POLICY CONTROL SHEET

(updated August 2011)

Policy Title and ID number:	**CC4.8 Venous Thromboembolism Policy**			
Sponsoring Director:	**Medical Director**			
Implementation Lead:	Dr Ye Myint, Consultant Anaesthetist			
Impact:	*(a) To patients*	**Yes**		
	(b) To Staff	**Yes**		
	(c) Financial	**Yes**		
	(d) Equality Impact Assessment (EIA)	Completed: **Yes**		
	(e) Counter Fraud assessed	Completed: **Yes / No**		
	(e) Other			
Training implications:	*To be incorporated into induction:* **Yes / No**			
Date of consultation:	***Approval Process***	**Date**	**Local Consultation**	**Date**
	Executive Team	*26/01/12*	*Joint Partnership Forum*	
	Board Committee:		*Local Negotiating Committee*	
	• *Clinical Governance*	*01/02/12*	*Infection Control Committee:*	
	• *Non Clinical Governance & Risk*		*Health & Safety Committee*	
	• *Audit Committee*		*Quality Safety Improvements & Effectiveness Board*	
	• *Finance Committee*			
	• *RATS*		*Investment Board*	
	Trust Board Approval / Ratification		*Patients Experience Board*	
	Other:		*Other:*	

Approval/Ratification at Trust Board:	*February 2012*	Version Number:	1
Date on Policy Warehouse:	*February 2012*	Team Brief Date:	
Circulation Date:		Date of next review:	January 2014

For completion by ET for *new* policies only:				
Additional Costs			Budget Code:	Revenue or Non Revenue
	(a) Training	£		
	(b) Implementation	£		
	(c) Capital	£		
	(d) Other	£		

Barnsley Hospital NHS
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VENOUS THROMBOEMBOLISM POLICY

DOCUMENT ID: CC 4.8 (CLINICAL CARE 4.8)
ISSUE NO 1

JANUARY 2012

SPONSORING DIRECTOR: MEDICAL DIRECTOR

VENOUS THROMBOEMBOLISM

(POLICY ID: CC 4.8)

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POLICY

APPENDICES

ABBREVIATIONS AND ACRONYMS

♦ Board	Board of Directors
♦ DD	Divisional Director
♦ ADD	Assistant Divisional Director
♦ ET	Executive Team
♦ NHSLA	NHS Litigation Authority
♦ The Trust	Barnsley Hospital NHS Foundation Trust

VENOUS THROMBOEMBOLISM

(POLICY ID: CC4.8)

1 STATEMENT OF INTENT

The purpose of this policy is to ensure that all in-patients are appropriately assessed for the risk of venous thromboembolism (VTE) and treated according to that risk throughout their stay at Barnsley Hospital NHS Foundation Trust (BHNFT). It is intended that the Trust shall have a robust overarching framework for the risk assessment and management of patients with VTE.

NICE Clinical Guideline 92, Venous Thromboembolism: reducing the risk, published in 2010 underpins this policy.

2 INTRODUCTION

A VTE Committee was established under the auspices of the Medical Director with the purpose of ensuring that the Trust is compliant with NICE and NPSA standards.

There is representation from each Directorate on the Committee, which reports into the Quality & Safety Improvements & Effectiveness Board as required.

This policy supersedes all prior relevant clinical and non-clinical policies, protocols and guidelines within the Trust.

3 MANAGEMENT ARRANGEMENTS: ROLES OF INDIVIDUALS AND GROUPS

Overall responsibility for the management of risk lies with the Chief Executive as Accountable Officer for the Trust.

All Trust directors are responsible, collectively, for the Trust's systems of internal control and management. The Board of Directors needs to be satisfied that appropriate policies and procedures are in place and that systems are functioning effectively.

The Board of Directors has delegated its accountability arrangements for the Policy for Venous Thromboembolism to the Medical Director.

The responsibility for the effective implementation of the Venous Thromboembolism policy and supporting procedures necessarily involves the whole management chain of command, and all members of staff have a responsibility to ensure the effective implementation of the policy and procedures.

Within that system there are certain key officers who's specific functions are outlined below.

3.1 Medical Director

The Medical Director has overall clinical responsibility for implementation and compliance to this policy and will report to the Board of Directors and the Clinical Governance Committee.

They are also responsible for ensuring that Junior doctors are trained in accordance with the Training Needs analysis.

3.2 Chief Nurse

The Chief Nurse is responsible for ensuring that nursing staff are trained in the correct use of mechanical prophylaxis.

3.3 Divisional Directors and Assistant Divisional Directors /Heads of Departments

All Divisional Directors and Assistant Divisional directors are responsible for the implementation of this policy within their directorates.

3.4 Thromboprophylaxis and Thrombosis Committee

The Thromboprophylaxis and Thrombosis Committee are responsible for co-ordinating the implementation of the policy, education and audit.

3.5 Admitting Consultant

The admitting consultant is responsible for ensuring compliance with this policy for their patients.

3.6 Nursing staff

The pre-assessment nurses are responsible for risk assessing all elective surgical patients, attending the pre-assessment clinic.

3.7 Junior Doctors (Admitting Doctors)

Junior doctors are responsible for risk assessing emergency patients and undertaking a further review within 24hrs of admission .

4 PROCESS FOR RISK ASSESSMENT/IDENTIFYING PATIENTS AT RISK OF VENOUS THROMBOEMBOLISM

All patients (18 years and older) should be risk assessed for Venous Thromboembolism in accordance with the Trust Thromboprophylaxis Guideline (Appendix A).

5 PROPHYLACTIC TREATMENT FOR HIGH RISK PATIENTS

All high risk patients should be given prophylactic treatment in accordance with the Trust Thromboprophylaxis Guideline (Appendix B)

6 PROCEDURE TO BE FOLLOWED IF VTE IS SUSPECTED

Procedures outlined in the Trust ‘Guidelines for investigation of deep vein thrombosis (DVT) and suspected Pulmonary embolism (PE)’ should be followed for all patients where VTE is suspected. (Appendix C)

7 MANAGEMENT OF A PATIENT ONCE A POSITIVE DIAGNOSIS HAS BEEN MADE

Patients should be treated in accordance with the Trust ‘Guidelines For The Management Of Venous Thromboembolic Disease (VTE) – Deep Venous Thrombosis (DVT) And Pulmonary Embolism (PE)’. (Appendix D)

8 STAFF TRAINING

Staff training will be undertaken in accordance with the Training Needs Analysis.

9 MONITORING

This policy will be monitored in accordance with the policy monitoring matrix.

10 REVIEW DATE

This policy is to be reviewed every two years or whenever new guidance is issued, whichever is the sooner.

Date of next review for this Policy is January 2014

CROSS REFERENCE DOCUMENTS/POLICIES

The following is a list of other policies, procedure documents or guidance documents (internal or external), which staff should refer to for further details:

Trust Guideline for the risk assessment/identifying patients at risk of venous thromboembolism
Prophylactic treatment for high risk patients
Guidelines for the investigation of suspected DVT and PE in adults
Guidelines for The Management Of Venous Thromboembolic Disease (VTE) – Deep Venous Thrombosis (DVT) And Pulmonary Embolism (PE)
NICE Guideline CG92: Venous thromboembolism: reducing the risk, 2010

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Affix ID label or complete
Name .....
Unit number .....
Date of birth .....
NHS Number .....

Risk Assessment For Venous Thromboembolism (VTE)

DH Department of Health

Date of assessment:
Date of surgery:
Risk assessment by:

All patients should be risk assessed on admission to hospital. Patients should be reassess within 24 hours of admission and whenever the clinical situation changes.

Mobility - all patients (tick one box)	Tick		Tick		Tick
Surgical patient		Medical patient expected to have ongoing reduced mobility relative to normal state		Medical patient NOT expected to have significant reduced mobility relative to normal state.	
Assess for thrombosis and bleeding risk below				Risk assessment now complete	

Thrombosis Risk			
Patient related	Tick	**Admission related**	Tick
Active cancer or cancer treatment		Significantly reduced mobility for 3 days or more	
Age >60		Hip or knee replacement	
Dehydration		Hip fracture	
Known thrombophilias		Total anaesthetic + surgical time >90 minutes	
Obesity (BMI>30kg/m2)		Surgery involving pelvis or lower limb with a total anaesthetic + surgical time >60 minutes	
One or more significant medical comorbidities (e.g. heart disease; metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions)		Acute surgical admission with inflammatory or intra-abdominal condition.	
Personal history or first-degree relative with a history of VTE		Critical care admission	
Use of hormone replacement therapy		Surgery with significant reduction in mobility	
Use of oestrogen-containing contraceptive therapy			
Varicose veins with phlebitis			
Pregnancy or < 6weeks post partum (See NICE guidance for specific risk factors)			

Bleeding risk			
Patient related	Tick	**Admission related**	Tick
Active bleeding		Neurosurgery, spinal surgery or eye surgery	
Acquired bleeding disorders (such as acute liver failure)		Other procedure with high bleeding risk	
Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR >2)		Lumbar puncture/epidural/spinal anaesthesia expected within the next 12 hours	
Acute Stroke		Lumbarpuncture/epidural/spinal anaesthesia within the previous 4 hours	
Thrombocytopaenia (platelets <75 x 10⁹/l)			
Uncontrolled systolic hypertension (230/120mmHg or higher)			
Untreated inherited bleeding disorders (such as haemophilia and von Willebrand's disease)			

If the patient qualifies for thromboprophylaxis then prescribe enoxaparin 40mg subcutaneously once daily or 20mg once daily if the creatinine clearance is estimated to be less than 30 (equating to a creatinine of >180 in men and >150 in woman)

Based on NICE CG92 and Department of Health March 2010 - Reviewed Sept 10 BHNFT 1031 Version 5

Appendix B

Thromboprophylaxis Guideline

Thromboprophylaxis for All Patients

Risk for Venous Thrombo Embolism (VTE) should be assessed on admission and reassessed within 24hrs of admission and whenever clinical condition changes. Review the patient related risk factors for VTE against bleeding risks.

Check that there is no contra-indication to anticoagulation. If patient is suitable for pharmacological prophylaxis give 40mg Enoxaparin subcutaneously at time of admission and subsequently between 2000 and 2200 hours.

The dose should be reduced to 20mg if serum creatinine is above150 micro mol/L in female patients and above 200 micro mol/L in male patients or if creatinine clearance is less than 30 ml per minute.

Mechanical Thromboprophylaxis with graduated elastic stocking or intermittent pneumatic compression should be considered in appropriate patients.

Monitor Full Blood Count (FBC) as in Medical Patients below.

Thromboprophylaxis for Obstetric/Gynaecology Patients - See Separate Guideline

Thromboprophylaxis for Orthopaedic Surgery

- **Elective Hip replacement**: Enoxaparin as thromboprophylaxis for medical patients then switch to oral Rivaroxaban 10mg Once Daily for 35 days on the day after the operation or on discharge.
- **Elective Knee replacement**: Enoxaparin as thromboprophylaxis for medical patients then switch to oral Rivaroxaban 10mg Once Daily for 14 days on the day after the operation or on discharge.
- **Hip fracture**: Enoxaparin as thromboprophylaxis for medical patients below
- **Pelvic surgery**: Enoxaparin as thromboprophylaxis for medical patients below
- **Upper limb surgery**: do not routinely offer VTE prophylaxis unless considered at high risk of VTE.
- **Other Orthopaedic surgery**: Use mechanical prophylaxis with graduated elastic stocking or intermittent pneumatic compression device unless contraindicated. If additional risk factors for VTE prescribe enoxaparin as below. Continue until mobility no longer significantly reduced.
- **Patients with lower limb casts with additional factors for VTE** (including cancer, previous VTE, family history VTE in first degree relative, known thrombophilia, pregnancy): Enoxaparin as below then switch to oral Rivaroxaban 10mg Once Daily at discharge until cast removed and regained mobility. Pregnant patients should continue on Enoxaparin.

Thromboprophylaxis for General Surgery

- **Major surgery for abdominal and pelvic cancer**: continue enoxaparin for 28 days after surgery
- **Head and Neck surgery**: enoxaparin not routinely necessary unless patient considered high risk by Consultant surgeon
- **Urology**: for patients undergoing transurethral surgery where age is the only risk factor for VTE offer **only** mechanical prophylaxis. For all other patients follow the advice above
- **Acute spinal cord injury**: ALL patients should receive enoxaparin as above and mechanical prophylaxis on admission. Initiate warfarin with target INR of 2.5 for 12 weeks.

Thromboprophylaxis for Medical Patients

- Start Low Molecular Weight Heparin Enoxaparin (Clexaine) 40 mg SC once daily as standard dose.
- Use Anti-factorXa Fondaparinux 2.5 mg SC if there is Low Molecular Weight Heparin allergy.
- Monitor FBC every 2-3 days between days 4-14 of enoxaparin administration. Check FBC weekly for 2 weeks for outpatients. Request a Heparin Induced Thrombocytopaenia test if patient shows thrombocytopaenia or platelet count drops less than 50% of initial platelet count. If Heparin Induced Thrombocytopaenia is suspected, patient should be admitted (if outpatient) and discussed with Haematologist.
- Monitor FBC and U/E on day 5 then every 2-3 days until day 14, then check at day 21, then monthly after if stable
- Do not use graduated elastic stocking in patients with stroke

Cross Reference Documents:
CC4.8 Venous Thromboembolism Policy
Guideline for investigation of DVT and PE in adults
Guideline for the management of DVT and PE in adults
NICE CG92: VTE

Appendix C

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GUIDELINES FOR INVESTIGATION OF DEEP VEIN THROMBOSIS (DVT) AND SUSPECTED PULMONARY EMBOLISM (PE) IN ADULTS

Authors:

Dr Y Myint, Consultant Anaesthetist
Dr S Yates, Consultant Radiologist
Dr H Mahdi, Consultant in Respiratory Medicine
Dr J Beahan, Consultant in Emergency Medicine
Dr K Rajiv, Consultant Physician
Dr J P Ng, Consultant Haematologist
Dr T Locker, Consultant in Emergency Medicine

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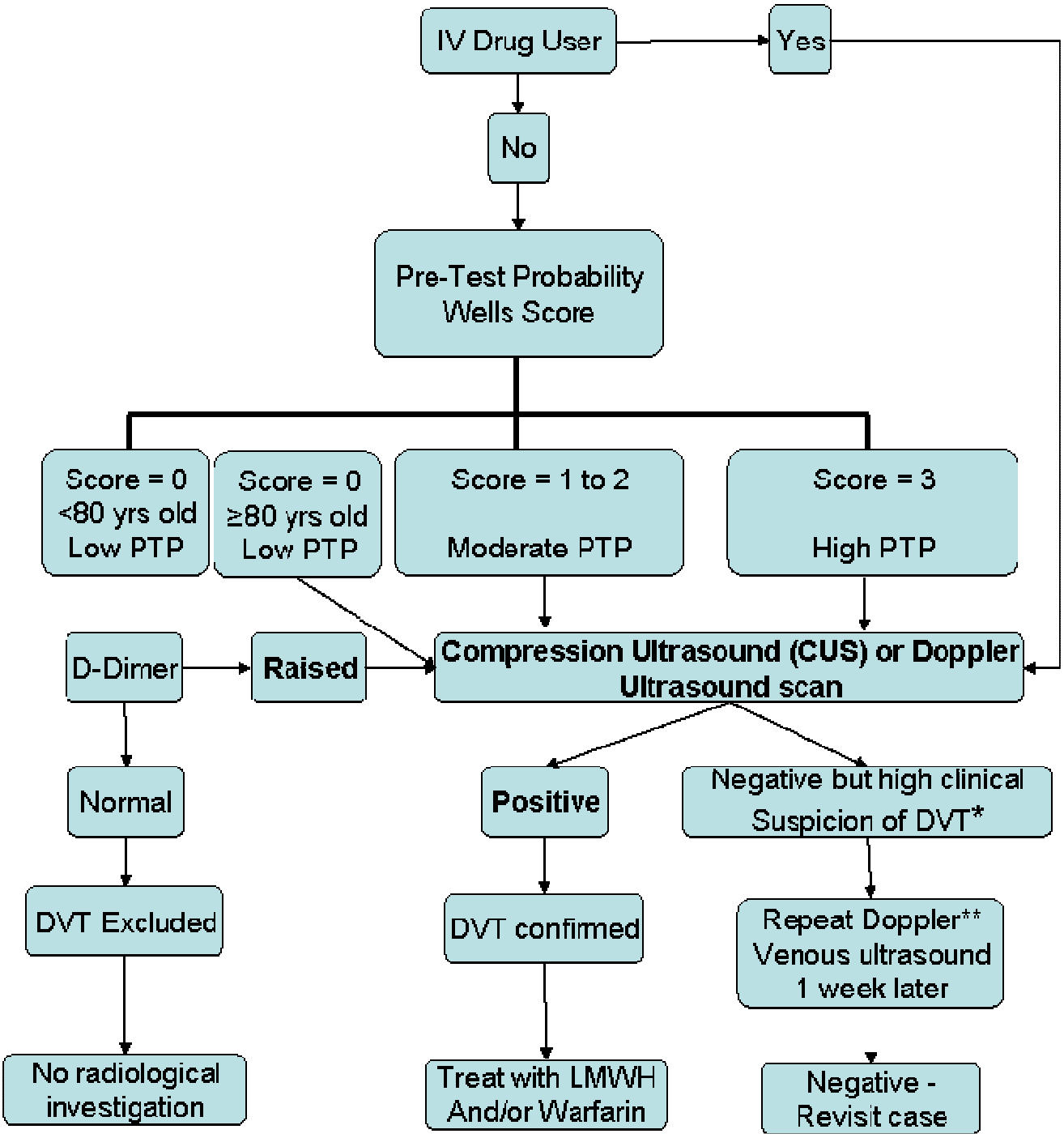
Investigation pathway for suspected DVT



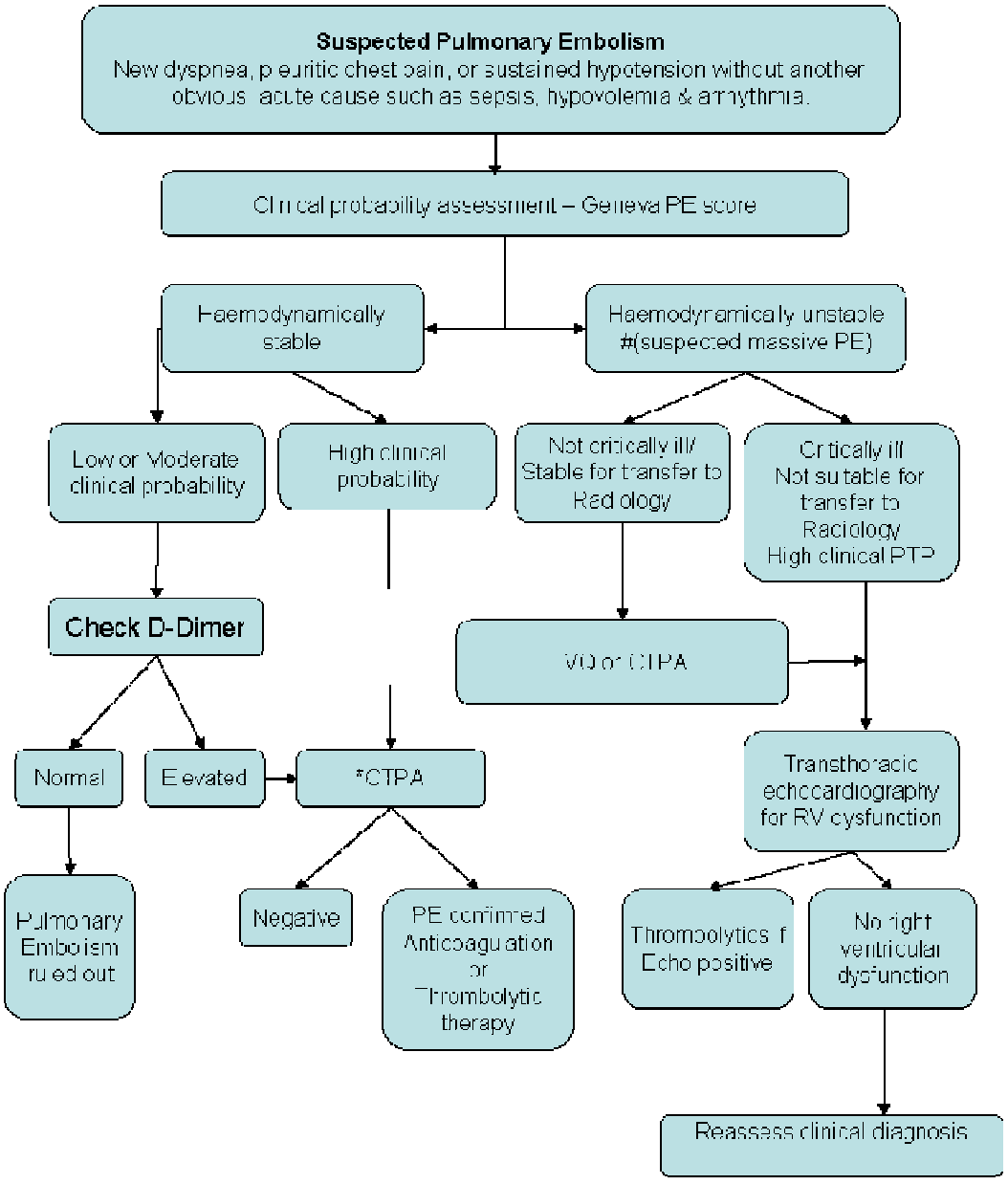
***If Doppler negative and suspected Pelvic DVT, may need CT venography for diagnosis if Doppler US negative.

**** If unable to see calf veins on full leg scan or proximal scan only undertaken

Flowchart 2

For pregnant patients refer to the Obstetrics guidelines

PE investigation pathway recommended by thrombosis Committee



*****Q scan can replace CTPA in patient with normal CXR with no cardiopulmonary diseases (proceed to CTPA if result indefinite). Compression ultrasound (CUS) of the leg is first imaging test in patient with clinical DVT, if CUS show no DVT proceed to CTPA.

#Massive PE defined as systolic blood pressure below 90mmHg or a pressure drop of ≥40mmHg for 15 minutes if not caused by new-onset arrhythmia, hypovolaemia or sepsis.

GUIDELINES FOR INVESTIGATION OF DEEP VEIN THROMBOSIS (DVT)
AND
SUSPECTED PULMONARY EMBOLISM (PE)

INTRODUCTION

Deep Vein Thrombosis (DVT) and its complication, Pulmonary Embolism (PE) are common conditions. The incidence of DVT is 1 in 1000 for all age groups. If untreated 50% of Proximal DVT may lead to development of PE of which 10% can have a fatal outcome. When applying the clinical prediction guide to determine the pre-test probability (PTP) the patient may have Low, Moderate or High PTP.

After clinical assessment use objective scoring tools to decide further specific investigations:

- Wells DVT score
- Geneva PE score.

SUSPECTED DVT

Leg swelling with or without pain is a common symptom. Some of suspected DVT patients may have additional symptoms suggestive of probable PE. There is good advice to do a Pre-Test Probability (PTP) assessment and D-Dimer test (D-Dimer is only for appropriate patients (see below)) before embarking on Compression or Doppler Ultrasound and other Radiological test like CTPA or Q scan in suspected DVT or PE or both simultaneously. Best practice is to first look at the Clinical Prediction Guide (CPG) to select suspected DVT patients from the cohort of patients with swollen or painful leg. This will ensure that D-Dimer test is done in appropriate cases where it is indicated and facilitates interpretation to proceed further along the **DVT Investigation Guideline**.

Any patient who is suspected to have PE or may have started as suspected DVT and later on developed PE symptoms should be then investigated along the **PE Investigation Guideline**. If it is not feasible to do a CTPA or Q scans in this scenario and the Ultrasound is positive for DVT then it must be treated as PE. It requires the clinician to consider whether an alternative diagnosis is more likely than PE.

A patient with DVT or PE who is haemodynamically stable may be safely managed as an Outpatient with initiation of Secondary Therapy i.e. Anticoagulation. The practical management is vide Flowchart 1

Differential diagnosis for leg swelling (DVT) in secondary care – seek advice of a senior colleague.

WELLS SCORE FOR DVT PROBABILITY TO DECIDE INVESTIGATIONS:

1. Lower limb trauma or surgery or immobilization in plaster cast +1
2. Bedridden > 3 days or Surgery < 4 weeks +1
3. Tenderness along deep venous system +1
4. Entire limb swollen +1
5. Calf circumference > 3cm bigger 10cm below tibial tuberosity +1
6. Pitting oedema +1
7. Dilated collateral superficial veins (non-varicose) +1
8. Malignancy (including treatment up to 6 months previously) +1
9. Alternative Diagnosis more likely than DVT as above -2

Low probability score = 0
Intermediate probability = 1 or 2
High probability = ≥ 3

SUSPECTED PE

This guideline aims to assist the investigation of suspected PE in adult patients including patients who are pregnant or postpartum.

Only 15-25% of patients undergoing radiological investigation will have the diagnosis confirmed and the remaining patients should not be subjected to the risks of anti-coagulant therapy, unless they are too unwell to move to the radiology department.

Clinical Features

Suspicion of PE is raised by clinical symptoms such as dyspnoea, chest pain and syncope, haemoptysis either singly or in combination

It is important to assess the clinical probability which will assist for further investigations. All patients with possible PE should have clinical probability assessed and documented. The clinical probability assessment requires:

The patient has clinical features compatible with PE – mainly, acute breathlessness and/or tachypnoea, with or without pleuritic chest pain and/or haemoptysis.
Two other factors are sought;

a. The absence of another reasonable clinical explanation
and/or
b. Presence of major risk factor.

Where (a) and (b) are both true the probability is high; if only one is true the probability is intermediate and if neither is true the probability is low.

Classification

Pulmonary Thrombo Embolism (PE) is part of the spectrum of Venous Thrombo Embolism which also includes deep vein thrombosis of lower and upper extremities.

1. Massive pulmonary embolism (5%)

   This is characterised by haemodynamic instability, mark hypotension, or frank cardiopulmonary arrest.

2. Sub-massive pulmonary embolism (25%)

   These patients are haemodynamically stable. Echocardiography will show right heart strain and an abnormal function.

3. Non-massive pulmonary embolism (70%)

   These patients usually have normal circulation and right heart function remain stable.

DIAGNOSTIC INVESTIGATIONS

The clinical assessment of patients with suspected PE is absolutely crucial. Use PERC and Geneva Score combined with other diagnostic tests such as the D-dimer to reduce the need for radiological investigations. Echocardiography may demonstrate, right ventricular overload. Clinical suspicion for PE should be followed by full clinical assessment including risk assessment for VTE. Chest radiography can demonstrate hypovascularity (Westermark's sign) or an area of peripherally placed wedge shape consolidation (suggesting infarction). Chest x-ray, arterial blood gases and ECG may suggest an alternative diagnosis but have insufficient sensitivity to exclude a diagnosis of PE.

Patients with acute PE usually have hypoxaemia, but the arterial oxygen tension may be normal.

ECG

ECG may show sinus tachycardia, atrial fibrilation right axis deviation. S1Q3T3 pattern (non-specific sign) occurs in less than 20% of patients with PTE.

D-dimers

D-dimer assay could be considered for patients with a low clinical probability of VTE. A normal assay result virtually excludes the presence of pulmonary embolism. If D-dimer is high, further investigations are required to confirm PE. D-dimer should not be performed in patients with a high clinical probability of VTE or in patients with other significant medical problems (eg post-operative patients, patients with pneumonia, patients with sepsis). D-dimer has not been validated in pregnant patients and D-dimer level may increase in pregnancy.

A negative D-dimer test reliably excludes PE in patients with low or intermediate clinical probability and such patients do not require imaging for VTE.

Ultrasonography

Ultrasonography of the leg veins is a good alternative in patients with leg symptoms, (high sensitivity and specificity in such situations). In patients with co-existing clinical DVT, leg ultrasound as initial imaging test is often sufficient to confirm VTE. A single normal leg ultrasound should not be relied on for exclusion of sub-clinical DVT. Ultrasonography can be considered in pregnancy to avoid ionising radiation.

Lung Scintigraphy

Pre-test probability (Q scan) using Geneva Score should be completed for **all** requests for Q scan and computerised tomographic pulmonary angiography (CTPA). Ensure appropriate staff escort ill patients

when transferred to radiology department. A normal perfusion lung scan (Q scan) result rules out PE. PE is more than 90% likely, if a high probability Q scan is obtained.

All patients requiring Q scans should have normal chest x-ray (no acute abnormalities e.g. pneumonia) taken within 24 hours of the request. There is no out of hours service for Q scan.

For pregnant patients refer to the Obstetrics guidelines.

Computerised Tomographic Pulmonary Angiography

Pre-test probability (Geneva Score) should be completed with all requests and should be discussed with a consultant radiologist. CTPA is safe in pregnant patients and ionising radiation has been shown to be within an acceptable range even during the first trimester.

If patient is anit-coagulated for >5 days Negative CTPA cannot rule out PE.

For pregnant patients refer to the Obstetrics guidelines.

Echocardiography

There should be risk stratification, whether the PE patient is haemodynamically stable or unstable based on hypotension i.e. Systolic BP <90mmHg or drop of >40mmHg from initial recording and a Portable Echocardiography shows right ventricular hypokinesis, or if Troponins are raised, in order to choose treatment. Trans thoracic echocardiogram should be considered for haemodynamically unstable or critically ill patients. A critically ill patient needs hospitalization for Thrombolytics or transferred for mechanical embolectomy where Thrombolytics are contraindicated. The practical management is vide Flowchart 2.

Echo is a useful bedside test for assessment of right heart function and for demonstration of central pulmonary embolism. This is a useful test for patients with massive (and sub-massive) emboli. However, routine use of echocardiography is not advised for diagnosis or exclusion of pulmonary embolism. This should be reserved for patients who cannot be transferred to the radiology department and for those with haemodynamic instability or in whom right ventricular dysfunction is suspected.

DIAGNOSTIC MANAGEMENT ACCORDING TO CLASSIFICATION

Massive Pulmonary Embolism - these patients require urgent and aggressive treatment. Consider for urgent CTPA if patient is stable to transfer to Radiology Dept. Bedside echocardiography should be considered for patients who are critically ill and unstable to transfer to Radiology Department.. Other investigations such as ECG, Blood Troponin and (BNP) Brain Natriuretic Peptide may be useful to confirm diagnosis of PE. Thrombolysis should be considered after confirmation of diagnosis. Follow-up of CTPA after successful therapy) should be considered after about a week of therapy to determine residual clot burden.

Sub-massive Pulmonary Embolism – Cardiac tropinin may be high in these patients with right heart strain. These patients are likely to remain unnoticed unless a pro-active approach with routine echocardiography is taken. Patients with new right heart strain on ECG should undergo echocardiography. CTPA should be considered in these patients.

Non-massive Pulmonary Embolism – Adequate diagnosis is essential in order to avoid unnecessary use of anti-coagulant therapy. This diagnosis should be obtained within 24 – 36 hours. In outpatients, a combination of clinical assessment and D-dimer tests can be used. In patients with leg symptoms, ultrasonography should be considered as a first line test. The same is true for pregnant patients. CTPA may be useful to confirm the diagnosis.

Suspected PE in Pregnant Women and the Peripartum Peripartum – Discuss with Obstetric Consultant and Consultant Radiologist.

Ensure senior input (Obstetricians and Radiologists) for further investigations including perfusion scan and/or CTPA)

PERC (PE RULE-OUT CRITERIA) SCORING FOR LOW RISK PATIENTS ONLY:

1. Age<50 years
2. Pulse<100 bpm
3. SaO2 >94%
4. No unilateral leg swelling
5. No haemoptysis
6. No recent trauma or Surgery
7. No prior PE or DVT
8. No hormone use

When the PERC criteria are not met, the advice is to proceed along the recommended pathway with the D-Dimer /radiological tests. The PERC rule only applies if all 8 criteria met in a low risk patient when no further work up advised.

GENEVA SCORES FOR PE PROBABILITY TO DECIDE INVESTIGATIONS:

1. Age: 60-79 years(1 point) 80+ years (2 points)
2. Previous DVT or PE (2 points)
3. recent surgery<4 weeks(3 points)
4. Heart rate >100bpm(1 points
5. PaCO2 < 35mmHg (2 points) >35-39 mmHg (1 points).
6. PaO2 <49mmHg (4 points) 49-59mmHg (3 points) 60-71mmHg (2 points) 72- 82mmHg (1 point).
7. CXR findings Band atelectasis(I point) elevation of hemi-diaphragm (1 point)

Score < 5 points indicates low probability of PE,
Score 5-8 points indicates a moderate probability of PE and
Score >8 points indicates high probability.

Special situations:

PE in Pregnancy will be investigated first line by Bilateral Lower limb Doppler US

Cross Reference documents:

CC4.8 Venous Thromboembolism Policy
BHNFT Guideline for the management of DVT and PE in adults
BHNFT Thromboprophylaxis Guideline
NICE Clinical Guideline 92 VTE

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GUIDELINES FOR THE MANAGEMENT OF VENOUS THROMBOEMBOLIC DISEASE (VTE) – DEEP VENOUS THROMBOSIS (DVT) AND PULMONARY EMBOLISM (PE)

Authors:
Dr Y Myint, Consultant Anaesthetist
Dr H Mahdi, Consultant in Respiratory Medicine
Dr J Beahan, Consultant in Emergency Medicine
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Dr T Locker, Consultant in Emergency Medicine

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GUIDELINES FOR THE MANAGEMENT OF VENOUS THROMBOEMBOLIC DISEASE (VTE) – DEEP VENOUS THROMBOSIS (DVT) AND PULMONARY EMBOLISM (PE)

Introduction

A clinical diagnosis of VTE is unreliable and objective confirmation must be obtained. See the Trust 'Guidelines For Investigation Of Deep Vein Thrombosis (DVT) and
Suspected Pulmonary Embolism (PE) in Adults

Management for DVT

If the scan cannot be done that day, then patients may be allowed home on enoxaparin treatment providing the following criteria are met:

1. The patient must be *either*:
    a. able to self-administer enoxaparin (or have a relative/carer do it for them) *or*
    b. willing to return daily for an injection until a scan is performed
2. The patient must be a responsible, fit, mobile adult, with access to transport
3. Age less than 75 years (discretionary)
4. The patient should have creatinine clearance >30mL/min
5. Full blood count (FBC) and clotting screen, Liver Function Test (LFT) and Urea and electrolytes (U+E) must have been taken and reviewed.

The following patients should be managed as inpatients:

1. If they are clinically unstable
2. Have extensive DVT including pelvic vein thrombosis
3. Have significant comorbid disease
4. Have significantly limited mobility
5. Pregnant patients
6. Patients who have had surgery within the last 30 days.

Anticoagulation

Anticoagulation is the mainstay of VTE management. Unless there is a contraindication, LMWH or UFH should be started if DVT/PE is strongly suspected.

- absolute contraindication to anticoagulation:
    - active bleeding
- relative contraindications:
    - haemophilia or other haemorrhagic disorders
    - thrombocytopenia $<50x10^9/L$
    - oesophageal varices
    - coagulopathy with bleeding – e.g. liver failure
    - severe liver disease (prolonged prothrombin time)
    - recent cerebral haemorrhage, surgery to eye or CNS
    - severe hypertension (BP 230/120mm/Hg or higher)
    - Large acute ischaemic stroke – discuss with Consultant and consider delay to anticoagulation.
- Consider the insertion of an IVC filter if anticoagulation contraindicated. Ask Haematology or Vascular Radiology (Northern General Hospital, Sheffield) for advice if in doubt.

Choice of anticoagulant

- Initial anticoagulation should be with low molecular weight heparin (LMWH: enoxaparin Use BHNFT 'Enoxaparin Prescription Chart for DVT and PE Treatment'.
- An accurate weight must be available before calculating the dose of enoxaparin: do not use estimates.
- **Do not give LMWH or unfractionated heparin if the patient has a history of heparin-induced thrombocytopenia (HIT) or allergic to Heparin - ask Haematology for advice**.

Renal impairment

- Creatinine clearance of <20-30mL/min, reduce dose of Clexane to 1mg/kg.
- <20mL/min: will require admission for unfractionated heparin infusion

Religious objection to porcine products

- All LMWH are of porcine extraction.
    - substitute the use of LMWHs with treatment-dose FONDAPARINUX until the patient is established on warfarin

Oral Anticoagulation

As soon as DVT/PE is confirmed, warfarin can be started

- Most patients with DVT will be suitable for warfarin anticoagulation (note special situations- pregnancy/ cancer/ IDU below). If patients are being managed as outpatients, start on LMWH then refer to the Anticoagulant/Thrombosis Clinic for counselling and initiation of warfarin.
- Target INR 2.5 (range 2-3) unless recurrent VTE whilst on warfarin and INR therapeutic. (See Appendix 1).
- LMWH or unfractionated heparin infusion MUST be continued for a minimum of 5 days and until INR is >2 on 2 consecutive days.
- Patient education - interactions of warfarin with other medication (antibiotics, medication bought over the counter eg analgesics, other prescription medication), foodstuffs and alcohol.
- Dosage instructions must be written in the 'Oral Anticoagulation Therapy Record, Important Information for Patients' booklet and given to patient before discharge.
- When starting anticoagulant the patient is loaded with warfarin as an inpatient then discharged to the anticoagulation clinic or, for early discharge patients, referred to the Thrombosis clinic for, counseling and warfarin adjustment, in both cases the doctor initiating the warfarin should briefly counsel the patient.

Special situations (pregnancy / cancer / IDU)

- Continue with LMWH in the following groups of patients:
    - PREGNANT PATIENTS (warfarin is contraindicated). Treat with enoxaparin 1mg/kg twice daily. See guideline 'Venous Thromboembolism During Pregnancy and the Puerperium'
    - See separate Obstetric Guidelines.
    - CANCER PATIENTS. Discuss with Oncologist re prognosis of Cancer. Other key messages include:
        - 1.5mg/kg enoxaparin once daily for 4-6 weeks then dose reduce to
        - 1-1.2mg/kg enoxaparin once daily for minimum of 6 months (round dose to nearest syringe size for practicality of administration).
        - If ongoing active malignancy, continue anticoagulation longer term (after initial 6 months consider reducing dose enoxaparin to 40mg once daily or switch to warfarin once cancer treatment finished).

- INJECTABLE DRUG ABUSERS (Control of anticoagulation with warfarin may be difficult). Continue with enoxaparin1.5mg/kg once daily. If on LMWH refer to thrombosis clinic for consideration of continuation of LMWH/warfarin depending on compliance with taking of medication.

Monitoring for heparin-induced thrombocytopenia (HIT)

- This should be undertaken in all patients.
- FBC should be checked at baseline and:
  - 24hrs later if the patient has received unfractionated heparin or LMWH within the last 100 days
  - Weekly for 2 weeks
- If the platelet count falls by >50% or the patient develops clinical signs or symptoms suggestive of HIT after admission, refer to HIT guidelines.

Duration of anticoagulation for VTE (DVT or PE)

General recommendations are as follows. Obviously clinical features may lead to either a shorter (bleeding risk such as falls, unstable anticoagulation, compliance concerns) or a longer (strong family history VTE or ongoing risk factors such as cancer or major obesity) duration of anticoagulation.

- Postoperative or associated with lower limb cast – minimum 3 months (and until fully mobile)
- Associated with other persistent precipitating factors or Idiopathic - usually 6 months
- For recurrent DVT/PE (more than 2 DVT or more than 1 PE) or life threatening pulmonary embolism consider long term treatment.

Recurrence of DVT/PE

- Clinical diagnosis of recurrence is unreliable.
- Objective diagnostic tests by ultrasonography / CTPA or other imaging (discuss with Radiology) are again required.
- If the patient develops a new thrombosis whilst taking warfarin and INR is therapeutic prescribe LMWH and increased target INR range 3-4.

Follow up / Discharge

- Patients discharged on longer-term LMWH (eg pregnant and cancer patients):
  - Provide a 4 week supply of LMWH at discharge
  - Arrange HIT monitoring as appropriate (eg cancer patients on LMWH).
- Refer all patients on warfarin to the Anticoagulation Clinic at the point of discharge for monitoring of warfarin anticoagulation
- Refer all patients on LMWH to the Thrombosis Clinic for monitoring
- Patients with PE for follow up by Respiratory Clinician.

Pulmonary Embolism (PE) Management

Clinical

- History – Dyspnoea, haemoptysis, pleuritic chest pain, syncope, cough.
- Examination – Breathlessness, hypotension, cyanosis

These symptoms may be absent in some cases and may be subtle in young, previously healthy individuals

- If the patient has signs of DVT do a Doppler leg scan. If Doppler negative CTPA should be done.

Massive PE (associated with shock or hypotension) -

If massive PE suspected (circulatory collapse (systolic BP<90mmHg, Transient drop of systolic BP >40mmhg for more than 15 min) or Right ventricular dysfunction

- Resuscitate patient (airway, breathing, circulation)
- Start treatment pending results of investigations.
- Bolus IV unfractionated heparin (5000 units) followed by maintenance infusion
- Inform Consultant in charge
- Arrange EMERGENCY CTPA with Radiologists after stabilization of the patient ideally within one hour (available only at the request of consultant anaesthetists/intensivists, for patients who are being managed in an ITU/HDU environment)
- If collapsed patient or too unwell for CTPA make an emergency referral to the appropriate Clinician for urgent echocardiogram or consider thrombolysis on clinical grounds.

COMMENCE ANTICOAGULATION WHILST AWAITING INVESTIGATION in all patients

Investigation

Objective diagnosis of VTE is important to avoid the risks of anticoagulation where they are unnecessary.

- ECG/ blood gases - are not diagnostic and may be normal.
- Chest X-ray
- Laboratory investigations - FBC, coagulation screen, and Urea & electrolytes. Do not request thrombophilia investigations
- Troponin I - Patients with clinical signs of acute right heart failure and a raised troponin are at higher risk of complications, even if haemodynamically stable. Troponin I measurement should be considered in such patients for risk stratification and monitoring.

D-dimer result (<0.5mcg/L) EXCLUDES a PE in patients who are 'PE unlikely' if the patient is not receiving anticoagulant therapy. Remember that D-dimers are raised in other clinical situations.

PREGNANT PATIENTS - see separate protocol (duplex US legs followed by perfusion scan initially) (perfusion scan/CTPA)

Management

Stable patients with Geneva Score <2 can be managed as Out Patients Under the Thrombosis Clinic. (Appendix 2)

Patients can be stratified by risk of PE-related early mortality based on clinical features (shock/hypotension), markers of RV dysfunction (RV dilatation on CTPA/echo) and markers of myocardial damage (troponin).

(I) Specific treatment for massive PE/ haemodynamically compromised patient

- Diagnosis confirmed and systolic BP <90mmHg / haemodynamically unstable - THROMBOLYSE, followed by UFH infusion (see below). Decision to thrombolyse should be made with the consultant on call
- High flow oxygen to maintain O_2 saturation >94%; unless patient has CO2 retention.
- Start 28% O_2 if patient known to have COPD.
- These patients must be managed on ED, HDU or ICU.
- An IVC filter may need to be considered
- Embolectomy may very occasionally be appropriate if thrombolysis is contraindicated. Contact STH on-call Consultant Vascular Radiologist (in daytime/office hours via the NGH Angio suite (15346), out of hours via switchboard).

Thrombolysis

- Thrombolysis associated with an approximately 19% rate of major bleeding and 2% rate of intracranial haemorrhage in patients with PE.
- The risk of major bleeding with thrombolysis is twice that with heparin.
- Give as soon as possible after diagnosis massive PE is confirmed **or on clinical grounds if cardiac arrest imminent.**
- Consider thrombolysis if clinical deterioration despite anticoagulation with LMWH or unfractionated heparin infusion.
- There are few absolute contraindications to thrombolysis if it is given when there is imminent cardiac arrest or circulatory collapse.
- **Absolute contraindications:**
  - Any known history of haemorrhagic stroke or stroke of unknown origin.
  - Known history of ischaemic stroke or transient ischaemic attack (TIA) in the preceding 6 months, except current acute ischaemic stroke within 3 hours.
  - Thrombolytic agents are contraindicated in cases where there is a high risk of haemorrhage such as:
  - Significant bleeding disorder at present or within the past 6 months, known haemorrhagic diathesis, patients receiving oral anticoagulants, e.g. warfarin sodium, manifest or recent severe or dangerous bleeding, known history of or suspected intracranial haemorrhage, suspected subarachnoid haemorrhage or condition after subarachnoid haemorrhage from aneurysm, any history of central nervous system damage (i.e. neoplasm, aneurysm, intracranial or spinal surgery), prolonged CPR
  - Recent (less than 10 days) traumatic external heart massage, Pregnancy or within 1 week postpartum, recent puncture of a non-compressible blood-vessel (e.g. subclavian or jugular vein puncture)
  - Severe uncontrolled arterial hypertension, bacterial endocarditis, pericarditis, acute pancreatitis, documented ulcerative gastrointestinal disease during the last 3 months, oesophageal varices, arterial-aneurysm, arterial/venous malformations, neoplasm with increased bleeding risk, severe liver disease, including hepatic failure, cirrhosis, portal hypertension (oesophageal varices) and active hepatitis, major surgery or significant trauma in past 3 months.

Thrombolysis Drug protocol

If a bolus dose of heparin has not already been given then administer 60 units/kg (max 4000units) of IV unfractionated. Do not give if transferring the patient from warfarin or therapeutic LMWH. As per Heparin and Prescription and Monitoring chart for use with Thrombosis only.

If unfractionated heparin infusion has already been started, then stop infusion.

Administration of thrombolysis alteplase (Tpa):
Dissolve the content of a vial of alteplase 50 mg with 50ml water for injections to obtain a final concentration of 1mg/ml.

Administer alteplase 10mg (10ml) bolus IV (over 1-2 minutes).

Use the remainder of the vial (ie 40mg plus a further 50mg vial, to prepare a 90mg infusion for administration over 2 hours.

If the patient is less than 65kg the total dose should not exceed 1.5 mg/kg of alteplase).

After thrombolysis start an IV unfractionated heparin infusion This regimen uses a starting dose of 12units/kg/hour of heparin. Monitor APTT ratio after 4-6 hrs and at least 12-hourly for 4 days. The APPT ratio should be adjusted to 1.5-2.5.
Commence oral anticoagulation on day 3.
Continue on unfractionated heparin until INR >2 for 2 consecutive days

If given at cardiac arrest (or if arrest is imminent) alteplase 50mg bolus ONLY should be given. If there is a clinical response, this should be followed by IV heparin infusion as above.

Resuscitation efforts /CPR should be continued for 60minutes following the administration of thrombloysis for PE.

(Ii) PE without circulatory collapse (non-massive PE)

Anticoagulation

- This is the mainstay of pulmonary embolism management.
- Start LMWH / unfractionated heparin (as above in DVT management) once VTE suspected and objective confirmatory tests ordered.
- Initiation of warfarin, counselling, target INR and duration of anticoagulation etc. as in DVT management above.

General advice
- Patients with saddle embolus on CTPA, significant hypoxia or clinical signs of acute right heart failure with a raised troponin I should be considered for a 24-48hr period of monitoring on HDU or RCU/CCU
- Supportive therapy with oxygen and analgesia as required (maintain O_2 sats >94% unless underlying COPD - see oxygen guidelines)
- Knee length anti-embolism stockings should be fitted as soon as practicable (contraindicated in lower limb ulceration and peripheral vascular disease)

PREGNANCY - consult with the Obstetricians for PE during pregnancy

Follow up
- Discharge recommendations are as for DVT above.
- All patients with PE should be followed-up at Respiratory Clinic.

Appendix 1 Warfarin Treatment Management Guidelines

Appendix 2 Geneva Score

Cross reference documents
CC4.8 Venous Thromboembolism Policy
BHNFT Guideline for the Investigation of DVT and PE in adults
BHNFT Thromboprophylaxis Guideline
NICE Clinical Guideline 92 VTE

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Clexane Inj:Summary of Product Characteristics; Sanofi Aventis Jan 2012

WARFARIN TREATMENT MANAGEMENT GUIDELINES

A How To Start Warfarin Treatment

INR should be measured daily when initiating warfarin treatment

DAY	INR (in morning)	Warfarin Dose (mg) (in evening)
ONE (Pre-treatment baseline)	<1.4	10*
TWO	<1.8	10*
	1.8 - 2.0	1
	>2.0	0
THREE	<2.0	10*
	2.0 - 2.2	5
	2.3 - 2.5	4
	2.6 - 2.9	3
	3.0 - 3.2	2
	3.3 - 3.5	1
	>3.5	0
FOUR (To give predicted maintenance dose) **Predicted maintenance doses may be unreliable if patient has been given less than 10 mg on days 1 or 2**	<1.4	>8
	1.4 - 1.5	8
	1.6 - 1.7	7
	1.8 - 1.9	6
	2.0 - 2.3	5
	2.4 - 3.0	4
	3.1 - 4.0	3
	>4.0	Omit dose until INR ≤ 3

After day 4, use clinical judgement.

*** Less aggressive loading for patients at risk.**

- Elderly patients (>70 years)
- Patients with risk factors for poor anticoagulation control, e.g. heart failure, liver disease
- Treatment with drugs that potentiate warfarin, e.g amiodarone.

Use these doses
Day 1 <1.4 5mg
Day 2 <1.8 5mg
Day 3 <2.0 5mg

Modified from Fennerty et al BMJ 1988: 297: 1285-8

B Recommended Target INRs

Indication	Target INR	Duration
First PE or proximal DVT	2.5 (± 0.5)	6 months
Distal DVT where treatment is appropriate	2.5 (± 0.5)	3 months
Second DVT while not on warfarin	2.5 (± 0.5)	1 year
Recurrent DVT (>2) or PE (>1) while not on warfarin	2.5 (± 0.5)	Long term
Recurrent DVT or PE while on warfarin	3.5 (± 0.5)	Long term
Atrial Fibrillation	2.5 (± 0.5)	Long term
Mechanical Heart Valves	3.5 (± 0.5)	Long term

For other diagnoses, seek advice from haematology

C Management Of Over-Anticoagulation With Warfarin.

3.0<INR<6.0 (target INR 2.5)	(1) Reduce warfarin dose or stop (2) Restart when INR < 5.0
4.0<INR<6.0 (target INR 3.5)	(1) Reduce warfarin dose or stop (2) Restart when INR < 5.0
6.0< INR<8.0 (no bleeding or minor bleeding)	(1) Stop warfarin (2) Restart when INR < 5.0
INR > 8.0 (no bleeding or minor bleeding)	(1) Stop warfarin (2) Restart warfarin when INR < 5.0 (3) If other risk factors for bleeding give 2mg of oral vitamin K
Major life threatening bleed (Contact on-call haematologist **URGENTLY** who will advise on the use of factor concentrates)	(1) Stop warfarin (2) Give prothrombin complex concentrate 50 units/kg (3) Give 5mg IV of vitamin K

Appendix 2

GENEVA SCORES FOR PE PROBABILITY TO DECIDE INVESTIGATIONS

1. Age: 60-79 years(1 point) 80+ years (2 points)
2. Previous DVT or PE (2 points)
3. recent surgery<4 weeks(3 points)
4. Heart rate >100bpm(1 points
5. PaCO2 < 35mmHg (2 points) >35-39 mmHg (1 points).
6. PaO2 <49mmHg (4 points) 49-59mmHg (3 points) 60-71mmHg (2 points) 72- 82mmHg (1 point).
7. CXR findings Band atelectasis(I point) elevation of hemi-diaphragm (1 point)

Score < 5 points indicates low probability of PE
Score 5-8 points indicates a moderate probability of PE and
Score >8 points indicates high probability