Whittington Health NHS

PULMONARY EMBOLISM
AMBULATORY PATHWAY GUIDELINE

Subject:	Pulmonary embolism ambulatory pathway
Policy Number	N/A
Ratified By:	Clinical Guidelines Committee
Date Ratified:	May 2014
Version:	1.0
Policy Executive Owner:	Dr Rizwan Kaiser
Designation of Author:	Consultant Physician
Name of Assurance Committee:	As above
Date Issued:	December 2014
Review Date:	3 years hence
Target Audience:	Emergency department, Acute and General Medicine, Haematology
Key Words:	Pulmonary embolism, ambulatory pathway

Version Control Sheet

Version	Date	Status	Comment
1.0	Dec 2014	LIVE	New guideline

Contributors (Comments sought)

Organisation	Name	Designation
Whittington Health	Dr Nathalie Richard	Consultant in Emergency Medicine
Whittington Health	Dr Sarah Howling	Consultant Radiologist
Whittington Health	Dr Marko Berovic	Consultant Radiologist
Whittington Health	Dr Farrukh Shah	Consultant Haematologist
Whittington Health	Nadine Shaw	Sister, Ambulatory Care
Whittington Health	Dr Clarissa Murdoch	Consultant in Acute Medicine
Whittington Health	Dr Ben Killingley	Consultant in Acute Medicine
Whittington Health	Dr Sara Lock	Consultant in Respiratory Medicine
Whittington Health	Dr Amit Patel	Consultant in Respiratory Medicine
Whittington Health	Dr Louise Restrick	Consultant in Respiratory Medicine
Whittington Health	Dr Myra Stern	Consultant in Respiratory Medicine
Whittington Health	Dr Norman Johnson	Consultant in Respiratory Medicine
Whittington Health	Dr David Brull	Consultant Cardiologist
Whittington Health	Dr Chee Loong	Consultant Cardiologist

Contents

Abbreviations pertaining to this guideline

ED	Emergency Department	**DVT**	Deep vein thrombosis
PE	Pulmonary Embolism	**RR**	Respiratory rate
LMWH	Low Molecular weight heparin	**AEC**	Ambulatory Emergency Clinic
PESI	Pulmonary Embolism Severity Index	**DMR**	Duty Medical Registrar
VQ	Ventilation perfusion scan	**CXR**	Chest X-ray
CNS (surgery)	Central nervous system	**LFT**	Liver function test
IV	Intravenous	**PSA**	Prostate specific antigen
CTPA	Computed tomography pulmonary angiogram	**US**	Ulltrasound
BP	Blood pressure		

➢ Introduction

Pulmonary embolism is a common and potentially fatal disease, and traditionally has been treated in an inpatient setting. There is growing evidence that a significant proportion of patients identified to be at low risk of adverse outcome (i.e. death, recurrent embolic events and bleeding) can be safely and effectively investigated and treated in an ambulatory care setting[1-7].

Ambulatory management reduces medical resource utilisation, may potentially result in less nosocomial complications and deconditioning, and is associated with high patient satisfaction with care.

This policy sets out the ambulatory management of patients with suspected and confirmed pulmonary embolism as they progress from diagnosis to outpatient treatment and follow up.

This policy should be read in conjunction with the comprehensive trust guideline on the diagnosis and treatment of pulmonary embolism.

Please see Whittington Health Guideline:

Pulmonary embolism – Diagnosis and management

➢ Aims of the pathway (Criteria for use)

- To investigate and treat suspected low risk PE patients safely as an outpatient and prevent these patients being admitted to hospital enabling them to lead a normal lifestyle.
- To perform risk stratification and prioritise admission for high risk patients, thereby free hospital beds for more acutely ill patients.
- To accelerate and provide a more streamlined service for assessment, imaging, diagnosis, and commencement of treatment.
- To improve the appropriate investigation and management of suspected PE (thereby also preventing unnecessary investigation) and improve adherence to Whittington Trust guidelines
- To educate patients/carers in ongoing treatment and future preventative care.

➢ Ambulatory care service – Working Timetable

The Ambulatory PE Service is operational Monday – Friday (9am -8 pm), and Weekends (9am – 5 pm)
It is staffed on a daily basis by Medical junior trainees, Ambulatory Care nursing staff, and an Ambulatory Care Consultant (Mon – Fri)

➢ Inclusion criteria

- Patients with clinically suspected low risk PE attending the Emergency Dept (self or GP referral) or Ambulatory Clinic (directly referred by GP)
- Patients admitted and confirmed to have PE, and are appropriate for early discharge, requiring continuing treatment with LMWH

➢ Essential prerequisites for Ambulatory Pathway

- Only patients with non massive PE (haemodynalically stable) can be treated on an ambulatory care pathway. It is essential that patients are carefully selected who are at low risk of adverse outcome ie death, recurrent thromboembolic events, and bleeding complications.
- Ambulatory PE Proforma (printed copies in ED) must be completed and signed by the attending clinician and to be filed in notes.
- Decision making regarding ambulatory PE management will be led by senior clinicians - either Consultants (ED, Acute Medical On Call or Ambulatory Care Consultant of the day) or the Duty Medical Registrar (if out of hours). This is to ensure that other potential diagnoses are not being missed, and to carefully select low risk suspected or confirmed PE patients.
- Pulmonary Embolism Severity Index (PESI) Score (See table 1 on page 7), and Troponin T measurement (measured at least 6 hours after onset of symptoms) should be used to guide risk stratification into low and high risk. Patients being managed as ambulatory, either before investigation or after confirmed diagnosis, must have a low PESI Score (Class I or II) and a negative Troponin T level.
- Further Exclusion Criteria (indicating high risk condition/ patient group) checklist on proforma will need to be completed and signed by the clinician attending the patient. A patient meeting any exclusion criteria

will need to be admitted to the Medical Assessment Unit for inpatient investigation and management.

- Definitive investigation (VQ or CTPA as per diagnostic algorithm) should take place within 24 hours of presentation, ideally on the same day.

- Patients awaiting a scan should be treated with therapeutic LMWH.

- Following the scan (with either positive or negative result), patient must be reviewed by the Ambulatory Care **Consultant** of the day. At the weekend, the duty Ambulatory Care doctor must discuss all cases with the DMR or Medical Consultant on call

➢ Clinical assessment and diagnosis

The clinical assessment of patients with possible pulmonary embolism should be undertaken in line with the Trust Guideline *Pulmonary embolism – Diagnosis and management* which should be referred to.

Please see Whittington Health Guideline:

Pulmonary embolism – Diagnosis and management

For a summary, see **Investigation Algorithm Appendix 1** (page 13)

➢ Patient selection and risk stratification

Only patients with non massive PE (haemodynamically stable) can be treated on an ambulatory care pathway. Low Risk patients are then carefully selected based on a Pulmonary Embolism Severity Index scoring system[8] (table 1) and assessing for right heart strain.

Patients with a PESI score Class I or II are considered to be at low risk of death, and therefore may be considered for ambulatory care.
Patients with PESI score Class III-V are high risk and should be admitted for inpatient investigation and management.

Table 1 – Pulmonary Embolism Severity Index (PESI) Score

Criteria	Points	Patients Score (score 0 if absent criteria)
Age	1 point per year	
Male Sex	10	
Active Cancer	30	
Heart Failure	10	
Chronic lung disease	10	
Pulse > 110/min	20	
Systolic BP < 100 mmHg	30	
Resp Rate > 30/min	20	
Body Temp < 36C	20	
Altered mental state	60	
Oxygen Sats < 90% on air	20	
	Total Score	

Classification of risk according to PESI score		
	Points	**30 day mortality**
Low Risk		
Class I	< 65	0.7%
Class II	66-85	1.2%
Intermediate Risk		
Class III	86-105	4.8%
High Risk		
Class IV	106-125	13.6%
Class V	>125	24.5%

The use of highly sensitive cardiac troponin T, as a marker of right heart strain improves the risk stratification of PE[9]. A positive troponin is an exclusion criteria for ambulatory care, and these patients should be admitted. If positive Trop T with high PESI score (Class 3-5), then an Echocardiogram should be considered to assess for right heart dysfunction.

In addition to a low risk PESI score and negative troponin, additional high risk condition checklist of further exclusion criteria for ambulatory care should be completed.

Additional High Risk Condition :

Any of the following additional high risk conditions are excluded from the ambulatory pathway and will require admission :

High Clinical Risk:

- Systolic BP < 100 mmHg, or persistent tachycardia > 110/min
- O_2 Sats < 94% on air, and/or RR > 24 /min
- PE whilst on therapeutic anticoagulation
- Co-existing major proximal DVT (high segment femoral and above)
  (Patient with clinical signs of a DVT should have a Doppler US scan before considering ambulatory treatment - if this excludes a proximal DVT then they can be ambulated.
  If PE and coexisting proximal DVT, admit at least 48 hours and then consider early discharge if no other exclusion criteria present and patient remains clinically stable)

High Bleeding Risk:

- Active bleeding
- Recent GI Bleed (within 2 weeks)
- Recent stroke (within 2 weeks)
- Recent eye or CNS surgery (within 2 weeks) – discuss with surgeon and haematologists regarding bleeding risk, as they may still be suitable for ambulatory
- Platelets < 75 or severe coagulopathy

Problems related to LMWH:

- Severe renal dysfunction (eGFR <20 ml/min), thereby necessitating IV Heparin infusion.
  N.B if eGFR is 20-30 ml/min – continue to manage as ambulatory with Tinzaparin, but with antiXa monitoring
- Allergy to Heparin
- Previous heparin induced thrombocytopenia
- Morbid Obesity (> 150 kg)

Ambulatory Treatment not feasible due to social issues or unlikely compliance:

- Alcoholic, homeless, known illicit drug abuse
- Acute mental illness, cognitive impairment
- Immobility, unable to obtain transport to/from the hospital, unable to access telephone at home, unaware of adverse symptoms

N.B Patients initially excluded for ambulatory care at presentation, can be reassessed after an initial period of at least 48-72 hours for early discharge if now clinically stable and assessed to be low risk.

➢ Radiological Investigation and Timing

Follow the pathway (algorithm) to request the most appropriate investigation.

For the ambulatory therapy programme to be effective it is important that there should be no undue delay in the diagnosis of the patients. **Definitive investigation should occur within 24 hours**, ideally on the same day.

VQ Scan:

Patient presenting within working hours Monday – Friday:

- VQ scan is available only Mon–Fri, with 2 slots available per day. A same day scan is usually possible if the request is made before 1 pm on the day.
- If same day VQ scan is not possible, a next day scan appointment is made. The patient is sent home with PE information leaflet, VQ scan appointment time, and an appointment time to be seen in Ambulatory Clinic following the scan.

Patient presenting outside of working hours Monday –Thursday:

- Attending clinician should book a next day ambulatory clinic appointment for 9.30am and leave the ambulatory care ICE referral form with completed PE proforma in the AEC tray. Patient is sent home with PE information leaflet to return next day. At 9.30am Ambulatory Consultant/SpR will review patient, and arrange appropriate scan after formal review of CXR with radiologist.

- If patient presents Friday evening or over the weekend, then a CTPA must be done, unless patient presents late on a Sunday, then VQ scan can be done on Monday – follow process as above.

CTPA:

- Within working hours, an immediate CTPA is often possible on level 2 CT scanner. Discuss with Radiology hot seat.

- Outside working hours, discuss with Radiologist On call :

If patient presents between 5 and 8 pm on Monday - Friday, CTPA may be possible if case has been reviewed by senior clinicians (Consultant or DMR) to ensure appropriate indication, and CT radiographer is available on site.

If patient presents after 8pm, arrange Ambulatory Clinic appointment in diary for 9.30 am, the following day. Patient should be sent home with PE information leaflet, and asked to return to AEC next day at 9.30 am. Ambulatory Care SpR/Consultant will review appropriateness of request with hot seat radiologist (including review of CXR), followed by early bird CTPA.

Over the weekend, CTPA will usually be done without delay.

➢ Post scan Review and Follow up

All patients must be reviewed by the Ambulatory Care Consultant of the day. Any patients seen in AEC over the weekend, should be discussed with the DMR or Medical Consultant on call

Negative Imaging:

Normal VQ scan and a CTPA (if good quality) reliably excludes PE.
An alternative diagnosis to explain symptoms should be made - refer back to GP or chest clinic if appropriate. If there is an incidental finding of a lung nodule, mass, or lymphadenopathy then an urgent respiratory review must be arranged. D/W Dr Kaiser or Resp SpR and refer to Respiratory Clinic.

In cases of discordant very high clinical probability of PE without an alternative cause for symptoms, further imaging may be indicated.
Discuss these discordant cases with Radiologists with an interest in PE imaging (Dr Marco Berovic, Sarah Howling) and a Respiratory Consultant (Dr Kaiser if available). If DVT is clinically suspected, then Doppler US should be performed initially.

Positive imaging:

Following confirmed diagnosis of PE, the exclusion criteria for ambulatory care checklist must be reviewed again by a senior clinician.

Patient will need admission if there is evidence of right heart strain, as evidenced by positive Troponin T, and/or features of right heart strain on CT. If subsequent ECHO excludes right heart dysfunction and patient is otherwise clinically stable, then early discharge can be considered

If no exclusion criteria are present, the patient is continued to be managed as ambulatory :

The attending clinician should prescribe 2 weeks supply of LMWH. Patient is taught to self inject by the ambulatory clinic nurse, otherwise patient will attend the Ambulatory Clinic or their GP surgery for daily tinzaparin injections until established on warfarin.

Patient is referred to the anticoagulation clinic for warfarin commencement.

The anticoagulation pharmacist is informed who will review the patient in AEC and provide warfarin counselling.

PE information leaflet (see Appendix 4) is provided with contact numbers to seek medical advice. Patient is advised to seek medical advice if they develop

worsening symptoms suggestive of recurrent thromboembolic events, or bleeding complications.

If patient has active cancer, they should continue LMWH only. The oncologist is informed about the new diagnosis of PE and proposed management plan.

A 1 week follow up appointment in AEC is made for clinical review, and referral made for Respiratory follow up at 3 months

If unprovoked (idiopathic) PE a focused malignancy screen is performed:

- Focused history/examination, including examination of external genitalia (in males) and breasts (females)
- Check Hb, Calcium, LFTS, PSA, Urinalysis
- In patients over 40 years, cosider CT Abdo/Pelvis and Mammogram

All patients with unprovoked PE should be referred to haematology for consideration of long term anticoagulation and selective thrombophilia screening if appropriate. A red top referral to haematology is made.

A letter is written to GP providing clinical details and proposed ambulatory management plan

➢ Dissemination and Implementation

Safe and efficient management of Pulmonary Embolus depends on collaboration and communication of clinicians from different specialities. The guideline will be circulated through the ambulatory care forum, and disseminated to all Emergency and Medical Staff. It will be electronically available on the intranet, and paper copies of the ambulatory pathway placed in ED and Ambulatory Clinic.

➢ Compliance monitoring (Audit and evaluation)

Data will be prospectively collected on all patients undergoing investigation and treatment on the ambulatory pathway. Regular audit will be conducted to evaluate effectivenenss of the pathway and adherence to the guideline. Initial audit is planned after 6 month pilot period. Additional training and support will be provided to staff as and when appropriate/required

➢ References

1. Aujesky D et al. Outpatient versus inpatient treatment for patients with acute pulmonary embolism : an international, open label, randomised, non inferiority trial. Lancet 2011 ; 387 : 41-48

2. Rowlinson JS et al. Ambulatory investigation and treatment of patients with suspected pulmonary embolism : a retrospective review of one year experience. J R Coll Physicians Edin 2006 ; 36 : 12-16

3. Janjua M et al. Treatment of acute PE as outpatients or following early discharge. A systematic review. Thromb Haemost 2008 ; 100 : 756-761

4. Davies C et al. Early discharge of patients with pulmonary embolism : a two phase observational study. Eur Resp J 2007 ; 30 : 708-714

5. Kovacs MJ et al. Outpatient treatment of Pulmonary Embolism with Dalteparin. Thromb Haemost 2000 ; 83 : 209-211

6. Kovacs MJ et al. Ambulatory management of pulmonary embolism : a pragmatic evaluation. Journal of Thromb and Haemost 2010 ; 8 : 2406-2411

7. Erkens PM et al. Safety of outpatient treatment in acute pulmonary embolism. Journal of Throb and Haemost 2010 ; 8 : 2412-2417

8. Aujesky D et al. Validation of a clinical prognostic model to identify low risk patients with pulmonary embolism. J of Int Medicine 2007 ; 261 : 597-604

9. Lankeit M et al. Highly sensitive troponin T assay in normotensive patients with pulmonary embolism. European Heart Journal 2010 ; 31 : 1836-1844

Appendix 1

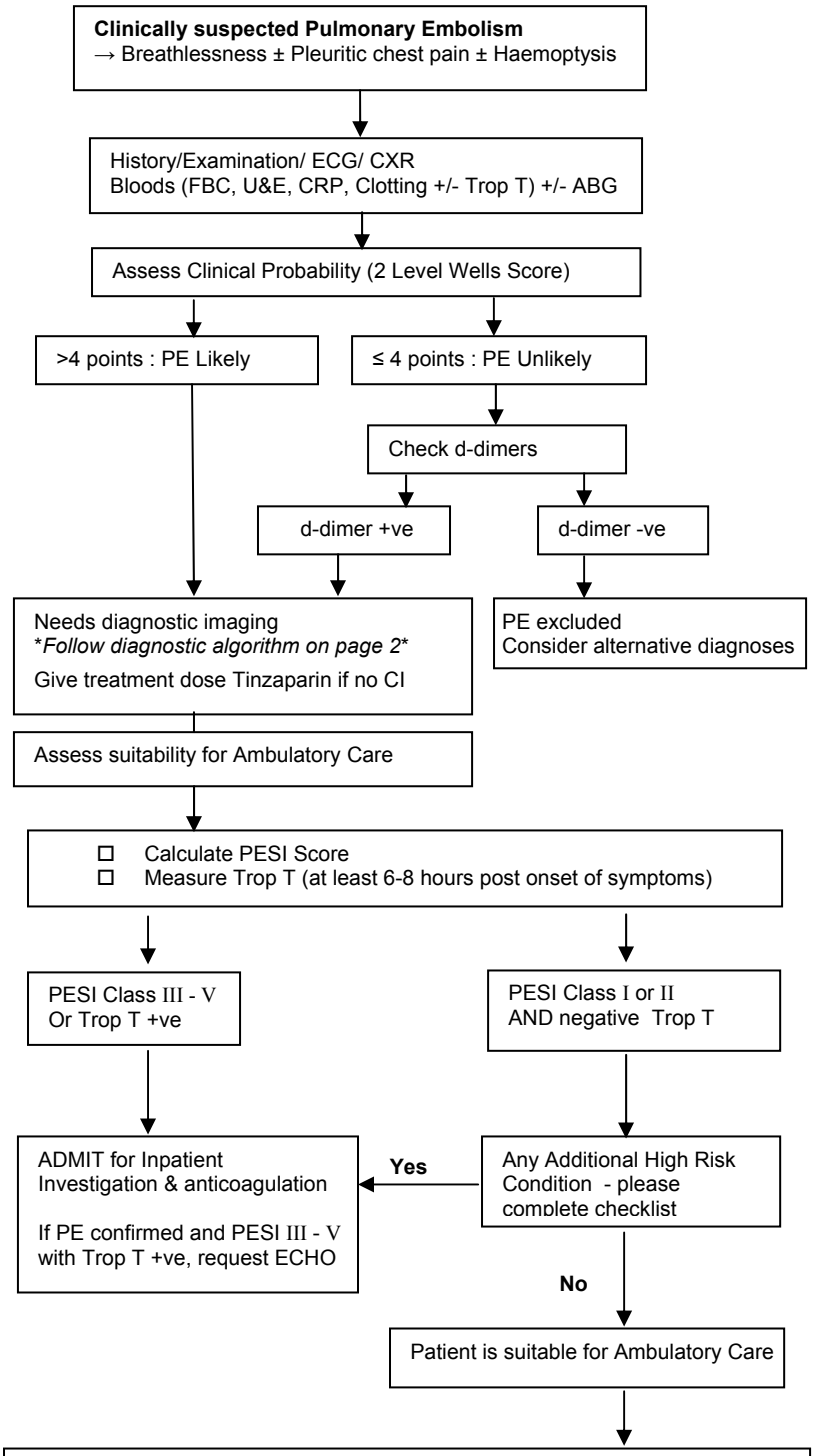
PULMONARY EMBOLISM AMBULATORY CARE - PRE SCAN PATHWAY

(Pathway applies to haemodynamically stable patients **only** and non pregnant patient)

Whittington Health NHS

Name……

Hosp No……**DOB**……



Give LMWH Heparin (if not already done so)

Arrange VQ Scan or CTPA (choice of test as per diagnostic algorithm page 2) :

Within working hours :→ **Same day scan preferable**

- If same day VQ not possible, arrange next day VQ scan appointment and post scan Ambulatory Clinic review appointment
- Provide patient information leaflet and discharge patient home to return next day for scan and review.

Out of hours :

- Book next day 9.30 am Ambulatory clinic appointment (at ED reception)
- Leave completed Ambulatory PE proforma, and Ambulatory care ICE referral form, in AEC Tray in ED reception.
- Provide patient info leaflet and discharge patient home to return next day
- At 9.30 am Ambulatory Consultant/SpR will review patient, formal radiologist review of CXR, and arrange appropriate scan

Wells Clinical Probability Score

Criteria	Score
Clinical signs of DVT	3
Alternative diagnosis les likely than PE	3
Immobilisation (>3 days) or surgery previous 4 weeks	1.5
Previous DVT or PE	1.5
HR > 100 /min	1.5
Haemoptysis	1
Active cancer	1
total	

Total score of > 4 points : PE likely
Total score of 4 points or less : PE unlikely

Pulmonary Embolism Severity Index (PESI)

Criteria	Scoring	Patients Score (score 0 if absent criteria)
Age	1 per year	
Male Sex	10	
Cancer	30	
Heart Failure	10	
Chronic lung disease	10	
Pulse > 110/min	20	
Systolic BP < 100 mmHg	30	
Resp Rate > 30/min	20	
Body Temp < 36C	20	
Altered mental state	60	
Oxygen Sats < 90% on air	20	
	total	

Low Risk	**Points**	**30 day mortality**
Class I	<65	0.7%
Class II	66-85	1.2%
Intermediate Risk		
Class III	86-105	4.8%
High Risk		
Class IV	106-125	13.6%
Class V	>125	24.5%

Additional High Risk Condition	Yes/No
SBP < 100mmHg, Persistent tachy >110/min	Y/N
O_2 Sats <94% on air, and/or RR > 24/min	Y/N
PE whilst on therapeutic anticoagulation	Y/N
Co-existing major proximal DVT	Y/N
High Bleeding Risk (discuss with Haematology): • Active Bleeding • Recent GI Bleed (within 2 weeks) • Recent Stroke (within 2 weeks) • Recent eye or CNS surgery (within 2 weeks) • Platelets < 75, or Coagulopathy	Y/N
Severe renal dysfunction (eGFR <20 ml/min)*	Y/N
Allergy to Heparin or Previous Heparin induced TCP	Y/N
Morbid Obesity (>150 kg)	Y/N
Compliance unlikely and social reasons for Ambulatory care being unfeasible : • alcoholic, homeless, IVDU • acute mental illness, cognitive impairment • immobility, unable to obtain transport to/from hospital, unable to access telephone at home, unaware of adverse symptoms	Y/N

*eGFR <20 ml/min – requires IV Heparin infusion
eGFR 20-30 ml/min – can manage as ambulatory with Tinzaparin, but requires antiXa monitoring

Clinician Name:.....**Signature**.....**Date**.....**designation**…….

Whittington Health NHS

PULMONARY EMBOLISM AMBULATORY CARE - POST SCAN PATHWAY

Name……

Hosp No……**DOB**……

VQ Scan / CTPA

Review by Ambulatory Care Consultant (Mon- Fri)
(Over weekend, Ambulatory Care doctor to discuss ALL cases with DMR or Medical Consultant)

Scan positive

Reassess if any Exclusion Criteria for Ambulatory Care

- ☐ PESI Class III - V
- ☐ Additional High Risk Condition
- ☐ Evidence of RV dysfunction/Strain (on CT or Echo)
- ☐ Evidence of myocardial injury (positive Troponin T)

IF ANY OF THE ABOVE

No

Continue Ambulatory Care

Daily LMWH (will require minimum 5 days treatment, doctor to prescribe 2 weeks supply)

- either teach patient to self inject or patient to attend Ambulatory Clinic or GP surgery daily

Contact anticoagulation pharmacist to provide warfarin counselling

Refer to Anticoagulation Clinic for warfarin loading and follow up

Active Cancer and PE – continue LMWH only. Inform oncologist

Yes

Inpatient Care

Continue anticoagulation with daily LMWH

Commence Warfarin loading (see dosing schedule in PE guideline), and continue LMWH minimum 5 days AND until INR in range for 2 consecutive days

Request ECHO if CT evidence of right heart strain or Trop T +ve with high risk PESI score.
All patients with Right Heart Strain at presentation will need repeat ECHO at 3 months and follow up - respiratory clinic OR cardiology clinic (if inpatient under cardiology)

Scan negative

PE Excluded
Consider Alternative diagnoses

N.B. d/w Thoracic Radiologist and Respiratory Consultant if discordant high clinical probability and no alternative diagnosis for symptoms – may need further imaging

Idiopathic PE and Malignancy Screening

- Focused history and full examination including breast exam in females and external genitalia in males
- Review CXR, Hb, Calcium, LFTs, PSA, Urinalysis
- Aged > 40 - Consider CT Abdo/Pelvis and Mammogram (in women)

Duration of Anticoagulation

Provoked PE : 6 months

Idiopathic PE : ≥6 months
Consider longer term. Individual risk assessment required. Refer to haematology

Recurrent PE : Lifelong. Target INR 2.5

Diagnostic Test Algorithm for Pulmonary Embolism

Contrast allergy Or severe renal impairment

Age < 40

CXR abnormal OR chronic respiratory disease

No

Yes

Age > 40

Any age and massive / submassive PE suspected (haemodynamically unstable and / or significant hypoxaemia)

VQ SCAN

CTPA

Clinician Name:……**Signature**……**Date**……**designation**……

TREATMENT

Exclusion Criteria for ambulatory care assessed and checklist completed ☐

Patient had baseline FBC, U&Es, LFTs, Clotting ☐

Patient weighed and Allergy status checked ☐

Consult dosage table (available in UCC or intranet) and **prescribe** ☐
Weight based dose of Tinzaparin (175 mg/kg) on **drug chart**

Patient Weight	Dose of Tinzaparin given	Volume of injection
kg	Units	ml

ORGANISING INVESTIGATION

All PE suspected cases should have been reviewed by a Consultant (ED, Medical or AEC of the day) or by DMR if out of hours ☐

All patients must have investigation **within 24 hours**. Request on Anglia ICE. ☐
Within working hours arrange VQ or CTPA (as per guidelines) via radiology hot seat :
→ Mon – Fri : same day scan if possible
→ Weekend (after Fri 5 pm) : CTPA only

Outside working hours (Mon – Fri after 5 pm) – Arrange next day AEC appt for 9.30am.
Patient returns next working day for Ambulatory SpR/Consultant review & scan.
Leave proforma and ambulatory care ICE referral form in AEC Tray ED reception

Discharge the patient from Emergency Dept/ Ambulatory Clinic with the following:

GP Letter ☐ PE Leaflet ☐ VQ/CTPA Appt (if able to) ☐ AEC Clinic Appt (diary at reception) ☐

FOLLOW UP

Monday – Friday: Patient returns to Ambulatory Care Clinic for **Consultant** Review :

If VQ/CTPA negative, PE is excluded. Consider alternative diagnosis ☐
(N.B. If discordant high clinical probability and no alternative cause for symptoms
- d/w with Resp Consultant (Dr Kaiser) and Radiology Consultant re need for further imaging

If VQ/CTPA positive, continue treatment. Minimum 5 days of Tinzaparin. ☐
(Will need admission if Trop T +ve, High risk PESI score or CT evidence of Right Heart Strain)

Referral to Anticoagulation Clinic for warfarin loading ☐

Arrange Ambulatory Clinic review at 1 week
and Respiratory clinic referral for review at 3 months ☐

If unprovoked PE – focused screening for malignancy, and referral to Haematology ☐

Clinician Name:.....**Signature**.....**Date**.....**designation……**

Whittington Health NHS

Further information

Please contact any of the following services:

Ambulatory care clinic (between 9am-8pm)
Tel: 020 7288 5940

Medical assessment unit (between 9am-8pm)
Tel: 020 7288 5051 / 5605 / 3766

Anticoagulant clinic (between 9am -5pm)
Tel: 020 7288 5390

Emergency department (24 hours)
Tel: 020 7288 5216 / 5100

NHS 111 urgent care service
Tel: 111

In the event of an emergency, please dial 999.

Whittington Health
Magdala Avenue
London
N19 5NF
Phone: 020 7272 3070

Date published: 01/09/2014
Review date: 01/09/2016
Ref: Icam/Rcm/Pem/01

Pulmonary embolism

A patient's guide

What is a pulmonary embolism?

A pulmonary embolism is a blood clot that becomes lodged in one or more of the blood vessels supplying the lungs.

It normally originates from a blood clot in the veins usually in the leg, called deep venous thrombosis (DVT). The original DVT may have caused pain, redness and swelling of the leg or may not have caused any obvious signs in the legs.

What are the symptoms of pulmonary embolism?

Symptoms vary according to the size and position of the clot. They can include:

- shortness of breath at rest or on exertion,
- chest pain, usually sharp knife-like and worse when breathing in deeply,
- coughing up small amounts of blood,
- rapid heartbeat, and
- dizziness or even collapsing when the blood clot happens.

Severe symptoms occur if there is a large clot near the centre of the lung, this is very serious.

Why might DVT or pulmonary embolism occur?

Sometimes a reason cannot be found, but the following have been identified as potential risk factors:

- a previous history of thrombosis,
- a period of reduced mobility e.g. after a surgical operation or major illness,
- pregnancy,
- recent trauma,
- a history of cancer ,
- blood clotting disorders which may be hereditary,
- contraceptive pill or hormone replacement therapy, and
- long-haul flights and travel.

If your symptoms get worse

If you experience any symptoms getting worse after you have gone home before the scan or following diagnosis of a pulmonary embolism, such as increased breathlessness, worsening chest pain, prolonged dizziness, or coughing up blood, please seek urgent medical advice and attend your nearest hospital.

You will be asked to attend the anticoagulation clinic regularly to monitor warfarin levels.

General advice including how to assist your recovery

- Pain relief
  Paracetamol is safe to take with warfarin. Aspirin and non-steroidal anti-inflammatory drugs such as ibuprofen, should be avoided, unless under the guidance of your doctor. These may interfere with your treatment.

- Other medication
  Always check with your GP or pharmacist before taking any medication, including herbal or alternative treatments. Some of your existing medication may need to be changed as it may interact with warfarin.

- Exercise and rest
  There is no need for complete rest whilst being treated for a pulmonary embolism. You may find that your physical activity is limited initially due to your symptoms. You are advised to carry on mild exercise as much as you can tolerate, but avoid long walks or heavy exercise such as gardening or attending the gym. Hopefully, you will be able to return to your normal lifestyle in time. When sitting, keep your legs elevated.

- Diet
  Eat a healthy balanced diet and drink plenty of fluid.

- Travel
  Long distance travel is not advisable for six weeks after your diagnosis. If you are planning to travel, discuss your plans with your doctor.

What tests will I need?

If your GP suspects you may have had a pulmonary embolism, you will be referred to our emergency department or ambulatory care centre (same day emergency treatment) for clinical assessment. This will involve an assessment with a doctor, blood tests, an electrocardiogram (ECG) and a chest x-ray. These tests will exclude other possible causes of your symptoms.

If the risk of a pulmonary embolism is low, the doctors can also do a blood test. A normal result usually rules out a pulmonary embolism.

The final test to diagnose or exclude a pulmonary embolism is a ventilation perfusion scan (VQ scan) or computed tomography pulmonary angiogram (CTPA). The doctor will decide which test is the most appropriate (see explanation below).

The VQ scan looks at blood and air flow to the lungs. Small amounts of substances called tracers are inhaled and injected that can be seen with a specially adapted camera. Firstly, you will inhale a tracer and pictures will be taken to show how air is flowing throughout the lungs.

Subsequently, an intravenous line (cannula) is inserted and a different tracer is injected. Then pictures are taken to look at blood flow. By comparing the two sets of images a doctor is able to see if blood flow has been obstructed to part of the lung.

A CTPA is a scan of the lungs and looks at the arteries in the lungs. In this test, you have contrast (dye) injected into one of your veins. The dye shows up on the scan and can show if any blood vessels are blocked.

Will I need to stay in hospital?

Scans are usually the same day. However, if you are being assessed in the late afternoon or evening, and your clinical condition is stable, doctors may arrange for you to have a dose of anticoagulant treatment (see below), and arrange for you to return the following day for your scan.

If the scan confirms a pulmonary embolism, you may be admitted to hospital for the first few days of treatment, usually between one and seven days. However, if your clinical condition is stable, and you are relatively well, you may be discharged home and safely treated as an outpatient at our ambulatory care centre. Your doctor will discuss this option with you.

Treatment

Anticoagulants or blood thinners are used to treat pulmonary embolism. Two types of medication are used, acting at different speeds to increase length of time for blood to clot. Initially, it is necessary for you to receive both treatments.

The medications used are:

- Low molecular weight heparin (called Tinzaparin) - given as a daily injection under the skin, for an average of five to seven days, this has a rapid effect.

- Warfarin - a long term treatment given in tablet form. It is started at the same time as the injection and takes a few days to take effect. To begin with, you will need frequent blood tests to monitor the warfarin level. Your warfarin levels will be monitored by the anticoagulation service.

Treatment with these drugs will prevent the existing clot from becoming any larger and prevent any further clots from forming. The existing clot will dissolve naturally over a period of weeks, therefore, do not expect instant relief once your treatment starts.

We can teach you or any of your family members how to self-inject the Tinzaparin injections, which you can then receive daily at home. Otherwise, you will have to attend the ambulatory care centre or your GP surgery daily to receive your injections.

What are the potential side effects of anticoagulants?

Anticoagulants thin the blood and therefore increase the risk of bleeding. Be extra careful when shaving or using sharp objects.

If you experience any of the following, you must seek urgent medical advice, and contact your GP immediately:

- blood in your bowel motions or urine,
- coughing or vomiting blood,
- heavy or persistent nosebleeds, and
- unexplained bruising.

There are some medications, such as aspirin, which cannot be taken with warfarin.Some herbal medication and food types also interact with certain anticoagulants. Your doctor or specialist will advise you on these.

How long will I be on anticoagulants?

You will need anticoagulant medication for at least three to six months. You may require treatment for a longer period, which your haematologist will discuss with you.

What follow up will I need?

In a small proportion of patients, the blood clot is large which puts a strain on the heart. In most cases this resolves over time. You will be seen again by a respiratory specialist and will need a repeat scan of the heart.

To be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1.	**Does the procedural document affect one group less or more favourably than another on the basis of:**		
	• Race	No	
	• Ethnic origins (including gypsies and travellers)	No	
	• Nationality	No	
	• Gender	No	
	• Culture	No	
	• Religion or belief	No	
	• Sexual orientation including lesbian, gay and bisexual people	No	
	• Age	No	
	• Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
2.	**Is there any evidence that some groups are affected differently?**	No	
3.	**If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?**	No	
4.	**Is the impact of the procedural document likely to be negative?**	No	
5.	**If so can the impact be avoided?**	N/A	
6.	**What alternatives are there to achieving the procedural document without the impact?**	N/A	
7.	**Can we reduce the impact by taking different action?**	N/A	

If you have identified a potential discriminatory impact of this procedural document, please refer it to the Director of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	Yes/No	Comments
1.	**Title**		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	**Rationale**		
	Are reasons for development of the document stated?	Yes	
3.	**Development Process**		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	
4.	**Content**		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
5.	**Evidence Base**		
	Are key references cited in full?	Yes	
	Are supporting documents referenced?	Yes	
6.	**Approval**		
	Does the document identify which committee/ group will approve it?	Yes	
7.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	Yes	
8.	**Document Control**		
	Does the document identify where it will be held?	Yes	
9.	**Process to Monitor Compliance and Effectiveness**		
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	

	Title of document being reviewed:	Yes/No	Comments
10.	**Review Date**		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
11.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation and review of the document?	Yes	

Executive Sponsor Approval			
If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval			
Name		Date	
Signature			
Relevant Committee Approval			
The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.			
Name	Phillipa Davies	Date	
Signature			
Responsible Committee Approval – only applies to reviewed procedural documents with minor changes			
The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee			
Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

Tool to Develop Monitoring Arrangements for Policies and guidelines

What key element(s) need(s) monitoring as per local approved policy or guidance?	Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.	What tool will be used to monitor/check/observe/Assess/inspect/ authenticate that everything is working according to this key element from the approved policy?	How often is the need to monitor each element? How often is the need complete a report ? How often is the need to share the report?	What committee will the completed report go to?
Element to be monitored	**Lead**	**Tool**	**Frequency**	**Reporting arrangements**
Investigation & management of PE (all content)	Respiratory & Haematology consultants	Adherence to guideline via the use of clinical audit	Initial audit of all cases after a 2 year period (following publication of the guideline)	Respiratory departmental meetings, escalated to ICAM divisional board if appropriate