary Embolism, risk factors, management and outcomes. BJOG 2008: 115:453-61

MBRRACE UK Confidential Enquiry into Maternal Death 2016

National Institute of Health and Clinical Excellence (2010) Venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital. London: NICE

Royal College of Obstetricians and Gynaecologists (2015) Reducing the risk of thrombosis and embolism during pregnancy and the puerperium. London: RCOG

Royal College of Obstetricians and Gynaecologists (2015) Thromboembolic Disease in Pregnancy and the Puerperium: Acute Management. London: RCOG

9. Trust Associated Documents

The following leaflets should be read in conjunction with this document:
Reducing the risk of venous thrombosis in pregnancy and after birth by RCOG

https://www.rcog.org.uk/en/patients/patient-leaflets/reducing-the-risk-of-venous-thrombosis-in-pregnancy-and-after-birth/

10. Appendices

Appendix 1: Antenatal risk assessment for venous thromboembolism

Appendix 2: Postnatal risk assessment for venous thromboembolism

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Appendix 1 - Antenatal risk assessment for venous thromboembolism

Name_____ **District number** _____ **DOB**

NHS number _____ **Allergies**_____ **Consultant**

Major risk factors for thrombosis (score as indicated)

- ☐ Previous VTE (equivalent to **4** minor risk factors)
- ☐ Previous VTE provoked by major surgery (equivalent to **3** minor risk factors)
- ☐ Medical comorbidities (equivalent to **3** minor risk factors)
  - heart failure,
  - cancer,
  - active SLE,
  - Active IBD or inflammatory polyarthropathy,
  - nephrotic syndrome,
  - type 1 DM with nephropathy,
  - sickle cell disease,
  - current IVDU.
- ☐ High risk thrombophilia without previous VTE (equivalent to **3** minor risk factors):
  - Antithrombin 3, Protein S and C deficiency, compound heterozygous or homozygous for low-risk thrombophilias.
- ☐ BMI ≥ 50 (= **3** minor risk factors)
- ☐ BMI 40-49 (= **2** minor risk factors)

Minor risk factors for thrombosis (score 1 for each risk factor).

- ☐ Age >35
- ☐ BMI 30-39
- ☐ Parity 3 or more
- ☐ Family history of unprovoked or oestrogen related VTE in first degree relative at age <50.
- ☐ Low risk thrombophilia: heterozygous for FVL or PGV
- ☐ Multiple pregnancy or assisted reproductive techniques (ART)
- ☐ Gross Varicose Veins
- ☐ Current systemic infection
- ☐ Pre-eclampsia
- ☐ Smoker > 30 per day
- ☐ Immobility/reduced mobility (e.g inpatient stay)

Score ≥4 – offer LMWH prophylaxis from the first trimester

Score = 3 – offer LMWH prophylaxis from 28 weeks

Score = 2 – mobilization and avoidance of dehydration

NB: consider LMWH for all antenatal admissions during hospital stay unless contraindications apply e.g. active bleeding or risk of labour

Name of Assessor:	Signature:
Designation:	Date & Time:

Indications for anti-embolism stockings:

- All women in high and intermediate risk groups
- Hospitalised women with a contraindication to LMWH
- Women travelling long distance for more than 4 hours

Contraindications to anti-embolism stockings:

- Suspected or proven peripheral arterial disease including bypass grafting
- Peripheral neuropathy or other causes of sensory impairment
- Any local conditions in which anti-embolism stockings may cause damage
- Known allergy to material of manufacture
- Severe leg oedema
- Major limb deformity or unusual leg size or shape preventing correct fit
- Lower leg cellulitis

Dose of LMWH:

Weight (kg)	Dalteparin (Fragmin)
<50	2500 units
50-90	5000 units
91-130	7500 units
131-170	10,000 units
>170	75 units/kg/day

Cautions to LMWH (this list is not an exhaustive see BNF)

- Platelet count <50x10^9/l – discuss with haematology
- Severe renal disease eGFR <30ml/min/1.73m2 (dose reduction)
- CVA (any type) in previous 4 weeks
- Uncontrolled hypertension >200mmHg systolic
- Bleeding disorders – caution with Von Willebrand's or acquired coagulopathy
- Severe liver disease with prolonged PT or known varices

Contraindications to LMWH (this list is not an exhaustive see BNF)

- Active postpartum bleeding or high risk of bleeding
- Uncontrolled hypertension >220mmHg systolic and >120 diastolic
- History of heparin induced thrombocytopenia / heparin sensitivity
- Significant head / spine / ocular trauma or surgery
- Untreated inherited bleeding disorders (such as haemophilia and von Willebrand's disease)

Consider referral to obstetric haematology clinic for high risk / complex women or if advice required regarding thromboprophylaxis or delivery planning

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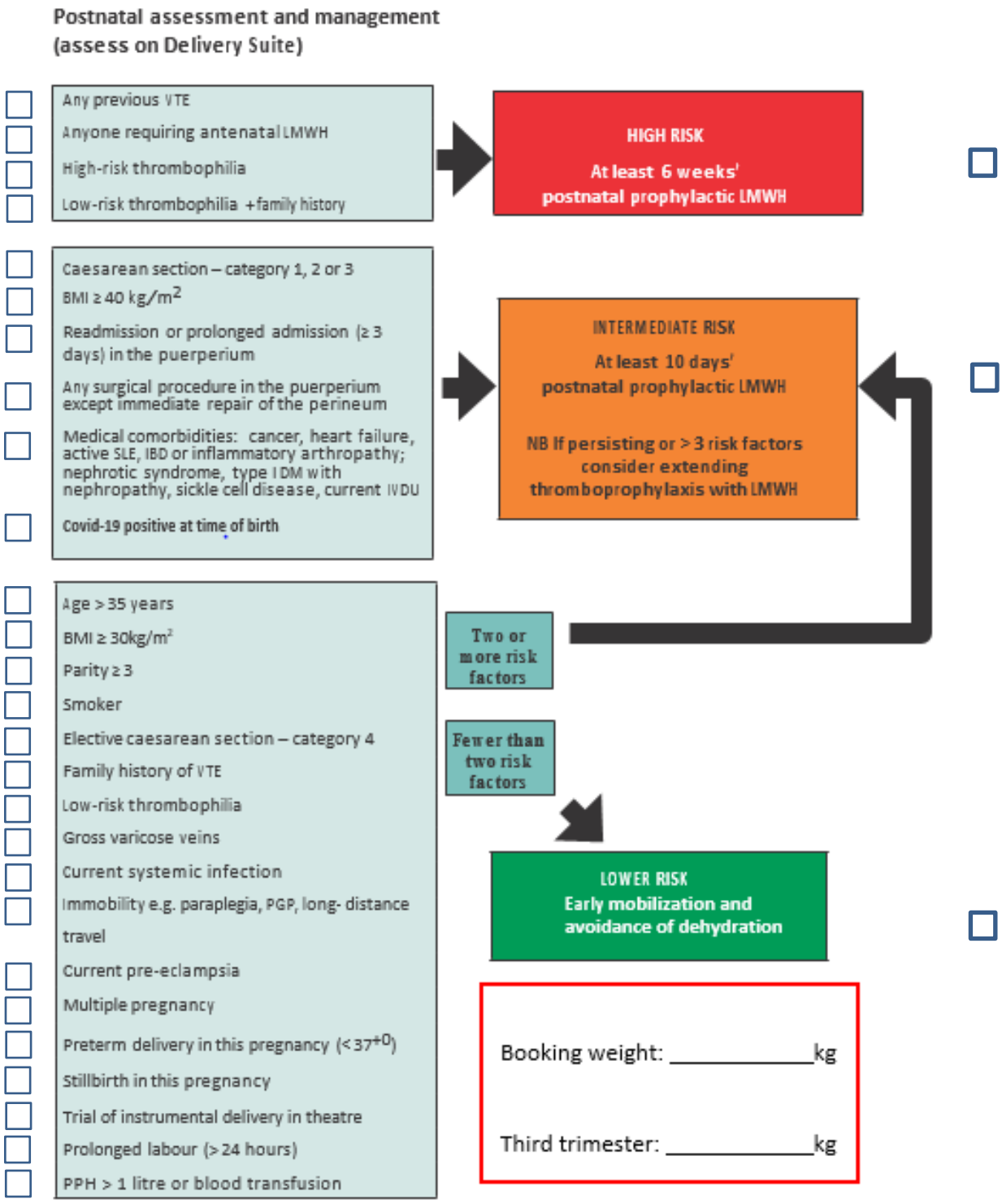
Appendix 2 – Postnatal VTE risk assessment



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Designation:	Date & Time:

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Timing:

- Spinal Anaesthesia and Epidural Blood Patches are contraindicated within 12 hours of LMWH and 24 hours if on high-dose prophylaxis
- LMWH could be given 4 hours or more after delivery or Caesarean section
- Do not administer LMWH until at least 4 hours after spinal/ epidural catheter is inserted or removed
- The epidural catheter should not be inserted / removed within 12 hours of LMWH administration