



**CLINICAL PRACTICE GUIDELINE**

# VTE occurring in the present pregnancy and puerperium

This document should be read in conjunction with this [Disclaimer](#)

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## Quick reference guide

## Woman presents with symptoms/signs of VTE:

**Deep vein thrombosis (DVT):** Leg pain; unilateral swelling; tenderness; oedema; colour change of leg; low grade fever.

**Pulmonary embolism (PE):** Dyspnoea; pleuritic chest pain; tachycardia; collapse; haemoptysis; cyanosis; raised JVP; signs of DVT or right ventricular strain.

## Assess risk factors for Venous Thromboembolism (VTE):

- |  |                           |                                     |
|--|---------------------------|-------------------------------------|
| • Personal /family history of thrombosis | • Nephrotic syndrome      | • Forceps (midcavity or rotational) |
| • Thrombophilia                          | • Sickle cell disease     | • Blood loss >1L                    |
| • Age >35                                | • Varicose veins          | • Prolonged immobilisation          |
| • Multiparity                            | • Smoker                  | • Surgery                           |
| • Obesity                                | • Multiple pregnancy      | • Infection                         |
| • Malignancy                             | • Pre-eclampsia           | • Hyperemesis/ dehydration          |
| • Cardiac disease                        | • Prolonged labour >24hrs | • Ovarian hyperstimulation syndrome |
|  | • Caesarean section       |                                     |

## Diagnose/exclude

- **DVT:** Compression ultrasound
- **PE:** ECG & CXR, V/Q scan if CXR normal, CTPA if CXR abnormal

## Treatment

- Consult with physician experienced in management of medical disorders in pregnancy.
- Take full blood count, coagulation screen, U&E's, LFT's to confirm normal prior to treatment.
- **Confirmed PE or DVT above knee/ proximal:** For the remainder of the pregnancy and for at least 6 weeks postnatally, for a minimum treatment period of six months.
- **Confirmed DVT confined to the calf/ distal:** Therapeutic anticoagulation for at least 6-8 weeks then prophylactic anticoagulation for the remainder of the pregnancy & 6 weeks postpartum if USS demonstrates resolution of the thrombus and no post thrombosis syndrome in affected leg.
- **Therapeutic anticoagulation:** Refer to dosing on page 9
- **Prophylactic anticoagulation:** Refer to 'Duration of Treatment' dosing on pages 9 - 10

## Birth

- Planned birth preferable; discontinue anticoagulant 24 hours prior (induction/ Caesarean)
- If spontaneous labour, send blood for cross match and consult Haematologist and/or Obstetric physician, and Anaesthetist

## Aim

To guide the appropriate investigation of women with suspected venous thromboembolism and management of confirmed venous thromboembolism in the current pregnancy and puerperium.

## Key points

1. VTE is an important cause of morbidity and mortality in pregnant women
2. Important risk factors include history of VTE, thrombophilia, age, obesity and Caesarean section
3. Women with suspected VTE in pregnancy should be commenced on therapeutic LMWH and undergo prompt investigation for VTE
4. The diagnostic investigation of choice for DVT is compression ultrasound
5. The diagnostic investigation of choice for PE is V/Q scan
6. The risk of radiation to the fetus from chest X-ray, V/Q scan and CTPA is minimal
7. When proximal DVT or PE has been diagnosed, therapeutic anticoagulation should be continued for the duration of the pregnancy and 6 weeks postpartum, and a minimum treatment period of 6 months.
8. When distal DVT has been diagnosed therapeutic anticoagulation should continue for at least 6-8 weeks, after which treatment with prophylactic anticoagulation may be considered. Anticoagulation should be continued for the remainder of the pregnancy and 6 weeks postpartum
9. LMWH is generally the anticoagulant of choice in pregnancy
10. Warfarin may be considered in the postpartum period
11. Intravenous unfractionated heparin allows for more rapid onset and manipulation of anticoagulant effect and is appropriate in the management of massive PE, VTE at term, and intrapartum
12. Graduated compression stockings reduce pain and swelling and minimise the risk of thrombotic syndrome
13. Women with VTE in pregnancy should have postnatal follow up in an obstetric medicine clinic to plan for anticoagulation in future pregnancies and high risk situations and consider thrombophilia testing

## Background

Venous thromboembolism (VTE) during pregnancy is the third leading cause of maternal deaths in Australia, and is associated with significant long-term morbidity, namely post-thrombotic syndrome and venous insufficiency.<sup>1-4</sup> VTE encompasses both deep vein thrombosis (DVT) and pulmonary embolism (PE), with DVT accounting for approximately 80% of thromboembolic events in pregnancy.<sup>3, 5</sup> Physiological changes occurring in pregnancy from the first trimester, including a

haemostatic shift towards a hypercoagulable state, venous stasis, compression of the inferior vena cava and pelvic veins by the gravid uterus and reduced mobility, increase the risk of VTE during pregnancy by 4-5 times that of non-pregnant women of the same age.<sup>1, 3, 6-9</sup> However the absolute risk remains low, with VTE affecting 1-2 in 1000 pregnancies.<sup>1, 3, 5-9</sup> The risk increases with gestational age and the maximal risk occurs during the first six weeks postpartum, with a 22-fold increase in relative risk.<sup>1, 5, 7-10</sup> Delivery via elective Caesarean section doubles with risk of VTE in the puerperium compared with vaginal delivery, and emergency Caesarean section is associated with a four times increased risk of postpartum VTE compared to vaginal delivery.<sup>7</sup>

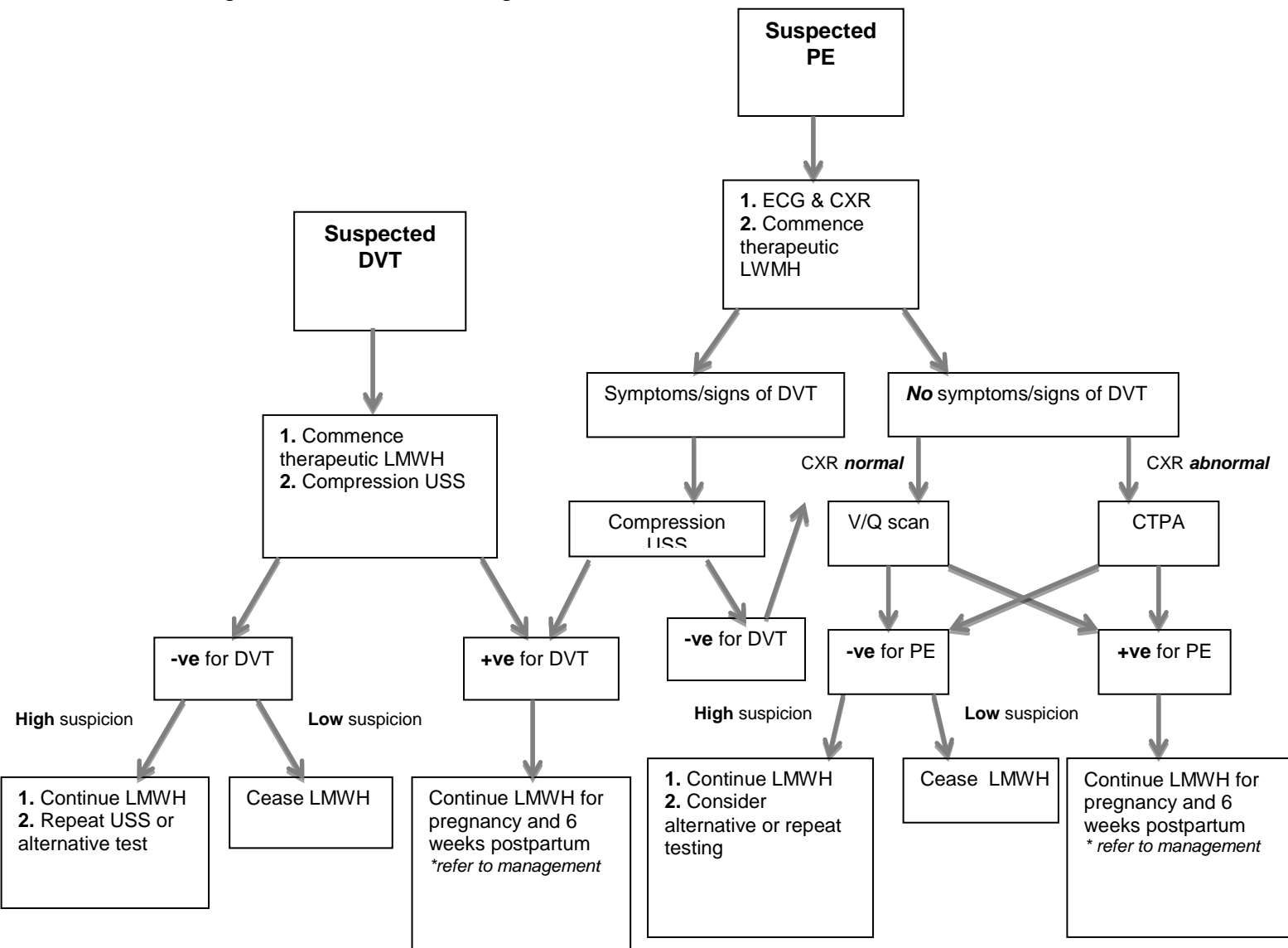
## Risk factors

Pre-existing risk factors	Obstetric risk factors	Transient risk factors
Previous VTE <sup>1, 7-9</sup> Heritable thrombophilia <sup>1, 7, 9</sup> <ul style="list-style-type: none"> <li>• Antithrombin deficiency</li> <li>• Protein C deficiency</li> <li>• Protein S deficiency</li> <li>• Factor V Leiden</li> <li>• Prothrombin gene mutation</li> </ul> Acquired thrombophilia <sup>1, 7, 9</sup> <ul style="list-style-type: none"> <li>• Antiphospholipid syndrome</li> <li>• Persistent lupus anticoagulant and/or persistent/moderate-high titre anticardiolipin antibodies and/or β2-glycoprotein 1 antibodies</li> </ul> Family history unprovoked VTE or oestrogen related VTE in first degree relative <sup>7</sup> Advanced maternal age >35 <sup>1, 7, 8</sup> Parity ≥3 <sup>7</sup> Overweight or obese <sup>1, 7-9</sup> Cancer <sup>7</sup> Heart disease <sup>1, 9</sup> Systemic lupus erythematosus <sup>7, 9</sup>	Multiple pregnancy <sup>1, 9</sup> Assisted reproductive thecnology <sup>7, 9</sup> Pre-eclampsia <sup>1, 9</sup> Fetal growth restriction <sup>9</sup> Antepartum haemorrhage <sup>7, 9</sup> Preterm delivery <37 weeks <sup>7</sup> Stillbirth <sup>7</sup> Prolonged labour >24 hours <sup>1, 7</sup> Caesarean section, particularly emergency Caesarean section <sup>1, 7-9</sup> Mid-cavity or rotational operative delivery <sup>7</sup> Postpartum haemorrhage >1000mL <sup>7, 9</sup> Blood transfusion <sup>7, 9</sup> Weight gain in pregnancy >21kg <sup>7, 9</sup>	Prolonged immobilisation ≥3 days <sup>1, 7, 9</sup> Hospitalisation <sup>7</sup> Long distance travel >4 hours <sup>7</sup> Surgery during pregnancy or puerperium <sup>7</sup> Fracture <sup>7</sup> Systemic infection <sup>7</sup> Hyperemesis <sup>7, 9</sup> Ovarian hyperstimulation syndrome (first trimester only) <sup>7</sup>

Inflammatory polyarthropathy <sup>7</sup> Inflammatory bowel disease <sup>7</sup> Nephrotic syndrome <sup>7</sup> Diabetes <sup>9</sup> Sickle cell disease <sup>7, 9</sup> Anaemia <sup>7, 9</sup> Varicose veins <sup>7</sup> Smoking <sup>1, 7, 9</sup> Current IV drug user <sup>7</sup>		
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## Diagnosis

Clinical assessment of DVT and PE during pregnancy is unreliable, as symptoms of leg swelling and discomfort, dyspnoea and tachypnoea are common in pregnancy.<sup>2, 6, 8</sup> A small proportion of women with clinically suspected VTE during pregnancy have the diagnosis confirmed on objective testing.<sup>6</sup> 2-6% of women who undergo investigation for PE will be diagnosed with PE.<sup>6</sup>



## Symptoms and signs

Most women who have VTE in pregnancy will manifest clinical symptoms and signs.<sup>6</sup> The symptoms and signs of DVT include (usually unilateral) leg pain and swelling and lower abdominal or back pain (in the event of iliofemoral vein thrombosis).<sup>1, 6</sup> Calf vein and iliofemoral thrombosis is equally common in pregnancy, with the left leg affected in 80% of cases. Rarely, DVT involves arm veins, particularly after insertion of long intravenous lines from the cubital fossa.

The symptoms and signs of PE include dyspnoea, tachypnoea, tachycardia, pleuritic chest pain, haemoptysis, cyanosis, raised JVP and collapse.<sup>1, 2, 6</sup> Women with VTE may also have a low-grade fever.<sup>6</sup>

Women with symptoms and signs of VTE should have timely investigation for VTE, and should be commenced on therapeutic anticoagulation until the diagnosis is excluded, unless treatment is strongly contraindicated.<sup>6</sup> Untreated DVT will progress to PE in 15-24% of pregnant patients.<sup>6</sup> PE has a mortality rate of 15% in pregnancy, with 66% of deaths occurring in the first 30 minutes of the embolic event.<sup>6</sup> Thus early initiation of therapeutic anticoagulation when VTE is clinically suspected is important.

## Investigations

### Investigations for DVT

The first line investigation for DVT in pregnancy is compression ultrasound of the whole leg, looking for both proximal and distal DVT.<sup>2, 6</sup> If the ultrasound is negative and the clinical suspicion for DVT is low, anticoagulation may be ceased.<sup>6</sup> If the ultrasound is negative but the clinical suspicion for DVT remains high, further investigation with repeat compression ultrasound, venography or magnetic resonant direct thrombus imaging should be considered.<sup>2</sup>

### Investigations for PE

All women with suspected PE should have an ECG and chest X-ray.<sup>6</sup> 41% of pregnant women with PE have an abnormal ECG.<sup>6</sup> The most common ECG changes include tachycardia, T wave inversion, S1Q3T3 pattern and right bundle branch block.<sup>6</sup> Chest X-ray is useful in detecting differential diagnoses for the woman's symptoms, and may also show abnormalities caused by PE including atelectasis, effusion, focal opacities, regional oligoemia or pulmonary oedema.<sup>6</sup> The radiation dose to the fetus from a chest X-ray is extremely low at any stage of pregnancy.<sup>6</sup>

Women with suspected PE who also have symptoms and signs of DVT should have a compression Duplex ultrasound prior to undergoing further investigation for PE.<sup>6</sup> If DVT is confirmed on compression ultrasound no further investigation is required and they should continue on therapeutic anticoagulation.<sup>6</sup> This limits the dose of radiation to the woman and the fetus.<sup>6</sup>

Women with suspected PE without symptoms or signs of DVT should have a ventilation/perfusion (V/Q) scan or computerised tomography pulmonary angiogram (CTPA).<sup>6</sup> In non-pregnant patients, there is a high rate of non-diagnostic V/Q scan and as a consequence CTPA is now the investigation of choice for PE.<sup>2</sup> However, the increased cardiac output in pregnancy reduces the rate of non-diagnostic V/Q scan and thus V/Q scan is the first line investigation for PE in pregnancy.<sup>2</sup> If the chest X-ray is normal, the next investigation of choice is V/Q scan, but if the chest-X-ray is abnormal CTPA is preferred in order to further define the pathology visualised on chest X-ray.<sup>6</sup> If the V/Q scan or CTPA is negative, but the clinical suspicion of PE remains high, therapeutic anticoagulation should be continued until PE is excluded on alternative or repeat testing.<sup>6</sup>

Both CTPA and V/Q scan expose the fetus to a negligible radiation dose of 0.1mGy and 0.5mGy respectively, which is well below the threshold for teratogenicity, fetal growth restriction and fetal death, and the potential harm resulting from a missed PE is significantly greater than the risk of radiation.<sup>2, 6</sup> The higher radiation dose from V/Q scan is associated with a very small increased risk of childhood cancer.<sup>6</sup> However the radiation dose to maternal breast tissue from CTPA is 20-100 times that from V/Q scan depending on breast size, the technique used and the age of the woman, which increases the woman's lifetime risk of breast cancer.<sup>2, 6</sup> In younger women, particularly women who have had a previous chest CT or have a family history of breast cancer, V/Q scan should be the investigation of choice.<sup>6</sup> Where CTPA is required due to unavailability of V/Q scan, abnormal chest X-ray, or negative V/Q scan in the context of ongoing high clinical suspicion for PE, a bismuth shield in front of the woman's breasts should be used to reduce the radiation dose to breast tissue.<sup>2, 6</sup> To minimise the radiation dose to the fetus from V/Q scan, the ventilation component of the scan can be omitted, without compromising the negative predictive value of the scan.<sup>2, 6</sup> However women with a positive perfusion scan, require a ventilation scan to determine the ventilation/perfusion mismatch.<sup>2</sup> Breastfeeding women should discard breast milk for 12 hours after a V/Q scan, but this is not required following a CTPA.<sup>2</sup>

There is also a theoretical risk of neonatal hypothyroidism from fetal exposure to the iodinated contrast used in CTPA, but this has not been demonstrated in studies to date.<sup>6</sup> Pregnant women with suspected PE should be informed of the above risks prior to undergoing V/Q scan or CTPA and should provide informed consent before the investigation is undertaken.<sup>6</sup>

### **Other investigations**

D-dimer testing is not currently recommended for investigation of VTE in pregnancy.<sup>2, 6</sup> D-dimer levels progressively rise throughout pregnancy due to the hypercoagulable state, and remains elevated in the postpartum period.<sup>6, 11</sup> Further there is some evidence to suggest that a normal d-dimer in pregnancy is not

sufficient to rule out VTE.<sup>6</sup> There is currently insufficient evidence for clinical pre-test probability assessment in pregnancy.<sup>6, 11</sup>

Prior to commencing therapeutic anticoagulation for treatment of VTE blood should be taken for full blood count, urea and electrolytes, liver function tests and coagulation studies, as the use of anticoagulants is influenced by renal and liver function.<sup>6</sup> Anticoagulants may also cause a drop in platelet count.<sup>6</sup> Although a high proportion of women who have VTE in pregnancy have an underlying thrombophilia, there is no role for thrombophilia testing in pregnancy due to the physiological changes of pregnancy and pathophysiological changes in acute VTE.<sup>6</sup>

Thrombophilia testing may be considered postnatally, once anticoagulants have been ceased, if the results are likely to change the woman's future management.<sup>6</sup>

## Management

When DVT or PE is suspected low-molecular-weight heparin (LMWH) should be commenced and continued until the diagnosis is excluded, except in women at a high risk of bleeding.<sup>6</sup>

### Choice of anticoagulant

- There is a lack of data on choice of anticoagulation for treatment of VTE in pregnant patients, and much of the current recommendations are extrapolated from data in non-pregnant patients<sup>2, 5, 6</sup>
- LMWH is the anticoagulant of choice for treatment of VTE in pregnancy<sup>2, 9</sup>
- LMWH has a longer plasma half life, higher bioavailability, more reliable anticoagulant effect and subcutaneous injections are generally less painful due to smaller injection volume, compared to unfractionated heparin<sup>2, 5, 10</sup>
- In non-pregnant patients LMWH is more effective than unfractionated heparin for treatment of DVT and PE, with lower rates of recurrence or extension<sup>6</sup>
- In non-pregnant patients LMWH is associated with a lower risk of bleeding complications and mortality than unfractionated heparin<sup>2, 6, 10</sup>
- The incidence of postpartum haemorrhage in women receiving LMWH has been found to be 5%, which is comparable to the background risk<sup>2</sup>
- There is a lower risk of heparin induced thrombocytopenia (HIT) and osteoporosis with use of LWMH compared to unfractionated heparin<sup>5-7, 9, 10</sup>
- LMWH does not cross the placenta<sup>2, 5, 6, 9, 10</sup>
- There is insufficient evidence on the use of anticoagulation for VTE in pregnancy,<sup>10</sup> however systematic reviews and large case series have concluded LMWH is a safe and effective alternative to unfractionated heparin for treatment of VTE in pregnancy<sup>6</sup>



## Dosing LMWH

The dose of LMWH should be based on the patient's booking or early pregnancy weight.<sup>6</sup> There is insufficient evidence to favour either once daily or two divided doses.<sup>2, 6</sup> Based on expert recommendations, pregnant women with DVT or PE should be treated with **twice daily LMWH**, but once daily dosing can be considered in the postpartum period. The doses of enoxaparin are outlined below.<sup>6</sup>

Booking/early pregnancy weight	Therapeutic enoxaparin dose*	
	BD dose	OR Once daily dose
<50kg	40mg BD	or 60mg once daily
50-69kg	60mg BD	or 90mg once daily
70-89kg	80mg BD	or 120mg once daily
90-109kg	100mg BD	or 150mg once daily
110-125kg	120mg BD	or 180mg once daily
>125kg	Discuss with haematologist	

\*Doses should be reduced if the creatinine clearance is <30mL/minute.

There is insufficient evidence to recommend routine monitoring of anti-Xa levels to guide LMWH dosing in pregnancy.<sup>2, 9</sup> Anti-Xa monitoring may be considered in patients at extremes of body weight (<50kg or >90kg), with renal impairment or recurrent VTE.<sup>9</sup> There is also no role for routine platelet monitoring in women exclusively receiving LMWH for VTE as the risk of HIT is low.<sup>6, 9</sup>

## Duration of treatment

In the case of proximal DVT or PE in pregnancy, therapeutic LMWH should be continued for the remainder of the pregnancy and for at least 6 weeks postnatally, for a minimum treatment period of six months.<sup>10</sup> In women with isolated distal DVT in pregnancy, a shorter period of 6-8 weeks of therapeutic anticoagulation may be considered, with prophylactic anticoagulation for the remainder of the pregnancy and six weeks postpartum.<sup>6</sup> When changing to prophylactic anticoagulation the dose of LMWH is enoxaparin 40mg subcut daily, or dalteparin 5000units subcut daily.<sup>12</sup> Continuation of therapeutic LMWH throughout pregnancy and immediately postpartum is recommended due to the ongoing risk of recurrent VTE throughout this period, and the high incidence of thrombophilia in patients with VTE in pregnancy.<sup>6</sup> Women with PE and proximal DVT should be monitored and treated as an inpatient for the first few days, after which they can be managed as outpatients until delivery.<sup>2, 6</sup> Outpatient management is suitable for women with isolated distal DVT, who are clinically stable, with good social support and the ability to return to hospital if required.<sup>6, 9</sup>

## Alternative anticoagulants

There is a relatively high incidence (19.8%) of delayed-type hypersensitivity reactions in women receiving LMWH for treatment of VTE during pregnancy.<sup>6</sup> When this occurs, an alternative LMWH can be prescribed.<sup>6</sup> However there is a cross-reactivity of 33.3%, and thus danaparoid, a low-molecular-weight heparinoid, may be required as an alternative.<sup>6, 9</sup> Danaparoid hasn't been found to be associated with adverse fetal effects and is considered safe to use in breastfeeding.<sup>7, 9</sup>

In women at a high risk of bleeding, for example in the case of antepartum haemorrhage, coagulopathy, progressive wound haematoma, suspected intra-abdominal bleeding and postpartum haemorrhage, unfractionated heparin should be used as it has a shorter half life and can be completely reversed with protamine sulphate.<sup>2, 6</sup> Unfractionated heparin is also preferred in patients with significant renal dysfunction (eGFR <30mL/minute/1.73m<sup>2</sup>).<sup>9</sup> Unfractionated heparin does not cross the placenta and thus is safe for the fetus.<sup>5</sup> Postoperative patients receiving unfractionated heparin should have their platelet count checked every 2-3 days between day 4 and 14.<sup>6</sup>

Vitamin K antagonists, such as warfarin, should not be used for the treatment of VTE in pregnancy due to the risk of adverse pregnancy outcomes including warfarin embryopathy when given in the first trimester, miscarriage, preterm birth, low birth weight, neurodevelopmental problems and fetal and neonatal bleeding.<sup>2, 5-7, 9, 10</sup>

While there have been no reports of the new oral anticoagulants (NOACs) in pregnancy, they are likely to cross the placenta and have direct fetal effects, and thus are not recommended for use in pregnancy.<sup>5-7, 9</sup>

## Contraindications to LMWH\*

- Known bleeding disorder - haemophilia, von Willebrand's disease, acquired coagulopathy
- Active antepartum or postpartum haemorrhage
- Increased risk of major haemorrhage – placenta praevia
- Thrombocytopenia with platelets <75x10<sup>9</sup>/L
- Current or previous diagnosis of HIT
- Haemorrhagic or ischaemic stroke in the past 4 weeks
- Precaution with Severe renal disease with eGFR <30mL/minute/1.73m<sup>2</sup>
- Severe liver disease with raised prothrombin time
- Uncontrolled hypertension with SBP >200mmHg or DBP >120mmHg

\* Requires discussion regarding the risks of thrombosis versus bleeding with haematologist

## Mechanical treatments

Correctly fitted, knee high graduated elastic compression stockings and early mobilisation should be encouraged in pregnant women with DVT (including proximal DVT), in order to reduce pain and swelling and the development of post-thrombotic syndrome.<sup>6</sup> There may be some benefit in wearing graduated elastic compression stockings daily for at least 2 years to minimise the risk of post-thrombotic syndrome.<sup>2, 6</sup> A bed cradle is also helpful when the leg is very painful.

Placement of an inferior vena cava filter may be considered in patients with recurrent VTE despite adequate anticoagulation, or in whom anticoagulation is contraindicated due to a high risk of bleeding.<sup>2, 5, 6, 9</sup>

## Management of massive PE

Pregnant women with massive PE may present with shock, refractory hypoxaemia and/or right ventricular dysfunction on echocardiogram.<sup>6</sup> Massive PE in pregnancy is a medical emergency and should be assessed and managed by a multidisciplinary team including consultant physicians, obstetricians, radiologists and haematologists.<sup>6</sup>

Intravenous unfractionated heparin is the initial treatment of choice for massive PE, as it has a rapid onset of action and the dose can be readily adjusted depending on future management decisions.<sup>6, 9</sup> A guide for the use of unfractionated heparin is outlined below.<sup>6</sup>

- Loading IV dose of 80 units/kg (omit and begin with infusion if the patient has received thrombolysis)
- Continuous IV infusion of 18 units/kg/hr
- Measure APTT 4-6 hours after the loading dose and adjust the dose as required
- APTT must also be measured 6 hours after any dose change, and daily while within the therapeutic range
- A haematologist should be consulted regarding the target APTT

In massive PE with haemodynamic instability or iliofemoral vein thrombosis with life or limb threatening ischaemic complications, thrombolytic therapy may be required.<sup>6, 9</sup> Thrombolytic therapy should be followed by an infusion of unfractionated heparin (without the loading dose).<sup>6</sup> Thrombolytic therapy in massive PE in non-pregnant patients is associated with a significant reduction in PE recurrence and death, but in pregnancy carries risks of maternal bleeding (incidence of non-fatal maternal major bleeding 30.8%), preterm labour (incidence 38.5%), placental abruption and fetal demise (incidence 15.4%).<sup>2, 6</sup> Thus thrombolysis should only be considered in

women with life or limb threatening complications of VTE after discussion of the benefits and risks.<sup>2</sup>

Urgent thoracotomy may be considered if the patient is not suitable from thrombolysis or is moribund.<sup>6</sup>

## Intrapartum management

A multidisciplinary team including obstetric physicians and/or haematologists, obstetricians and anaesthetists should be involved in the intrapartum management of women with VTE in order to minimise the risk of maternal haemorrhage and epidural haematoma.<sup>5,9</sup> Where possible, anticoagulation should be altered prior to delivery to avoid bleeding complications.<sup>6</sup>

- Therapeutic LMWH should be stopped 24 hours prior to induction of labour or Caesarean section and replaced with prophylactic LMWH to be given 12 hours prior to induction or Caesarean section<sup>6</sup>
- Subcutaneous unfractionated heparin should be stopped 12 hours prior to induction of labour or Caesarean section and the APPT should be checked<sup>6,9</sup>
- Intravenous unfractionated heparin should be stopped 6 hours before induction of labour or Caesarean section and the APTT should be measured 4 hours post-dose to ensure normalisation<sup>5,6,9</sup>
- Women should be informed not to inject heparin if they have vaginal bleeding or begin spontaneous labour<sup>5-7,9</sup>
- If labour occurs whilst the woman is anticoagulated blood should be sent for cross matching and a haematologist and/or obstetric physician and anaesthetist should be consulted
- Women who are being treated with therapeutic subcutaneous unfractionated heparin who present in spontaneous labour should have the APTT monitored throughout labour and consideration of protamine sulphate to reverse heparin and reduce the risk of bleeding<sup>6</sup>

When VTE occurs at term, treatment with intravenous unfractionated heparin may be considered to minimise the duration without anticoagulation and allow for manipulation of dosing.<sup>6,9</sup> Women with a high risk of recurrent VTE may also be transitioned to intravenous unfractionated heparin prior to delivery.<sup>2,5</sup> In these cases, planned delivery through induction or labour or elective Caesarean section is recommended.<sup>2</sup>

In order to avoid epidural haematomas, regional analgesia or anaesthetic should not be inserted for 24 hours after a therapeutic dose of LMWH.<sup>6,9</sup> An epidural catheter should not be removed for 12 hours after a dose of LMWH.<sup>6</sup> Therapeutic LMWH

should not be given for 24 hours after removal of an epidural catheter.<sup>9</sup> The implications of anticoagulation on regional analgesia and anaesthesia should be discussed with the woman prior to labour or elective Caesarean section.<sup>7</sup>

In the case of Caesarean section, a prophylactic dose of LMWH should be given 4 hours post-operatively, and the therapeutic dose recommenced 8-12 hours later.<sup>6, 9</sup>

See also Anaesthetic guideline: [Labour and Postoperative Pain Management](#): Removal of Epidural, Management of LMWH, UGH and neuraxial blockade.

## Postnatal management

In the postpartum period, women should be given choice between LMWH or warfarin after discussion of the reduced risk of post-thrombotic syndrome with prolonged use of LMWH, the increased risk of postpartum haemorrhage and perineal haematoma with warfarin, and the need for frequent blood tests while receiving warfarin treatment.<sup>6</sup> LMWH, unfractionated heparin and warfarin are safe in breastfeeding, but NOACs should be avoided in women who are breastfeeding.<sup>2, 5-7, 9</sup> When warfarin is commenced postnatally, it should be delayed until at least postnatal day 5.<sup>6, 9</sup> The INR must be monitored regularly in women receiving warfarin, and the dose titrated to an INR of 2.0-3.0.<sup>6</sup> Heparin treatment should continue until the INR has been 2.0 for at least 24 hours.<sup>6</sup>

Women with VTE in pregnancy should be reviewed in an obstetric medicine clinic postnatally for discussion of thromboprophylaxis in future pregnancies and other times of increased risk, thrombophilia testing if anticoagulation has been ceased and it would alter the women's future management, and discussion of hormonal contraception.<sup>6</sup> Prior to undergoing investigation for heritable or acquired thrombophilia women should be counselled on the implications of the result for themselves and their family.<sup>7</sup>

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## Related WNHS policies, procedures and guidelines




KEMH Clinical Guidelines:

Obstetrics & Gynaecology:

- Venous Thrombo Embolism (VTE) Prevention and Management:
  - Antenatal Prophylaxis for Women with Proven Thrombophilia and a Previous Thrombotic Event or Obstetric Complication
  - Prophylaxis for Women with a Prior Thrombotic Event in whom no Thrombophilia has been Identified

- Thromboprophylaxis after Caesarean Birth
- Graduated Compression Stockings
- Intravenous Heparin Therapy
- Pre and Post Operative Management of Patients on Therapeutic Warfarin Anticoagulation
- Risk assessment and recommended venous thromboembolic prophylaxis in patients admitted for Gynaecological conditions
- Medical Disorders in Pregnancy: Cardiac Conditions

Anaesthetics: [Labour and Postoperative Pain Management](#): Removal of Epidural, Management of LMWH, UGH and neuraxial blockade

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