Document Control

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Author			**Author's job title** ST1 O&G
Directorate Surgery			**Department** Obstetrics
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Main Contact Consultant Obstetrician North Devon District Hospital Raleigh Park Barnstaple, EX31 4JB			**Tel: Direct Dial** –
Lead Director Medical director			
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CONTENTS

1. Purpose

1.1. The purpose of this document is to ensure adherence to the standard set in this guideline.

1.2. The policy applies to all staff employed with the Maternity Services

1.3. Implementation of this policy will ensure that:

- Clinicians are aware of the minimum standard of practice set within this document
- According to the standard, all the maternity staff carries out immediate investigation and management of women in whom thromboembolism is suspected during pregnancy or the puerperium. In order to reduce the level of morbidity and to prevent mortality

2. Definitions

VTE Venous

Thromboembolism PE

Pulmonary Embolism

DVT Deep Vein Thrombosis

LMWH Low molecular weight heparin

3. Introduction

3.1. VTE remains one of the main direct causes of maternal death in the UK and sequential reports on Confidential Enquiries into Maternal Deaths have highlighted failures in obtaining objective diagnoses and employing adequate treatment.

3.2. The UK incidence of antenatal PE calculated in the UKOSS study is 1.3 per 10 000 maternities. The risk of antenatal VTE is four-to five-folds higher in pregnant women than in non-pregnant women of the same age, although the absolute risk remains low at around 1 in 1000 pregnancies. Venous thromboembolism can occur at any stage of pregnancy but the puerperium is the time of highest risk, with estimates of relative risk of approximately 20- fold.

3.3. The symptoms and signs of DVT include leg pain and swelling (usually unilateral) and lower abdominal pain (reflecting extension of thrombus into the pelvic vessels and/or development of a collateral circulation)

3.4. The symptoms of PE include dyspnea, chest pain, haemoptysis and collapse. It is noteworthy that a low-grade pyrexia and leucocytosis can occur with VTE.

3.5. This document sets out Northern Devon Healthcare NHS Trust's best guidance on the management of women presenting with acute VTE. Any deviation from this guideline must be clearly documented, including the reason for deviation.

4. Responsibility for reporting suspected thromboembolic disorder

4.1. All maternity staff must act swiftly by onward referral, investigation and treatment where they suspect deep vein thrombosis or pulmonary embolism in pregnancy and the puerperium.

5. Associated risk factors

5.1. All clinicians working within the maternity services need to be mindful of the risk factors for venous thromboembolism in the childbearing period:

- Previous VTE / Personal or family history of DVT, PE
- Congenital or acquired thrombophilia
- Smoker
- Obesity, BMI > 30
- Age over 35
- Multiparity (3 or above)
- Multiple pregnancy
- IVF/ART
- Gross varicose veins
- Surgical procedures or fractures.
- Current severe infection
- Hyperemesis
- Dehydration
- Current pre-eclampsia
- Paralysis of lower limbs
- Long- haul travel, more than 4 hours
- Hospital admission, immobility $\geq$ 3 days
- Medical co-morbidities e.g., inflammatory bowel disease, cancer, nephrotic syndrome, active SLE, heart failure, sickle cell disease, type 1 DM with nephropathy, current IV drug user

6. Diagnosis of acute VTE

6.1. Any woman with symptoms and/or signs suggestive of VTE should have objective testing performed expeditiously and treatment with low-molecular- weight heparin (LMWH) given until the diagnosis is excluded by objective testing, unless treatment is strongly contraindicated. (Appendix 1)

6.2. Acute DVT

6.3. Compression duplex ultrasound should be undertaken where there is clinical suspicion of DVT.

6.4. If ultrasound is negative and there is a low level of clinical suspicion, anticoagulant treatment can be discontinued. If ultrasound is negative and a high level of clinical suspicion exists, anticoagulant treatment should be discontinued but the ultrasound should be repeated on days 3 and 7.

6.5. When iliac vein thrombosis is suspected (presentation with back and buttock pain and swelling of the entire limb), Doppler ultrasound of the iliac vein, magnetic resonance venography or conventional contrast venography may be considered. In practice, because of the extensive nature of these thrombi, ultrasound venography will be sufficient.

6.6. Acute PE

- ECG

➢ Sinus tachycardia: the most common seen in 44% of patients

➢ Complete or incomplete right bundle branch block

➢ Right axis deviation

➢ Dominant R wave in V1

➢ $S_1Q_3T_3$

- Chest x-ray
  Normal chest x-ray is common
  May show pulmonary oligaemia, an elevated hemidiaphragm, small pleural effusions and linear opacities

- ABG
  This would allow detection of low $p0_2$. The $PC0_2$ may also be low due to hyperventilation.

6.7. In women with suspected PE who also have symptoms and signs of DVT, compression duplex ultrasound should be performed. If compression ultrasonography confirms the presence of DVT, no further investigation is necessary and treatment for VTE should continue.

6.8. In women with suspected PE without symptoms and signs of DVT, a ventilation/perfusion (V/Q) lung scan or a computerized tomography pulmonary angiogram (CTPA) should be performed. When the chest X-ray is abnormal and there is a clinical suspicion of PE, CTPA should be performed in preference to a V/Q scan.

6.9. Alternative or repeat testing should be carried out where V/Q scan or CTPA is normal but the clinical suspicion of PE remains.

Anticoagulant treatment should be continued until PE is definitively excluded.

6.10. Women with suspected PE should be advised that, compared with CTPA, V/Q scanning may carry a slightly increased risk of childhood cancer but is associated with a lower risk of maternal breast cancer; in both situations, the absolute risk is very small. Ideally, informed consent should be obtained before these tests are undertaken.

6.11. **Blood tests**

- D-dimer testing should not be performed in the investigation of acute VTE in pregnancy.
- Before anticoagulant therapy is commenced, blood should be taken for a full blood count, coagulation screen, urea and electrolytes, and liver function tests.
- Performing a thrombophilia screen prior to therapy is not recommended.

NOTE: At present, there is no evidence to support the use of pre-test probability assessment (e.g. Wells Score) in the management of acute VTE in pregnancy.

7. Treatment of acute VTE

7.1. In clinically suspected DVT or PE, treatment with low-molecular-weight heparin (LMWH) should be commenced immediately until the diagnosis is excluded by objective testing, unless treatment is strongly contraindicated. (Appendix 1).

7.2. LMWH should be given in doses titrated against the woman's booking or early pregnancy weight. There is insufficient evidence to recommend whether the dose of LMWH should be given once daily or in two divided doses.

7.3. Routine measurement of peak anti-Xa activity for patients on LMWH for treatment of acute VTE in pregnancy or postpartum is not recommended except in women at extremes of body weight (less than 50 kg and 90 kg or more) or with other complicating factors (for example, with renal impairment or recurrent VTE).

7.4. Routine platelet count monitoring should not be carried out.

7.5. Treatment with therapeutic doses of subcutaneous LMWH should be employed during the remainder of the pregnancy and for at least 6 weeks postnatally and until at least 3 months of treatment has been given in total.

7.6. Women should be taught to self-inject LMWH and arrangements made to allow safe disposal of needles and syringes.

7.7. Vitamin K antagonists such as warfarin should not be used due to their effect on the fetus.

7.8. Consideration should be given to the use of newer anticoagulants (fondaparinux, argatroban or r-hirudin) in pregnant women who are unable to tolerate heparin (LMWH or unfractionated heparin) or danaparoid and who require continuing anticoagulant therapy. For discussion with haematology.

7.9. *Management of clinically suspected VTE in women at risk of haemorrhage. Any woman, who is considered to be at high risk of haemorrhage, and in whom continued heparin treatment is considered essential, should be managed with intravenous unfractionated heparin until the risk factors for haemorrhage have resolved.*

8. Management of massive life-threatening PE in pregnancy and the puerperium

8.1. Collapsed, shocked women who are pregnant or in the puerperium should be assessed by a team of experienced clinicians including the on-call consultant obstetrician. Management should involve a multidisciplinary team including senior physicians, obstetricians and radiologists.

8.2. Women should be managed on an individual basis regarding: intravenous unfractionated heparin, thrombolytic therapy or thoracotomy and surgical embolectomy. **Intravenous unfractionated heparin is the preferred, initial treatment** in massive PE with cardiovascular compromise. Infusion rate should be adjusted according to the APTT (Appendix 2)

8.3. The on-call medical team should be contacted immediately. **An urgent portable echocardiogram or CTPA within 1 hour of presentation should be arranged.** If massive PE is confirmed, or in extreme circumstances prior to confirmation, immediate thrombolysis should be considered.

9. Additional therapies

9.1. Compression stockings

9.2. In the initial management of DVT, the leg should be elevated and a graduated elastic compression stocking applied to reduce oedema. Mobilization with graduated elastic compression stockings should be encouraged.

9.3. IVC filters

9.4. Consider the use of a temporary inferior vena cava filter in the peripartum period for patients with iliac vein VTE to reduce the risk of PE or in patients with proven DVT and who have recurrent PE despite adequate anticoagulation.

10. Maintenance treatment of VTE

10.1. Treatment with therapeutic doses of subcutaneous LMWH should be employed during the remainder of the pregnancy and for at least 6 weeks postnatally and until at least 3 months of treatment has been given in total.

11. Labour and delivery

11.1. When VTE occurs at term, consideration should be given to the use of intravenous unfractionated heparin which is more easily manipulated.

11.2. The woman on LMWH for maintenance therapy should be advised that once she is in established labour or thinks that she is in labour, she should not inject any further heparin. Where delivery is planned, either by elective caesarean section or induction of labour, LMWH maintenance therapy should be discontinued 24 hours prior to planned delivery.

11.3. Regional anaesthetic or analgesic techniques should not be undertaken until at least 24 hours after the last dose of therapeutic LMWH. LMWH should not be given for 4 hours after the use of spinal anaesthesia or after the epidural catheter has been removed, and the epidural catheter should not be removed within 24 hours of the most recent injection.

12. Surgical management of anticoagulated patients at caesarean section

12.1. In patients receiving therapeutic doses of LMWH, wound drains (abdominal and rectus sheath) should be considered at caesarean section and the skin incision should be closed with interrupted sutures to allow drainage of any haematoma.

13. Postnatal anticoagulation

13.1. Therapeutic anticoagulant therapy should be continued for the duration of the pregnancy and for at least 6 weeks post-natally and until at least 3 months of treatment has been given in total. Before discontinuing treatment the continuing risk of thrombosis should be assessed.

13.2. Women should be offered a choice of LMWH or oral anticoagulant for postnatal therapy after discussion about the need for regular blood tests for monitoring of warfarin, particularly during the first 10 days of treatment.

13.3. Postpartum warfarin should be avoided until at least the fifth day and for longer in women at increased risk of postpartum

haemorrhage.

13.4. Women should be advised that neither heparin (unfractionated or LMWH) nor warfarin is contraindicated in breastfeeding.

14. Prevention of post thrombotic syndrome

14.1. Women should be advised that prolonged use of LMWH (more than 12 weeks) is associated with a significantly lower chance of developing post- thrombotic syndrome.

14.2. Following a DVT, graduated elastic compression stockings should be worn on the affected leg to reduce pain and swelling.

15. Postnatal clinic review

15.1. Postnatal review for patients who develop VTE during pregnancy or the puerperium should, whenever possible, be at an obstetric medicine clinic.

15.2. Thrombophilia testing should be performed once anticoagulant therapy has been discontinued only if it is considered that the results would influence the woman's future management.

16. Monitoring compliance with and the effectiveness of the guideline

16.1. Monitoring of implementation, effectiveness and compliance with these guidelines will be the responsibility of the Lead Clinician for Obstetrics. Where non-compliance is found, it must have been documented in the patient's medical notes

17. References

17.1. Confidential Enquiry into Maternal and Child Health (CEMACH). Why Mothers Die 2000–2002. The Sixth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. London: RCOG Press; 2004

17.2. RCOG Green-Top Guideline Number 37bThromboembolic disease in pregnancy and the puerperium: acute management , April 2015

17.3. Wyatt, J et al., Oxford Handbook of Emergency Medicine. Oxford, England: Oxford University Press.

18. Appendix 1

Treatment dose of Enoxaparin in suspected and confirmed VTE

Enoxaparin 1.5mg/kg OD **or** Enoxaparin 1mg/kg BD

Table 1a.
Guidance taken from the RCOG guideline

Booking or early pregnancy weight	Initial dose of enoxaparin
< 50 kg	40 mg twice daily or 60 mg once daily
50–69 kg	60 mg twice daily or 90 mg once daily
70–89 kg	80 mg twice daily or 120 mg once daily
90–109 kg	100 mg twice daily or 150 mg once daily
110–125 kg	120 mg twice daily or 180 mg once daily
> 125 kg	Discuss with haematologist

Lower dose of LWMH if Cr: clearance is less than 30 ml/minute

19. Appendix 2

IV unfractionated heparin in massive PE

Suggested regimen for intravenous unfractionated heparin by

RCOG 2007: *Loading dose 80 units per kg*

Followed by:

- Continuous intravenous infusion 18 units per kg per hour
- Measure activated partial thromboplastin time (APTT) 4-6 HOURS AFTER LOADING DOSE.
- Measure APTT 6 HOURS after any change in dose
- When APTT within the therapeutic range – measure at least daily
- Therapeutic target of APTT ratio is usually 1.5-2.5 times the average laboratory control value.

Senior Haematologist should be involved in the patient's management.

Infusion rates according to APTT	Dose change (units/kg/hour)	Additional action	Next APTT (hours)
Less than 1.2	**Plus 4**	**Re-bolus 80 units/kg**	**6**
1.2-1.5	**Plus 2**	**Re-bolus 40 units/kg**	**6**
1.5-2.5	**No change**		**24**
2.5-3.0	**Minus 2**		**6**
Greater than 3.0	**Minus 3**	**Stop infusion 1 hour**	**6**

20. Appendix 3 Algorithm for the investigation and initial management of suspected PE in pregnancy