Belfast Health and Social Care Trust
caring supporting improving together

Policy Code: BHSCT/SHWH/Mat (04) 2021

Title:	**Management of Acute Deep Venous Thrombosis and Pulmonary Embolus in Pregnancy**				
Policy Author(s)	Dr Alyson Hunter, Consultant Obstetrician Tel: 028 961 56761 alyson.hunter@belfasttrust.hscni.net, Dr Suha Abdalla, Registrar in Obstetrics and Gynaecology suha.abdalla@belfasttrust.hscni.net Dr Gary Benson, Consultant Haematologist Tel: 028 950 47977 gary.benson@belfasttrust.hscni.net, Dr Kathy Cullen Consultant Respiratory Physician Tel: 028 961 55583 kathy.cullen@belfasttrust.hscni.net				
Responsible Director:	Heather Jackson, Interim Director for Trauma, Orthopaedics, Rehab Services, Maternity, Dental, ET and Sexual Health				
Policy Type: (tick as appropriate)	*Directorate Specific ☒	Clinical Trust Wide ☐	Non Clinical Trust Wide ☐		
If policy type is confirmed as ***Directorate Specific** please list the name and date of the local Committee/Group that policy was **approved**					
Date: Directorate Governance Approval	11/02/2021				
Approval process:	Standards and Guidelines Committee Executive Team Meeting		**Approval date:**	09/06/021 25/08/2021	
Operational Date:	August 2021		**Review Date:**	August 2026	
Version No.	2	**Supercedes**	V1 – April 2014 – April 2017		
Key Words:	Thrombosis, venous, pulmonary embolus, pregnancy				
Links to other policies	None				

1.0 INTRODUCTION / SUMMARY OF POLICY

1.1 Background

Women are at risk of thromboembolism from the very beginning of pregnancy until the end of the puerperium. Venous-thromboembolic disease still remains in the top three direct causes of Maternal death based on Eighth Report of the Confidential Enquiries into Maternal Deaths, Saving Mothers' Lives. 34 women died from thrombosis and/or thromboembolism i.e. maternal mortality rate of 0.79 per 100 000 maternities. Sixteen of the 18 deaths were attributed to pulmonary embolism and two to cerebral vein thrombosis.

VTE is up to ten times more common in pregnant women than in nonpregnant women of the same age and can occur at any stage of pregnancy. The puerperium is the time of highest risk.

1.2 Purpose

The aim of this guideline is to provide information regarding immediate investigation and management to all staff (who manage venous thrombosis in pregnancy and the postnatal period).

2.0 SCOPE OF THE POLICY

All medical/midwifery staff who manage women with this condition.

3.0 ROLES AND RESPONSIBILITIES

All staff caring for women antenatally, intranatally and postnatally must read this guideline.

4.0 CONSULTATION

This policy will be widely circulated amongst Excellence and Clinical Governance, Supervisors of Midwives and all key workers.

5.0 POLICY STATEMENT/IMPLEMENTATION

5.1 Recommendations (See Appendix 3 for a list of abbreviations)

- All pregnant women with suspected PE and DVT should be admitted for assessment and investigation. Responsibility is with the admitting team. If a woman is admitted through the emergency team at the Royal Victoria Hospital, a referral needs to be made on the day of admission to the obstetric team on call. It is the responsibility of the on call obstetric team to review the patient.

- If a DVT/PE diagnosed on RMH site, the obstetric team can liaise with medical team for advice.

- Follow up appointments need to be organised at the joint Obstetric Haematology clinic unless delivery is imminent when inpatient review need to be requested.

5.1.1 Preliminary Assessment

- Acute venous thromboembolism should be suspected in patients with a combination of suggestive symptoms and/or signs. Most patients with confirmed PE do not have clinically evident DVT and around 30% of patients with symptomatic DVT have asymptomatic PE.

- Suggestive symptoms and signs:
    - DVT: unilateral leg pain, swelling, tenderness, increased temperature, pitting oedema, prominent superficial veins.
    - PE: breathlessness, chest pain, haemoptysis, collapse, tachycardia, hypotension, tachypnoea, raised jugular venous pressure, focal signs in chest, hypoxia/cyanosis.

5.1.2 Investigations

Acute DVT:

- All women with suspected DVT should be commenced on therapeutic anticoagulation unless contraindicated.

- Compression duplex ultrasound is the primary diagnostic test for DVT. If ultrasound confirms the diagnosis of DVT, anticoagulant treatment should be continued.

- 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.

- If repeat testing is negative, anticoagulant treatment should be discontinued. If repeat testing is positive then anti coagulant treatment needs to be continued and joint Obstetric- Haematology clinic appointment need to be organised. (2nd and 4th Tuesday morning of every month at RMH).

- If iliac vein thrombosis is suspected (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,16 although in practice, because of the extensive nature of these thrombi, ultrasound venography will often suffice.

Acute PTE:

- Women presenting with symptoms and signs of an acute PE should have an electrocardiogram (ECG) and a chest X-ray (CXR) performed.

- 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.

- in women with suspected PE, without symptoms and signs of DVT, a ventilation/perfusion (V/Q) ling scan or a computerised 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.

- 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.

- 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.

- 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.

- Where feasible, women should be involved in the decision to undergo CTPA or V/Q scanning. Ideally, informed consent should be obtained before these tests are undertaken.

- **D-dimer testing should not be performed in the investigation of acute VTE in pregnancy.**

5.1.3 Baseline blood investigations

- Before anticoagulant therapy is commenced, blood should be taken for a full blood count, coagulation screen, urea and electrolytes and liver function tests.

- The use of anticoagulant therapy can be influenced by renal and hepatic function and blood should be taken to confirm that these are normal before starting treatment.

- Performing a thrombophilia screen prior to therapy is not recommended.

5.1.4 Treatment of VTE in pregnancy

- In clinically suspected DVT or PTE, treatment with LMWH should be given until the diagnosis is excluded by objective testing, unless treatment is strongly contraindicated.

- LMWHs do not cross the placenta. LMWHs are the first line of treatment for woman with normal renal function and platelet count although women should be made aware that they are not licensed in pregnancy. All LMWH are derived from porcine origin and those women who may wish not to receive them, should be referred directly to the coagulation team.

- 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.

- The recommended therapeutic dose of LMWH varies according to the manufacturer. Women should not be instructed to eject some drug before injecting as the dose should always be rounded up to the nearest whole syringe strength yellow (40mg),Orange (60mg), Brown (80mg), Black (100mg), Pink (120mg), Blue (150mg).

Table1. Calculation of initial doses of drugs by early pregnancy weight

Early pregnancy weight (kg)				
	< 50	**50–69**	**70–89**	**> 90**
Enoxaparin (commonly used)	40 mg twice daily	60 mg twice daily	80 mg twice daily	100 mg twice daily
Dalteparin	5000 units twice daily	6000 units twice daily	8000 units twice daily	10,000 units twice daily
Tinzaparin (if allergic to Enoxaparin) 175 units/kg once daily (all weights)				

- If proximal DVT/PE is suspected or diagnosed after 36 weeks of gestation, case need to be discussed on urgent basis with multidisciplinary team involving Obstetric, Haematology, Radiology consultants regarding early investigation and management, in view of possible risk of delivery and need to consider insertion IVC filter electively prior to delivery.

5.1.5 Monitoring LMWH therapy in pregnancy

- Routine platelet count monitoring should not be carried out.

- 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) putting them at high risk.

- Obstetric patients who are postoperative and receiving unfractionated heparin should have platelet count monitoring performed every 2–3 days from days 4 to 14 or until heparin is stopped.

5.1.6 Management of massive life-threatening PTE in pregnancy

- Management should involve a multidisciplinary resuscitation team including senior physicians, obstetricians and radiologists.

- **Collapsed, shocked patients** need to be assessed by a team of experienced clinicians, including the on call consultant obstetrician.

- Women should be managed on an individual basis regarding: intravenous unfractionated heparin, thrombolytic therapy or thoracotomy and surgical embolectomy.

Life of mother takes priority. If woman has cardiorespiratory arrest an emergency Caesarean section should be performed within 5 minutes of the arrest i.e. Wherever she is in the hospital – a Caesarean section tray should be immediately available.

- Intravenous unfractionated heparin is the preferred treatment in massive PTE with cardiovascular compromise.

- 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 PTE is confirmed or, in extreme circumstances prior to confirmation, immediate thrombolysis should be considered.

- One regimen for the administration of intravenous unfractionated heparin is: loading dose of 80 units/kg, followed by a continuous intravenous infusion of 18 units/kg/hour l if a patient has received thrombolysis, the loading dose of heparin should be omitted and an infusion started at 18 units/kg/hourl it is mandatory to measure activated partial thromboplastin time (APTT) level 4–6 hours after the loading dose, 6 hours after any dose change and then at least daily when in the therapeutic range.

  The therapeutic target APTT ratio is usually 1.5–2.5 times the average laboratory control value (this will depend on the APTT reagent used in the laboratory and, when unfractionated heparin is employed, the advice of a haematologist should be sought).

  Using this weight-adjusted regimen, the infusion rate should be adjusted according to the APTT.

5.1.7 Additional therapies

- In the initial management of DVT, the leg should be elevated and a graduated elastic compression stocking applied to reduce oedema. Mobilisation with graduated elastic compression stockings should be encouraged. Below-knee compression socks are acceptable.

- Consideration should be given to the use of a temporary inferior vena caval filter in the perinatal period for women with iliac vein VTE, to reduce the risk of PTE or in women with proven DVT and who have continuing PTE despite adequate anticoagulation.

5.1.8 Maintenance treatment of VTE

- 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.

- Women should be taught to self-inject LMWH and arrangements made to allow safe disposal of needles and syringes. Outpatient follow-up should include clinical assessment and advice with monitoring of blood platelets and peak anti-Xa levels if appropriate.

- Pregnant women who develop heparin-induced thrombocytopenia or have heparin allergy and require continuing anticoagulant therapy should be managed with an alternative anticoagulant under specialist advice.

- Because of their adverse effects on the fetus, vitamin K antagonists, such as warfarin, should not be used for antenatal VTE treatment.

- 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.

5.1.9 Anticoagulant therapy during labour and delivery and Anaesthetics

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

- 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.

- 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 12 hours of the most recent injection.

- 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.

- 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.

5.1.10 Postnatal anticoagulation

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

- 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.

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

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

5.1.11 DVT/PE in postnatal period

- If a woman develops a DVT /PE within 6 weeks of delivery, the management will be similar to non pregnant women. Admission will be usually to the medical unit and postnatal review will be by the obstetric team (consider side room if women is breast feeding).

- Investigations will be same as that of pregnant women but consider V/Q scan instead of CTPA as there is no risk of radiation exposure to fetus.
- If breastfeeding, advise breast feeding is not safe for 24 hours following the scan. Alternatives to breastfeeding like previously expressed breast milk or artificial feeds should be suggested.

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

- 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.

5.1.12 Importance of diagnosis and management of DVT/PE in long term

- The need for anticoagulation possibly in subsequent pregnancies.
- The use of COCP/HRT in the future.
- To diagnose or rule out blood disorder.

5.2 Dissemination

Following ratification by the Standards and Guidelines Committee and approval by the Policy Committee this guideline will be published on the Belfast Trust Intranet Site and staff will be informed.

The policy and guidelines section is regularly accessed by staff.

5.3 Resources

None.

5.4 Exceptions

None.

6.0 MONITORING AND REVIEW

This guideline contains the current evidenced based thinking on this topic, however data and statistics are routinely collected and correlated and should the need arise the guideline will be updated.

7.0 EVIDENCE BASE/REFERENCES

1. Saving Mothers' Lives, the thirteenth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom.
2. Prevention and management of venous thromboembolism, A national clinical guideline Scottish intercollegiate guideline.
3. RCOG Green-top Guideline No. 37a April 2015.
4. BTS guidelines for the management of suspected acute pulmonary embolism. Thorax 2003;58:470–483.

8.0 APPENDICES

Appendix 1 Suspected DVT
Appendix 2 Suspected acute pulmonary embolism
Appendix 3 Abbreviations

9.0 NURSING AND MIDWIFERY STUDENTS

Nursing and/or Midwifery students on pre-registration education programmes, approved under relevant 2018/2019 NMC education standards, must be given the opportunity to have experience of and become proficient in **Management of Acute Deep Venous Thrombosis and Pulmonary Embolus in Pregnancy**, where required by the student's programme. This experience must be under the appropriate supervision of a registered nurse, registered midwife or registered health and social care professional who is adequately experienced in this skill and who will be accountable for determining the required level of direct or indirect supervision and responsible for signing/countersigning documentation.

Direct and indirect supervision

- Direct supervision means that the supervising registered nurse, registered midwife or registered health and social care professional is actually present and works alongside the student when they are undertaking a delegated role or activity.
- Indirect supervision occurs when the registered nurse, registered midwife or registered health and social care professional does not directly observe the student undertaking a delegated role or activity. (NIPEC, 2020)

This policy has been developed in accordance with the above statement.

Wording within this section must not be removed.

10.0 EQUALITY IMPACT ASSESSMENT

The Trust has legal responsibilities in terms of equality (Section 75 of the Northern Ireland Act 1998), disability discrimination and human rights to undertake a screening exercise to ascertain if the policy has potential impact and if it must be subject to a full impact assessment. The process is the responsibility of the Policy Author. The template to be complete by the Policy Author and guidance are available on the Trust Intranet or via this **link**.

All policies (apart from those regionally adopted) must complete the template and submit with a copy of the policy to the Equality & Planning Team via the generic email address equalityscreenings@belfasttrust.hscni.net

The outcome of the equality screening for the policy is:

Major impact ☐
Minor impact ☐
No impact ☒

Wording within this section must not be removed

11.0 DATA PROTECTION IMPACT ASSESSMENT

New activities involving collecting and using personal data can result in privacy risks. In line with requirements of the General Data Protection Regulation and the Data Protection Act 2018 the Trust considers the impact on the privacy of individuals and ways to militate against any risks. A screening exercise must be carried out by the Policy Author to ascertain if the policy must be subject to a full assessment. Guidance is available on the Trust Intranet or via this **link**.

If a full impact assessment is required, the Policy Author must carry out the process. They can contact colleagues in the Information Governance Department for advice on Tel: 028 950 46576

Completed Data Protection Impact Assessment forms must be returned to the Equality & Planning Team via the generic email address equalityscreenings@belfasttrust.hscni.net

The outcome of the Data Protection Impact Assessment screening for the policy is:

Not necessary – no personal data involved ☒
A full data protection impact assessment is required ☐
A full data protection impact assessment is not required ☐

Wording within this section must not be removed.

12.0 RURAL NEEDS IMPACT ASSESSMENT

The Trust has a legal responsibility to have due regard to rural needs when developing, adopting, implementing or revising policies, and when designing and delivering public services. A screening exercise should be carried out by the Policy Author to ascertain if the policy must be subject to a full assessment. Guidance is available on the Trust Intranet or via this link.

If a full assessment is required the Policy Author must complete the shortened rural needs assessment template on the Trust Intranet. Each Directorate has a Rural Needs Champion who can provide support/assistance.

Completed Rural Impact Assessment forms must be returned to the Equality & Planning Team via the generic email address equalityscreenings@belfasttrust.hscni.net

Wording within this section must not be removed.

13.0 REASONABLE ADJUSTMENT ASSESSMENT

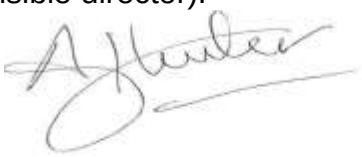
Under the Disability Discrimination Act 1995 (as amended) (DDA), all staff/ service providers have a duty to make Reasonable Adjustments to any barrier a person with a disability faces when accessing or using goods, facilities and services, in order to remove or reduce such barriers. E.g. physical access, communicating with people who have a disability, producing information such as leaflets or letters in accessible alternative formats. E.g. easy read, braille, or audio or being flexible regarding appointments. This is a non-delegable duty.

The policy has been developed in accordance with the Trust's legal duty to consider the need to make reasonable adjustments under the DDA.

Wording within this section must not be removed.

SIGNATORIES

(Policy – Guidance should be signed off by the author of the policy and the identified responsible director).



11/02/2021

_____ **Date:** _____

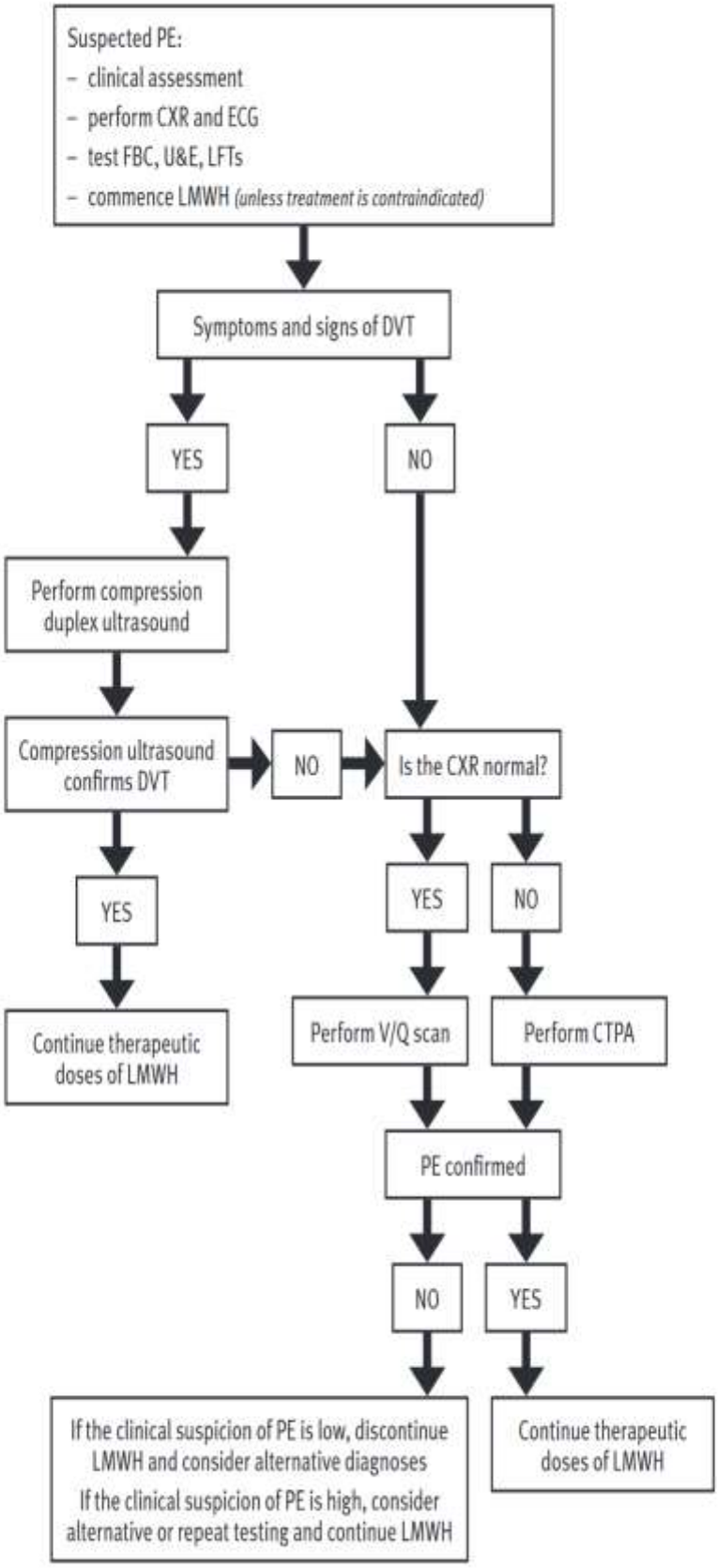
Policy Author

08/09/2021

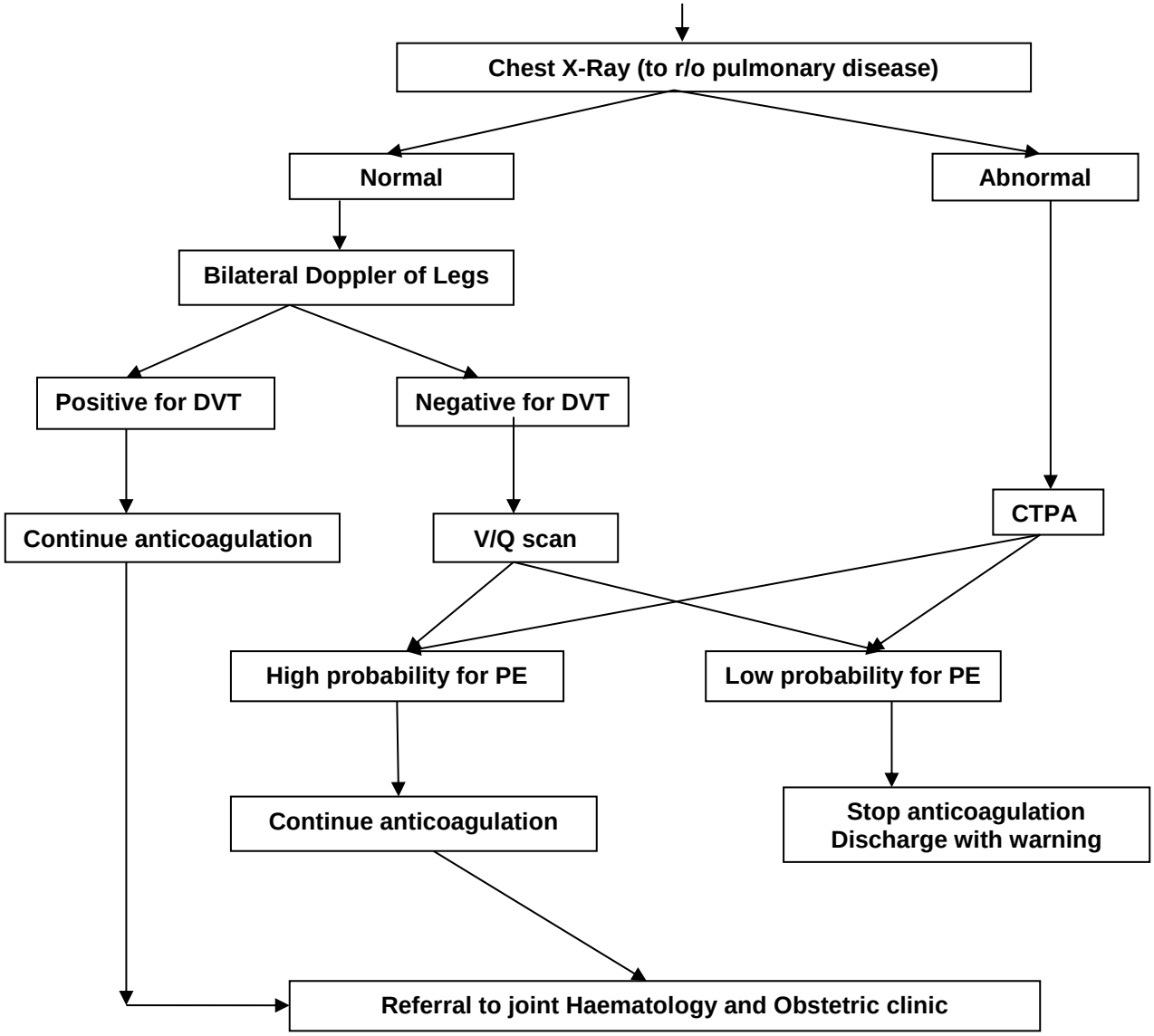
_____ **Date:** _____

Director

Appendix I: Algorithm for the investigation and initial management of suspected PE in pregnancy and the puerperium



Appendix 2


Chest X-Ray (to r/o pulmonary disease)
Normal
Abnormal
Bilateral Doppler of Legs
Positive for DVT
Negative for DVT
CTPA
Continue anticoagulation
V/Q scan
High probability for PE
Low probability for PE
Continue anticoagulation
Stop anticoagulation
Discharge with warning
Referral to joint Haematology and Obstetric clinic

Appendix 3

Abbreviations:

1. VTE — Venous Thrombo Embolism
2. DVT — Deep Vein Thrombosis
3. PTE — Pulmonary Thrombo Embolism
4. CTPA — Computed Tomography Pulmonary Angiogram
5. V/Q — Scan Ventilation Perfusion Scan
6. LMWH — Low Molecular Weight Heparin
7. CXR — Chest X-ray