Worcestershire Acute Hospitals NHS Trust

Guideline for the Management of Venous Thromboembolism Including the management of patients receiving low molecular weight heparin

This guidance does not override the individual responsibility of health professionals to make an appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

1.0 INTRODUCTION

Venous thromboembolism (VTE), manifested as deep vein thrombosis (DVT) and pulmonary embolism (PE), is a major cause of morbidity and mortality. VTE presents with a broad range of clinical signs and symptoms, from asymptomatic calf vein thrombosis to life-threatening, acute, massive PE. Important changes in prevention and treatment of VTE have occurred over the last few years and have been reflected in local, national and international guidelines. This guideline covers the management of adult patients with venous thromboembolism of the leg (patients with upper limb embolisms should be referred for vascular input).

For VTE occurring in pregnancy refer to:
Guidelines for the treatment of venous thromboembolism occurring in pregnancy (2019) WAHT-TP-094.
For thromboprophylaxis and risk assessment refer to:

- Venous Thromboembolism (VTE) risk assessment all patients >16
- NICE Guidance NG89: Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism.

For thromboprophylaxis and monitoring in COVID-19 patients, refer to:

- Coagulopathy in COVID-19: Recommendations for Laboratory Testing and Thromboprophylaxis (2021) WAHT-HAE-032

THIS GUIDELINE IS FOR USE BY THE FOLLOWING STAFF GROUPS:
This guideline is designed for use by clinical and nursing staff managing patients who have symptoms suggesting VTE or diagnosed with VTE.

Education and Training
Education and training for Clinical staff using this guideline is gained during professional education and training, it is the responsibility of all individuals to maintain their professional accountability, ensure they are up to date and maintain knowledge and skills in all aspects of thrombosis management.

This guideline also covers the use of low molecular weight heparin (LMWH), and it applies to all health professionals who are involved with initiating, prescribing, administering, monitoring and dosing injectable LMWH anticoagulant therapy.

Lead Clinician(s)

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Approved by Haematology Directorate Governance:	23rd November 2022
Approved by Trust Thrombosis Committee on:	13th January 2023
Approved by Medicines Safety Committee:	8th February 2023
Review Date: This is the most current document and is to be used until a revised version is available	8th February 2026

Key amendments to the guideline:

Date	Amendment	By:
10/04/2012	D Dimer result amended according to laboratory changes. Monitoring audit tool amended	Dr Crowther L Hancox
25/08/2012	Cut off of pre-test score for allowing d-dimer to be used changed from 0 to 1.	M Crowther
25/08/2012	For both DVT and PE instructions on how to request a d-dimer, how to request imaging, roles and responsibilities and ideal timescales is added.	M Crowther
25/08/2012	Suggested follow-up investigations for GPs are added	M Crowther
18/12/2012	Suggested rules for rescanning patients with possible DVT changes	M Crowther U Udeshi
18/12/2012	Reminder for those discharging patients on LMWH to provide sharps box	M Crowther
18/12/2012	Removed need to monitor platelet count for those on LMWH	M Crowther
24/01/2014	Re-write to include the use of rivaroxaban	M Crowther
15/09/2017	Re-write to include changes to the licensed dose of enoxaparin	M. Crowther
05/12/17	Sentence added in at the request of the Coroner	
01/03/2021	Document extended as per Trust agreement 11.02.2021.	
21/04/22	Alignment of DVT/PE diagnosis/screening with NICE guidelines.	R.Power
	Alignment of DVT/PE management with NICE guidelines (including the addition of DOACs as a suitable option with thrombosis and cancer and removal of the recommendation to supply every patient with compression stockings post VTE).	
	Management of ambulatory patients section updated.	
	Management of superficial thrombophlebitis section updated to reflect current guidance	

	Clarification of D-dimer with anticoagulation.	
	Thrombosis and Cancer section re-written to align with NICE guidelines (including the addition of DOACs as suitable options in some patient groups)	
	Use of eGFR removed throughout guideline and replaced with CrCl	
	Use of the brand Clexane removed and replaced with our current brand of Enoxaparin Inhixa	
	Monitoring requirements of LMWH updated to include Anti-Factor Xa monitoring in certain patient groups	
	Addition of a Protocol for thrombolysis in massive / high risk PE into Appendix 3	
	Re-wording of DVT/PE information sheets	
	Addition of References in Section 6.0	

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2.0 PURPOSE OF THE GUIDELINE

The purpose of this guideline is to provide good practice guidance for staff managing patients with venous thromboembolism (VTE). This guideline must be used in conjunction with a clinical assessment and other national and local guidelines, policies and procedures.

Priority Aims:

1. Improve accurate diagnosis and prompt treatment of venous thromboembolism (VTE).
2. Prevent progression or recurrence of thromboembolic disease.
3. Reduce the risk of complications from anticoagulation therapy.
4. Improve the safety by reducing the likelihood of patient harm associated with the use of anticoagulation therapy.

3.0 DETAILS OF GUIDELINE

This guideline covers patients admitted to Worcestershire Acute Hospitals NHS Trust with diagnosis or symptoms of VTE. It highlights the safe management of anticoagulation therapy and the importance of prompt treatment in patients receiving LMWH.

3.1 Scope and Target Population

Adult patients age 18 and over with VTE, excluding those with familial bleeding disorders or pregnancy.

3.2 Deep vein thrombosis (DVT)

3.2.1 Clinical features of a DVT

A diagnosis of DVT is usually suspected in patients who complain of a painful swollen limb. However, the clinical picture can vary widely and no clinical feature is sufficiently specific to be diagnostic. Less than a third of patients referred for tests, after initial history and clinical examination, have a DVT. Clinical diagnosis is notoriously difficult.

Common Presenting Features:

- Pain or tenderness of the leg
- Swelling of calf or leg
- Pitting oedema
- Palpable venous thrombosis
- Increased temperature in the leg
- Fever
- Discoloration or erythema of the leg
- Venous distension

3.2.2 Diagnosis of DVT

Patients suspected of having a DVT should have a pre-test probability score performed. This consists of scoring points if a clinical feature is present; the score is added at the end:

3.2.2.1 Pre-test probability scoring for DVT

Clinical feature	Score
Active cancer (treatment ongoing or within previous 6 months or palliative)	1
Paralysis, paresis, or recent plaster immobilisation of the lower extremities	1
Recently bedridden for more than 3 days or major surgery within 12 weeks requiring general or local anaesthesia	1
Localised tenderness along the distribution of the deep venous system	1
Entire leg swollen	1
Calf swelling by more than 3cm when compared with the asymptomatic leg (measured 10cm below tibial tuberosity)	1
Pitting oedema (greater in the symptomatic leg)	1
Collateral superficial veins (non-varicose)	1
Previous documented DVT	1
Alternative diagnosis as likely or greater than that of a DVT	-2

3.2.2.2 D-dimers

If the score is one or less a D-dimer should be performed, if this is negative then a DVT can be excluded at this point. If the D-dimer is positive the patient should be referred for imaging.

If the score is two or more the patient should be referred for imaging without having a D-dimer performed.

Patients on anticoagulation (this excludes prophylactic doses of LMWH) may have falsely low D-Dimers. These patients should progress straight to imaging without performing D-Dimer.

D-dimers are requested through the ICE OrderComms system, they require a single sodium citrate tube and are sent to haematology. The average turnaround time for a D-dimer, from arrival at the laboratory, is one hour. D-dimer requests require a pre-test score written on the form. D-dimers will be reported as positive or negative. It is the requester's responsibility to chase the result on the ICE system as the result is not routinely telephoned. The haematology laboratory is CPA accredited and takes part in internal and external quality control therefore all D-dimer results can be assumed to be accurate enough on which to base clinical practice.

3.2.2.3 Ultrasound Scan

Ultrasound scan (USS) has become the investigation of choice in the diagnosis of DVT. It will detect more than 90% of proximal DVTs (i.e. popliteal vein and above). It is less sensitive for calf vein thrombosis (about only 50% are detected) but pulmonary embolism from this site is rare and unlikely to cause significant haemodynamic disturbance even if it occurs.

Urgent ultrasounds can be requested by discussing the case with the ultrasound radiologist/radiographer and by completing the form on ICE OrderComms. Less urgent scans can be requested on ICE OrderComms. The ultrasound report will appear on the ICE system shortly after the scan has been performed (within 1 hour) or written in the patient notes. It is

the requester's role to check for the result, it will not be routinely telephoned. All sonographers/radiologists performing ultrasound scans are appropriately trained.

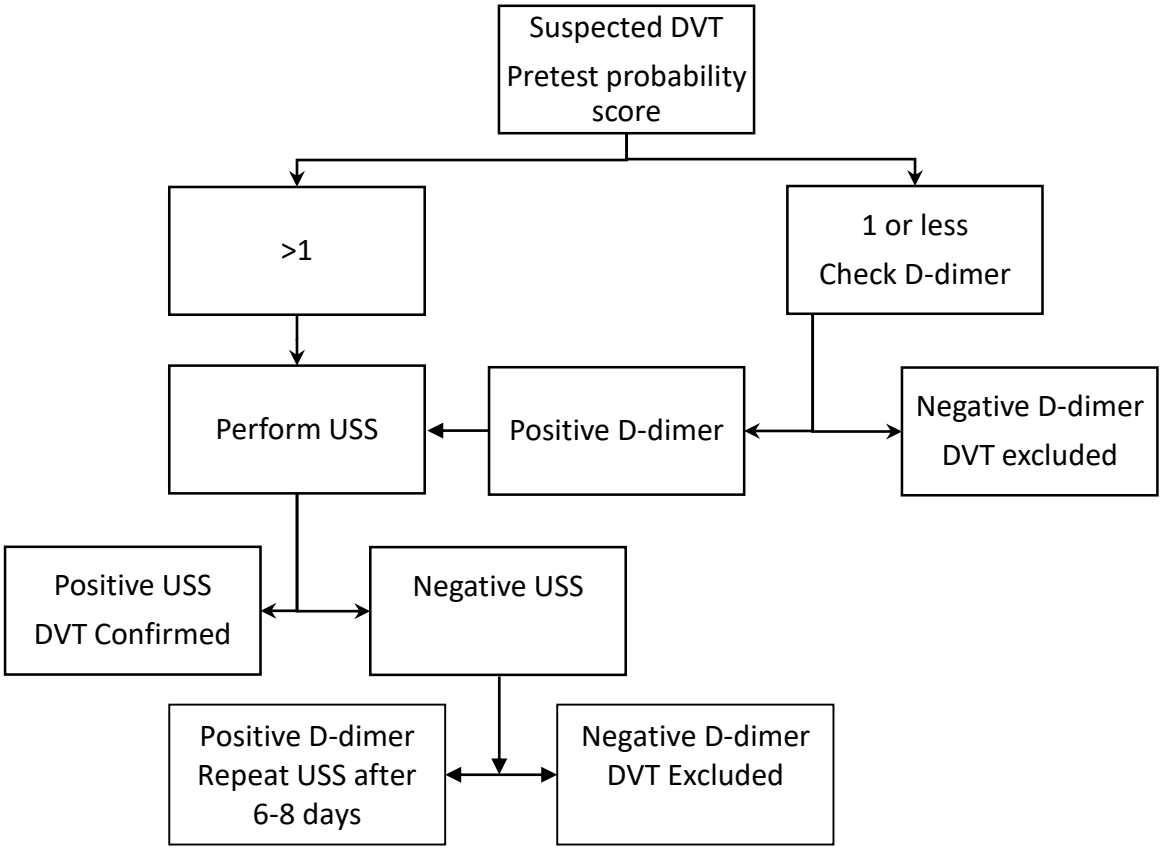
All patients with a suspected DVT, a negative ultrasound scan and no other explanation for their symptoms should have a D-Dimer test performed.

- If D-Dimer is positive, a repeat ultrasound scan should be performed after 6-8 days.
- If D-Dimer is negative, then DVT is unlikely.

If DVT is excluded, patients should be educated on signs and symptoms of DVT and when to seek medical advice.

Patients with borderline scans or scans which demonstrate clot(s) that cannot be aged should be considered for a venogram.

3.2.2.4 DVT Flow Chart



Patients who are to be referred for scanning should start treatment dose anticoagulation (as long as there are no exclusions) if the scan is likely to be more than 4 hours distant or there are significant symptoms. The anticoagulation can be stopped if the scan is negative, but they should be assessed for thromboprophylaxis if they are an inpatient. Anticoagulation can be either treatment dose low molecular weight heparin (LMWH) or a Direct Oral Anticoagulant Drug (DOAC) (the choice is discussed below in section 3.2.3). The results of all investigations which change management should be documented in the notes.

3.2.2.5 Ambulatory patients

Patients who do not meet the following criteria may be discharged home on anticoagulation while awaiting imaging:

- Patient where adherence to therapy/follow-up would be difficult.
- Those with inadequate social support at home.
- Patient with active bleeding / at high risk of bleeding e.g. those with:
  - Recent stroke
  - Previous haemorrhagic stroke proven on CT scan
  - Acute gastric or duodenal ulceration
  - Familial or acquired bleeding disorders
  - Recent head trauma or brain surgery
  - Patients with excessive alcohol consumption
  - Cancer patients with an associated high risk of bleeding
- Patients with severe hepatic failure or renal failure
- Patients with uncontrolled hypertension
- Any patient with possible pulmonary embolism (see ambulatory PE management)
- Patients with previous history of Heparin Induced Thrombocytopaenia (HIT) where the use of a DOAC is inappropriate/contraindicated.
- Patients requiring more aggressive investigation or management e.g. Thrombolysis

It is the clinician's responsibility to ensure that the patient has been fully informed of the likely diagnosis and follow-up arrangements.
The patient should be given 'DVT Information Sheet 1 – Suspected DVT'.
TTO packs of Enoxaparin and DOACs (Apixaban & Rivaroxaban) are available to facilitate discharge.

3.2.2.6 Timescales

Patients with a suspected DVT should be initially risk assessed. If a D-dimer is appropriate this should be taken within 1 hour and before any anticoagulation is given. The patient should be informed of the result, and the further plan, within 4 hours of the D-dimer being taken. If the patient requires imaging then they should be informed of the likely time for the scan and whether they require treatment with anticoagulation. The scan should be no more than 24 hours from the time of requesting. The patient should be informed of the result of the scan within 4 hours of the scan. The time of all patient contact events should be recorded in the notes.

These steps should only be performed by a doctor, nurse practitioner or a nurse from the DVT clinic apart from the D-dimer which can be taken by a trained phlebotomist. The patient should be initially assessed in hospital, the patient should only be sent home if a DVT has been excluded or diagnosed or they are awaiting imaging and have been treated with anticoagulation. The results of investigations should be given to the patient in hospital in person by the doctor, nurse practitioner or a nurse from the DVT clinic. The time of all patient contacts should be documented in the patient's notes.

Where the patient's care is referred to another department for further investigation/ management it is assumed that, on accepting the patient, the department will continue to follow the appropriate pathway and arrange all further investigations/treatments/referrals.

3.2.2.7 Information Sheets

The following information sheets are available for patients and should be used:

- DVT Information Sheet 1 – Suspected DVT
- DVT Information Sheet 2 – Confirmed DVT
- DVT Information Sheet 3 – No DVT

3.2.3 Treatment of DVT

The treatment of DVT is either with:

- A DOAC*
- LMWH alone (treatment guidelines below)
- LMWH or Unfractionated Heparin (UFH) converting to warfarin (The LMWH/UFH must be continued for at least five days and until warfarin is therapeutic for 2 days).

*Note: If Edoxaban and Dabigatran are considered as appropriate options, then at least 5 days of LMWH is required prior to initiation.

Patients discharged without pharmacy involvement (where appropriate) should be given a TTO pack of either Enoxaparin or a DOAC (Apixaban or Rivaroxaban) and asked to attend their GP for further supplies. If they are being started on warfarin then an appointment at either the hospital or a community anticoagulation clinic should be made and the warfarin started only on the advice of that clinic.

The duration of anticoagulation is determined by the risk of recurrence and the risk of bleeding, this is individual to the patient but as a guide:

- Provoked DVT (oestrogen containing pill, hormone replacement, post-surgery or limb immobilisation) – 3 months (or longer if provoking factor still present)
- Unprovoked proximal DVT – Initially 3 months, then discuss risks/benefits of long-term anticoagulation with the patient. Those with a low risk of bleeding are likely to benefit from prolonged anticoagulation*
- Antiphospholipid syndrome - Consider lifelong anticoagulation (Note: DOACs are contraindicated with these patients)
- Intravenous catheter associated thrombosis – 6 weeks
- Calf DVT – 3 months
- Intravenous drug abuser who is actively injecting into the affected leg – 6 weeks
- Cancer associated thrombosis – Usually treated for 6 months and then continued until the cancer is in remission (*see section on cancer associated thrombosis below).*

*Patients where continued use of anticoagulation would be favourable but is inappropriate e.g. due to high risk of bleeding should be discussed with haematology.

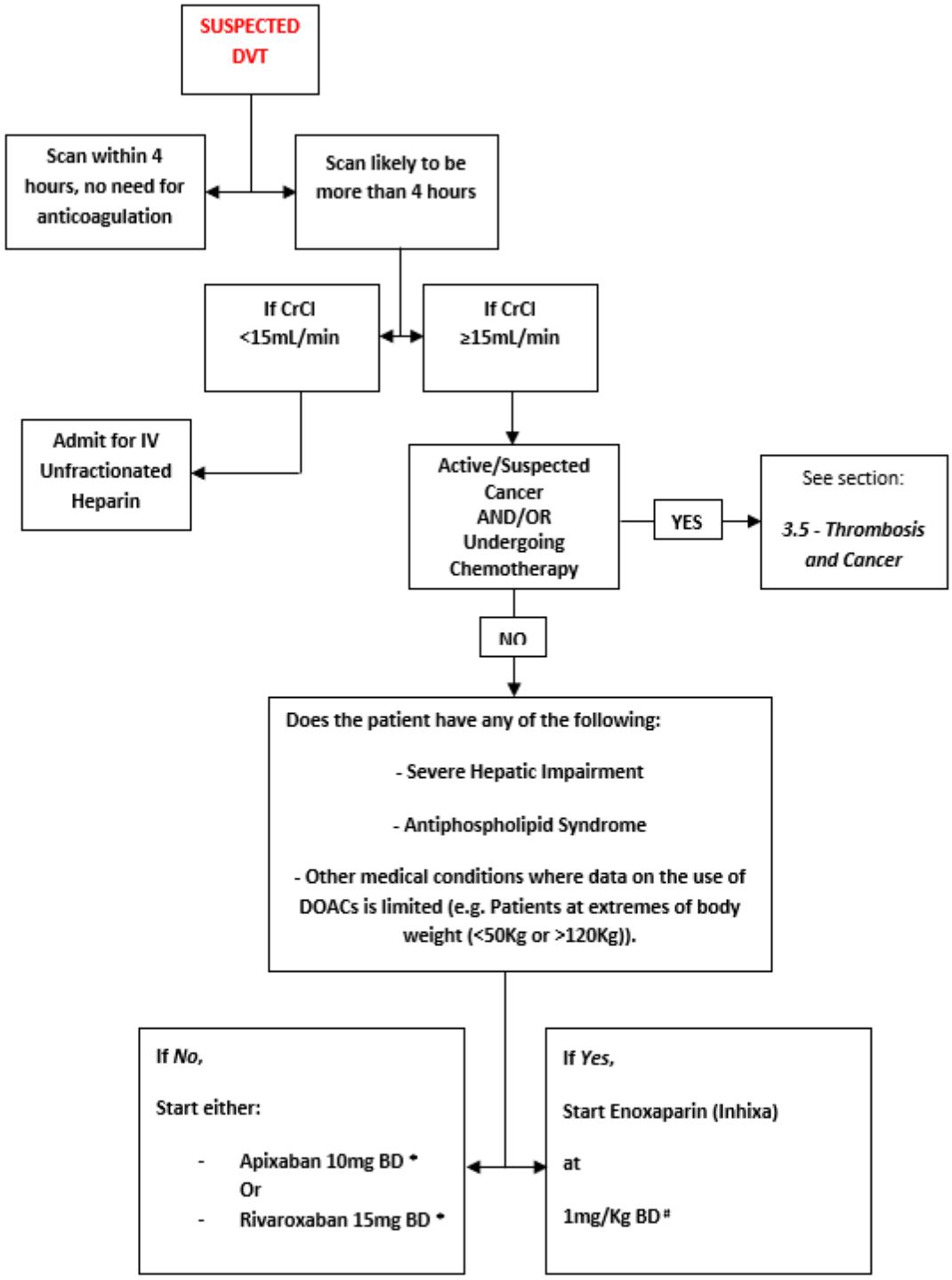
The patient should be fully counselled on the risk associated with anticoagulation and what to do if they occur e.g. bleeding. They should also be counselled on the signs/symptoms of recurrence to report and what high risk actions to avoid (prolonged immobility without prophylaxis, oestrogen containing medications). Advise them to always inform medical staff of their past medical history if they become pregnant, attend hospital or undergo any medical/surgical interventions (including dental procedures). First degree female relatives of patients with unprovoked DVT should be advised to avoid oestrogen containing medications.

3.2.3.1 Compression stockings

Routine use of stockings is no longer recommended by NICE to prevent post thrombotic syndrome or VTE recurrence after a DVT. However they may be considered for the management of leg symptoms following a DVT (e.g. pain, oedema, and residual venous obstruction).

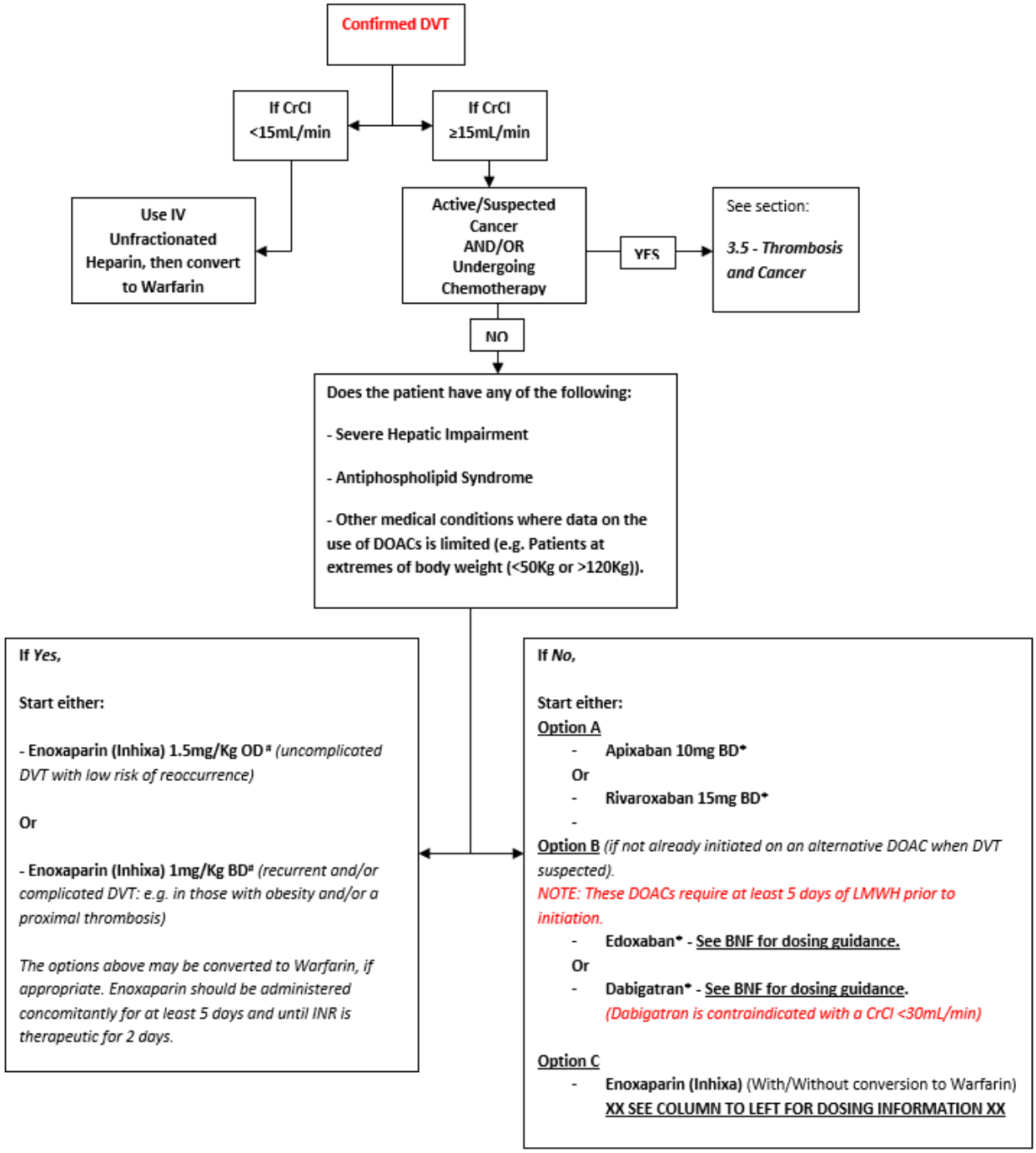
3.2.3.2 Treatment options for DVT

The choice of the most appropriate treatment is a decision between the clinician and the patient. For the majority of patients there is no clearly superior product. Treatment suggestions are found in the figure below.



For CrCl 15-29mL/min use Enoxaparin at a dose of 1mg/Kg OD

* See BNF and/or SPC for contraindications/interaction



For CrCl 15-29mL/min use Enoxaparin at a dose of 1mg/Kg OD

* See BNF and/or SPC for contraindications/interaction and full dosing schedule

For those patients who are to be considered for a DOAC (Apixaban, Dabigatran, Edoxaban and Rivaroxaban) a discussion between the patient and the prescriber is required.
Patients likely to benefit most from warfarin include those with:

- An indication not covered by a DOAC e.g. valvular AF, prosthetic valves, antiphospholipid syndrome
- Severe renal failure or high chance of significant deterioration (Apixaban, Edoxaban and Rivaroxaban should be avoided in patients with a CrCl of <15mL/min and Dabigatran if CrCl <30mL/min (See individual monographs in BNF for further guidance surrounding renal impairment)
- Hepatic dysfunction
- Arterial grafts
- Patient concerns over long term safety data
- Concomitant use of other medicines which interact with DOACs
- Other medical conditions where data on the use of DOACs is limited (e.g. Patients at extremes of body weight (<50Kg or >120Kg)).
- Use of unusual drugs where experience of them alongside DOACs is limited

There may be more benefit to treatment of DVT/PE with a DOAC compared to AF as the majority of patients are treated for a short period of time, therefore long term side-effects are less of a problem. Also the highest risk of bleeding on warfarin is in the first three months and that is when the majority of blood tests are.
Patient likely to benefit most from DOAC:

- Regularly prescribed drugs that interferes with warfarin e.g. COPD patient with multiple courses of antibiotics
- Difficulty attending INR clinics (personal or medical reasons)
- Needle phobic patients

Likely poor compliance is not a reason for choosing a DOAC, the relative short half-life means missed doses leaves the patients without anticoagulation until the next dose is taken, the relative long half-life of warfarin means an occasional missed dose is unlikely to affect the INR.

3.2.3.3 Thrombolysis for DVT

Thrombolysis leads to more rapid clot breakdown and a lower rate of post-phlebitic syndrome however it comes with the increased risk of bleeding and possibly death. Thrombolysis should be limited to patients who:

- Have a low risk of bleeding
- Have a life-expectancy >1 year
- Have a good performance status

And have one or more of the following:

- Bilateral DVT
- DVT extends as far as renal veins causing renal dysfunction
- Significant thrombosis causing whole leg swelling and significant pain
- The viability of the leg is compromised

Thrombolysis should be performed with the cooperation of the vascular surgeons and/or the interventional radiologists. If thrombolysis is to be considered then UFH should be used initially instead of either LMWH or a DOAC. Once thrombolysis is complete the patient can then be converted to LMWH or a DOAC.

3.2.3.4 Inferior vena cava filters

Inferior vena cava filters prevent the embolism of clots from the lower limbs to the lungs. They can however become thrombosed and may migrate to the lungs. Inferior vena cava filters should only be considered if there is a contra-indication to anticoagulation e.g. recent haemorrhage or requirement of emergency surgery. They should be ideally removed once full dose anticoagulation has been reinstated.

3.2.3.5 Recommended follow-up of DVT patients

Follow-up is usually with the GP. The following is a suggested follow-up regimen:

Diagnosis	Ensure patient understands condition and treatment. Alert patient to what signs/symptoms should prompt them to contact medical services.
1 week	Ensure patient understands condition and treatment. Alert patient to what signs/symptoms should prompt them to contact medical services. Consider further investigations if symptoms not improving.
4 weeks	Symptoms should be much improved/gone, consider further investigations if symptoms not improved. Ensure compliance. Patients with line associated and IVDU thrombosis should be advised to stop after six weeks if symptoms resolved. Consideration should be given to prophylaxis if indwelling line present.
8 weeks	Check patients have no problems
3 months (or after 6 months in those with cancer associated thrombosis)	Provoked event (post-surgery, oestrogen therapy, pregnancy, plaster cast, long haul flight etc.) - Stop anticoagulation if provoking factor removed (if not consider prophylaxis). Encourage patient to present if recurrence of symptoms. Unprovoked DVT – After three months of therapy discuss the risks/benefits of long-term anticoagulation with the patient. Those with a low risk of bleeding are likely to benefit from prolonged anticoagulation. (Where continued use of anticoagulation would be favourable but is inappropriate e.g. due to high risk of bleeding, haematology input should be sought). For those stopping anticoagulation a lupus anticoagulant and anticardiolipin antibodies should be checked 1 week after stopping anticoagulation and if positive referred to haematology. Encourage patient to present if recurrence of symptoms. **All patients continuing anticoagulation – ensure compliance, determine any signs or symptoms of thrombosis or anticoagulation.**
6 monthly for those still on anticoagulation	Ensure compliance and determine any suggestion or recurrence or problems with the anticoagulation. If there are problems with the anticoagulants then consideration should be given to changing them or stopping. U&E's should be checked annually for those with a normal renal function and 6 monthly for those with abnormal renal function.

3.2.3.6 Recurrent DVT

Symptoms of recurrent DVT should be investigated as in section 3.2.2 above. Confirmed recurrent DVT should be managed as follows:

- Recurrence when not receiving anticoagulation – treat as described in 3.2.3
- Recurrence when receiving anticoagulation (once poor compliance and other contributing factors e.g. drug interactions are excluded) – if being treated with warfarin (target INR 2.5) and patient within target range when recurrence happened consider increasing target INR to 3.5, if being treated with LMWH or a DOAC consider changing to warfarin with target INR 3.5, if being treated with warfarin target INR 3.5 and within range options are changing to or adding LMWH or adding aspirin (this should be discussed with haematology).

3.3 Thrombophlebitis

Superficial phlebitis is inflammation of a superficial vein while the term superficial thrombophlebitis is used when there is also clot present. Suppurative (thrombo)phlebitis is where there is bacterial infection of the vein and surrounding tissue. Superficial phlebitis is common with predisposing factors being venous catheters, malignancy, varicose veins, trauma, ablation surgery and thrombophilia.

The majority of cases of superficial phlebitis are benign and self-limiting but it is important that both coexisting deep vein thrombosis and suppurative phlebitis are excluded as these require treatment to prevent serious complications.

3.3.1 Diagnosis of Thrombophlebitis

Superficial phlebitis presents as pain, tenderness, induration and swelling along the course of a superficial vein. The vein itself will often be palpable as a thickened cord. There may be a mild pyrexia.

A clinical diagnosis of superficial phlebitis can be made if the above is present and the swelling and erythema does not extend for more than 5cm from the vein.

Suppurative phlebitis should be considered if there is a high fever, fluctuant swelling and/or erythema spreading for more than 5cm from the vein. Investigations may reveal raised inflammatory markers with a high ESR and CRP. Suppurative phlebitis is usually associated with previous cannulation or puncture of the vein.

Deep vein thrombosis (DVT) should be excluded with Doppler ultrasound scanning if there is either:-

- Risk factors for DVT (a past or family history of thrombosis, recent long-haul travel, immobility, malignancy, pregnancy, oral contraceptive or hormone replacement therapy use)
- Affecting the great or lesser saphenous vein
- Limb swelling
- The diagnosis is not clear.

If a DVT is suspected and the scan is likely to be more than 4 hours later then treatment dose Enoxaparin can be given subcutaneously (*See BNF for appropriate dose adjustments and contraindications*).

Ultrasound scanning should determine if there is clot present in either the superficial or deep veins. The scan may demonstrate other causes of symptoms or if there is a collection of pus. Because of the confusion when the term superficial femoral vein is used, which is a deep vein, care should be taken when reading the report. Where clot is demonstrated in a superficial vein a diagnosis of superficial thrombophlebitis can be made.

3.3.2 Treatment of superficial phlebitis

IF AT ANY TIME A PATIENT WITH SUPERFICIAL PHLEBITIS HAS EVIDENCE OF CLOT IN A DEEP VEIN THEN THIS SHOULD BE TREATED AS A DEEP VEIN THROMBOSIS.

Clinically diagnosed superficial phlebitis
Treatment of clinically diagnosed superficial phlebitis should be with symptomatic with pain relief, anti-inflammatory medications (unless there are contra-indications) and compression stockings. The patient should be counselled that symptoms may persist for several weeks but that they must present to medical services if there is failure to improve or progression of their symptoms. The patient should be reassessed after seven days to ensure that there have not been any significant changes.

Superficial thrombophlebitis
Superficial thrombophlebitis can be split into:-

- Clot lying >3cm of a junction with a deep vein and ≥5cm long. This requires treatment with subcutaneous Fondaparinux 2.5mg once a day for 6 weeks, provided there are no contra-indications (Enoxaparin 40mg once a day or Rivaroxaban 10mg once a day may be considered as alternatives – use would be off-label for this indication). See BNF for appropriate dose adjustments and contraindications for.
  If there are contra-indications to anticoagulation then a referral should be made to vascular surgery for tying off of the vein. The scan should be repeated after seven days to ensure there hasn't been progression. The patient should be encouraged to represent if there is worsening of symptoms.
- Clot lying >3cm from a junction with a deep vein and <5cm long. This is managed as clinically diagnosed superficial phlebitis. If there is progression/high risk of progression and/or severe symptoms then anticoagulation, as above, should be initiated. The patient should be encouraged to re-present if there is worsening of symptoms.
- Clot lying ≤3cm of a junction with a deep vein: **Treat as a DVT**.

Suppurative phlebitis
Suppurative phlebitis should be treated with antibiotics. Before starting antibiotics blood cultures should be taken. Any exudates from the wound should also be swabbed.
Surgical drainage should be considered where there are either systemic symptoms, severe pain or a fluctuant mass. Any puncture wound should be kept clean and dry.

Recurrent episodes of thrombophlebitis
Recurrent episodes should be referred to the vascular surgery for consideration of surgical intervention.

3.4 Pulmonary embolus

A PE is obstruction of the pulmonary artery or one of its branches by an embolus. The embolus usually is a blood clot developing in a deep vein.

3.4.1 Signs & Symptoms

Dyspnoea
Pleuritic chest pain
Sub sternal chest pain
Cough
Haemoptysis
Syncope
Tachypnoea (≥20breaths/min)
Tachycardia (>100beats/min)
Signs of DVT
Cyanosis
Pyrexia
Pulseless electrical activity

3.4.2 Diagnosis of a PE

All patients with possible PE should have clinical probability assessed and documented. An alternative clinical explanation should always be considered at presentation and sought when PE is excluded. Baseline investigations should include full blood count (FBC), clotting screen, electrolytes and creatinine, liver function tests, glucose, arterial blood gases (ABG), ECG and Chest X-Ray (CXR).

3.4.2.1 Clinical scoring system

Clinical feature	Score
Age >65	1
Previous DVT or PE	3
Unilateral lower limb pain	3
Pain on lower limb deep venous palpation and unilateral oedema	4
Heart rate 75-94 beats/min	3
Heart rate ≥95 beats/min	5
Active malignancy	2
Haemoptysis	2
Surgery or fracture within 1 month	2

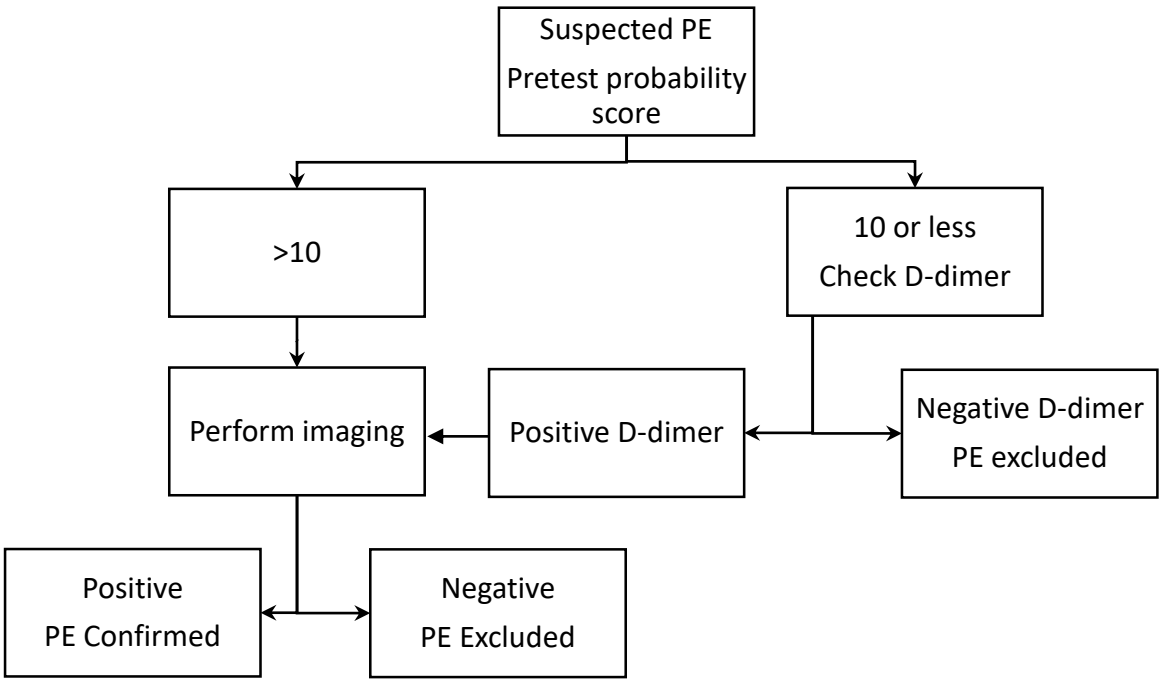
If the score is ten or less a D-dimer should be performed, if this is negative then a PE can be excluded at this point. If the D-dimer is positive the patient should be referred for imaging.
Patients on anticoagulation (this excludes prophylactic doses of LMWH) may have falsely low D-Dimers. These patients should progress straight to imaging without performing D-Dimer.

If the score is >10 then the patient should be referred for imaging without having a D-dimer performed.

Patients who are to be referred for scanning should start on either treatment dose LMWH, UFH or a DOAC (as long as there are no exclusions), see below.

D-dimers are requested through the ICE OrderComms system, they require a single sodium citrate tube and are sent to haematology. The average turnaround time for a D-dimer, from arrival to the lab, is one hour. D-dimer requests require a pre-test score written on the form. D-dimers will be reported as positive or negative. It is the requester's responsibility to chase the result on the ICE system as the result is not routinely telephoned. The haematology laboratory is CPA accredited and takes part in internal and external quality control therefore all D-dimer results can be assumed to be accurate enough on which to base clinical practice.

3.4.2.2 PE diagnosis flow chart



3.4.2.3 Investigations for PE

There are several modalities available for diagnosing PE:

- Ventilation/perfusion can be used in patients with a normal chest X-ray and no existing cardiopulmonary disease. If normal a PE can be excluded. Low, intermediate and high probabilities require confirmation with a CTPA.
- CT pulmonary angiogram (CTPA) can be used to diagnose/exclude PE in the majority of cases; the patient must have good renal function due to the use of intravenous contrast.
- Pulmonary angiography is the gold standard but is invasive.
- Echocardiography is useful in diagnosing PE in the emergency situation and it has no side-effects.

CTPAs or V/Q scans can be requested by discussing the case with the duty radiologist and by completing the form on ICE OrderComms. Less urgent scans can be requested on ICE OrderComms. The report will appear on the ICE system shortly after the scan has been performed (within 2 hours) or written in the patient notes, it is the requester's role to check for the result, it will not be routinely telephoned. All radiologists performing the scans are appropriately trained.

The results of any investigations which change management should be documented in the notes. In emergency situations the ICE OrderComms audit trail will determine when the result was viewed, except when the result is given verbally when it should be documented in the notes at the first opportunity.

3.4.2.4 Outpatient management of PE

Patients who meet the following inclusion criteria and do not have any of the exclusion criteria may be discharged home on anticoagulation while awaiting imaging:

Inclusion criteria:
- Age <80
- Fully understands nature of condition
- Able to return for further investigation

Exclusion criteria:
- Hypoxia
- Hypotension
- Heart rate >100 beats/min
- Respiratory rate >30 breaths/min
- Significant haemoptysis
- Hypothermia (temp <36°C)
- Uncontrolled chest pain
- Patient where adherence to therapy/follow-up would be difficult.
- Those with inadequate social support at home.
- Patient with active bleeding / at high risk of bleeding e.g. those with:
  - Recent stroke
  - Previous haemorrhagic stroke proven on CT scan
  - Acute gastric or duodenal ulceration
  - Familial or acquired bleeding disorders
  - Recent head trauma or brain surgery
  - Patients with excessive alcohol consumption
  - Cancer patients with an associated high risk of bleeding
- Patients with severe hepatic failure or renal failure
- Patients with uncontrolled hypertension
- Patients with previous history of Heparin Induced Thrombocytopaenia (HIT) where the use of a DOAC is inappropriate/contraindicated.
- Patients requiring more aggressive investigation or management e.g. Thrombolysis

It is the clinician's responsibility to ensure that the patient has been fully informed of the likely diagnosis and follow-up arrangements.
The patient should be given 'PE Information Sheet 1 – Suspected PE'.
TTO packs of Enoxaparin and DOACs (Apixaban & Rivaroxaban) are available to facilitate discharge.

3.4.2.5 Timescales

Patients with a suspected PE should be initially risk assessed. If a D-dimer is appropriate this should be taken within 1 hour and before anticoagulation. The patient should be informed of the result, and the further plan, within 4 hours of the D-dimer being taken. If the patient requires imaging then they should be informed of the likely time for the scan. The scan should be no more than 72 hours from the time of requesting. The patient should be informed of the result

of the scan within 4 hours of the scan. The time of all patient contact events should be recorded in the notes.

These steps should only be performed by a doctor or nurse practitioner apart from the D-dimer which can be taken by a trained phlebotomist. The patient should be initially assessed in hospital, the patient should only be sent home if a PE has been excluded or diagnosed or they are awaiting imaging and have been treated with LMWH and are felt by a Specialist Registrar or Consultant to be safe to be managed as an outpatient. The results of investigations should be given to the patient in hospital in person by a doctor or a nurse practitioner.

Where the patient's care is referred to another department for further investigation/ management it is assumed that, on accepting the patient, the department will continue to follow the appropriate pathway and arrange all further investigations/treatments/referrals.

3.4.2.6 Information Sheets

The following information sheets are available for patients and should be used:

- PE Information Sheet 1 – Suspected PE
- PE Information Sheet 2 – Confirmed PE
- PE Information Sheet 3 – No PE

3.4.3 Treatment of PE

Initial treatment of PE is either with –
- A DOAC *
- LMWH alone (treatment guidelines below)
- LMWH or Unfractionated Heparin (UFH) converting to warfarin (The LMWH/UFH must be continued for at least five days and until warfarin is therapeutic for 2 days).

*Note: If Edoxaban or Dabigatran are considered as appropriate options, then at least 5 days of LMWH is required prior to initiation.

Patients discharged <u>without</u> pharmacy involvement (where appropriate) should be given a TTO pack of either Enoxaparin or a DOAC (Apixaban or Rivaroxaban) and asked to attend their GP for further supplies. If they are being started on warfarin then an appointment at either the hospital or a community anticoagulation clinic should be made and the warfarin started only on the advice of that clinic.

The length of anticoagulation is determined by the risk of recurrence and the risk of bleeding, this is individual to the patient but as a guide:

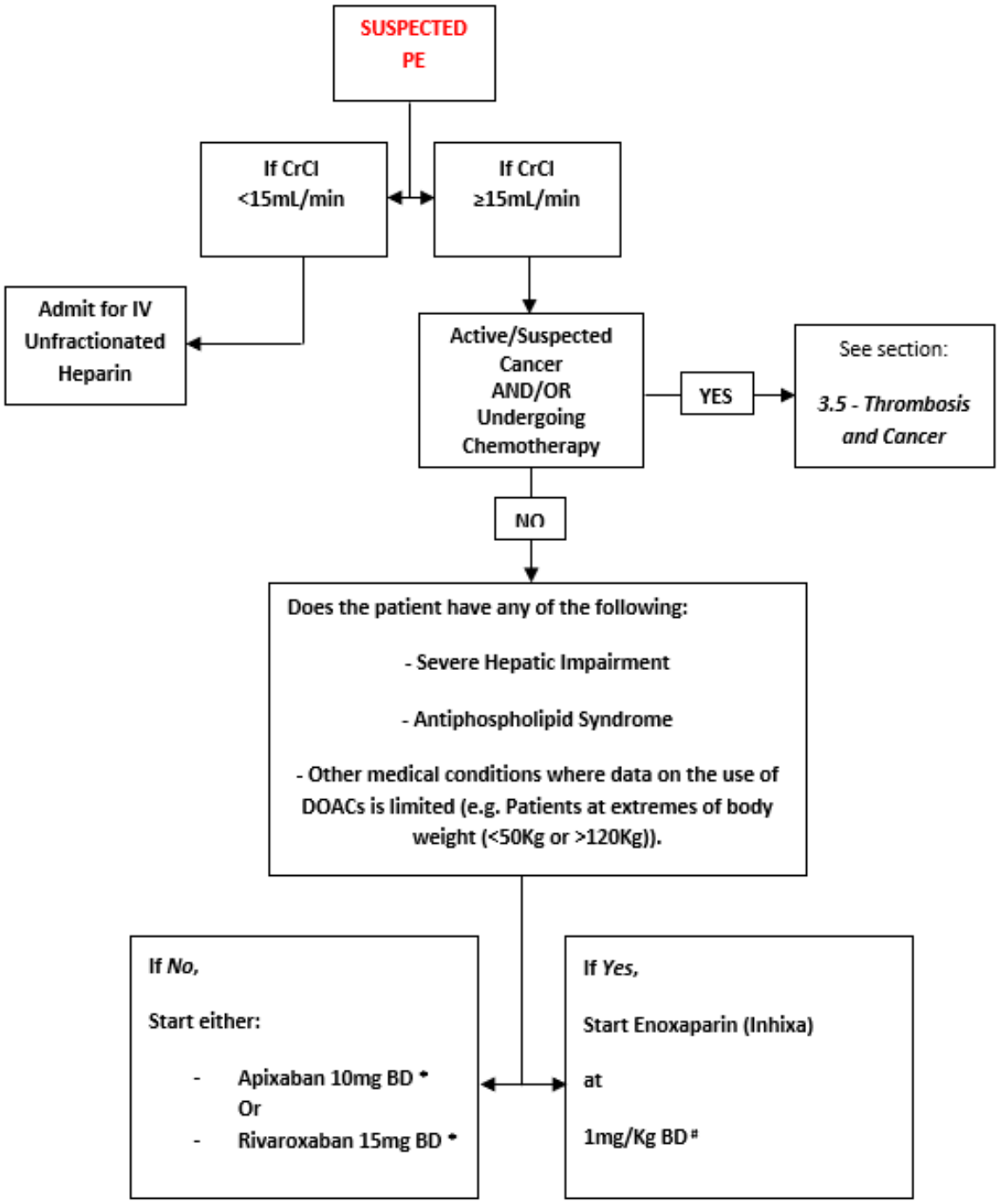
- First episode of provoked PE = Usually three months of anticoagulation (provided provoking factor no longer present and the clinical course was uncomplicated).
- Unprovoked PE = After three months of therapy discuss the risks/benefits of long-term anticoagulation with the patient. Those with a low risk of bleeding are likely to benefit from prolonged anticoagulation*
- In antiphospholipid syndrome and life-threatening PE = Consider lifelong anticoagulation. (Note: DOACs are contraindicated in antiphospholipid syndrome)
- Cancer associated thrombosis is usually treated for 6 months and then continued until the cancer is in remission (*see section on cancer associated thrombosis below)*

*Patients where continued use of anticoagulation would be favourable but is inappropriate e.g. due to high risk of bleeding should be discussed with haematology.

The patient should be fully counselled on the risk associated with anticoagulation and what to do if they occur e.g. bleeding. They should also be counselled on the signs/symptoms of recurrence to report and what high risk actions to avoid (prolonged immobility without prophylaxis, oestrogen containing medications). Advise them to always inform medical staff of their past medical history if they attend hospital or undergo any medical/surgical interventions (including dental procedures). First degree female relatives of patients with unprovoked PE should be advised to avoid oestrogen containing medications.

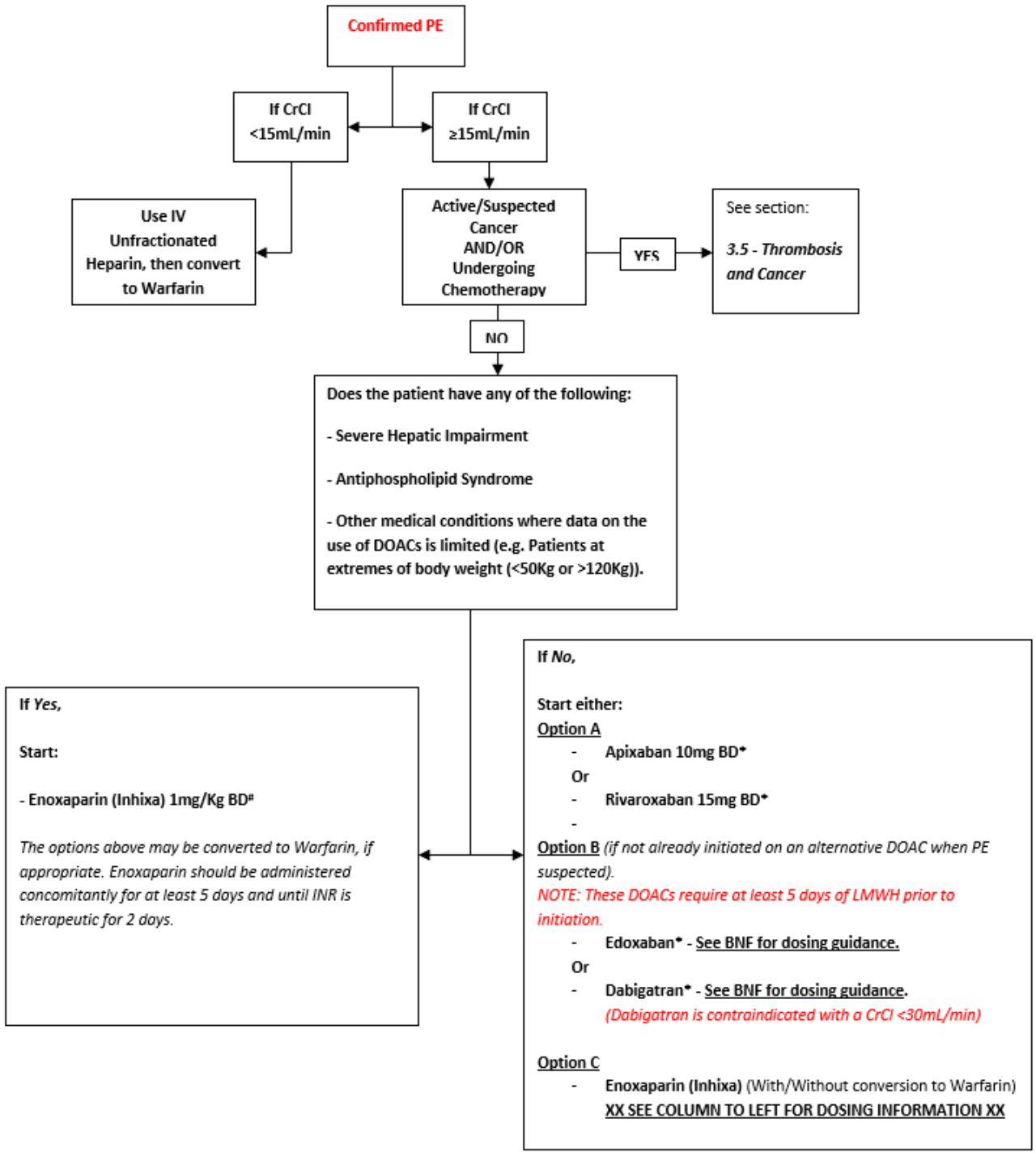
3.4.3.1 Treatment choices

The choice of the most appropriate treatment is a decision between the clinician and the patient. For the majority of patients there is no clearly superior product for all patients. Treatment suggestions are found in the figure below.



r CrCl 15-29mL/min use Enoxaparin at a dose of 1mg/Kg OD

e BNF and/or SPC for contraindications/interaction



For CrCl 15-29mL/min use Enoxaparin at a dose of 1mg/Kg OD

* See BNF and/or SPC for contraindications/interaction and full dosing schedule

For those patients who are to be considered for a DOAC (Apixaban, Dabigatran, Edoxaban and Rivaroxaban) a discussion between the patient and the prescriber is required.
Patient likely to benefit most from warfarin:

- Indication not covered by DOAC e.g. valvular AF, prosthetic valves, antiphospholipid syndrome
- Severe renal failure or high chance of significant deterioration (Apixaban, Edoxaban and Rivaroxaban should be avoided in patients with a CrCl of <15mL/min and Dabigatran if CrCl <30mL/min (See individual monographs in BNF for further guidance surrounding renal impairment)
- Hepatic dysfunction
- Arterial grafts
- Patient concerns over long term safety data
- Concomitant use of other medicines which interact with DOACs
- Other medical conditions where data on the use of DOACs is limited (e.g. Patients at extremes of body weight (<50Kg or >120Kg)).
- Use of unusual drugs where experience of them alongside DOACs is limited

There may be more benefit to treatment of DVT/PE with a DOAC compared to AF as the majority of patients are treated for a short period of time, therefore long term side-effects are less of a problem. Also the highest risk of bleeding on warfarin is in the first three months and that is when the majority of blood tests are.
Patient likely to benefit most from DOAC:

- Regularly prescribed drugs that interferes with warfarin e.g. COPD patient with multiple courses of antibiotics
- Difficulty attending INR clinics (personal or medical reasons)
- Needle phobic patients

Likely poor compliance is not a reason for choosing a DOAC, the relative short half-life means missed doses leaves the patients without anticoagulation until the next dose is taken, the relative long half-life of warfarin means an occasional missed dose is unlikely to affect the INR.

3.4.3.2 Follow-up arrangements for PE

Follow-up is usually with the GP. The following is a suggested follow-up regimen:

Diagnosis	Ensure patient understands the condition and treatment. Alert patient to what signs/symptoms should prompt them to contact medical services.
1 week	Ensure patient understands the condition and treatment. Alert patient to what signs/symptoms should prompt them to contact medical services. Consider further investigations if symptoms not improving.
4 weeks	Symptoms should be much improved/gone, consider further investigations if symptoms not improved. Ensure compliance.
8 weeks	Check patients have no problems (could be over telephone)
3 months (or after 6 months in those with cancer	Patients should have ECG/PFTs/Echo arranged to exclude pulmonary hypertension. The decision has to be made whether to stop anticoagulation or continue long term.

associated thrombosis)	Indications for long term anticoagulation include unprovoked events where the risk of bleeding is low, patients with active cancer, those continuing to experience symptoms, life threatening PE, patients with poor lung reserve, patients with antiphospholipid syndrome and/or those with a strong family history of recurrence. For those patients with an unprovoked PE and stopping anticoagulation, a lupus anticoagulant and anticardiolipin antibodies should be checked 1 week after stopping anticoagulation. If positive the patient should be referred to haematology. Those who decide to stop anticoagulation can be discharged. Encourage patient to present if recurrence of symptoms. (Where continued use of anticoagulation would be favourable but is inappropriate e.g. due to high risk of bleeding, haematology input should be sought). **All patients continuing anticoagulation – ensure compliance, determine any signs or symptoms of thrombosis or anticoagulation. Check U&Es in those whose baseline renal function was abnormal.**
6 monthly for those continuing anticoagulation	Ensure compliance and determine any suggestion of recurrence or problems with the anticoagulation. If there are problems with the anticoagulants then consideration should be given to changing them or stopping. U&E's should be checked annually for those with a normal renal function and 6 monthly for those with abnormal renal function.

3.4.3.3 Recurrent PE

Symptoms of recurrent PE should be investigated as in section 3.4.2 above. Confirmed recurrent PE should be managed as follows:

- Recurrence when not receiving anticoagulation – treat as described in 3.4.3
- Recurrence when receiving anticoagulation (once poor compliance and other contributing factors e.g. drug interactions are excluded) – if being treated with warfarin (target INR 2.5) and patient within target range when recurrence happened consider increasing target INR to 3.5, if being treated with LMWH or a DOAC consider changing to warfarin with target INR 3.5, if being treated with warfarin target INR 3.5 and within range the options are changing to or adding LMWH or adding aspirin (this should be discussed with haematology).

3.4.4 Life-threatening PE

Patients that demonstrate significant hypotension (systolic BP<90mmHg), a history suggestive of symptomatic hypotension e.g. dizziness or syncope or are in a peri-arrest situation should be considered for thrombolysis (As with DVT thrombolysis, these patients will initially require the use of Unfractionated Heparin as opposed to a LMWH or DOAC).
Contra-indications include:

- history of haemorrhagic stroke,
- active intracranial neoplasm and/or brain aneurysm
- recent (<2 months) history of intracranial surgery or trauma,
- active or recent internal bleeding (last six months).

(These contraindications may be relative and should be weighed against the mortality risk of each individual patient)

Care should be taken if there is a bleeding diathesis, uncontrolled hypertension, non-haemorrhagic stroke in the last two months, surgery in the previous 10 days or a platelet count <100x10^9/L (see Alteplase BNF Monograph/SPC for further cautions).

Patients who are felt to require thrombolysis but have absolute contraindications could be considered for catheter or open thrombectomy (not currently performed at WAHT).

See Appendix 3 – Protocol for thrombolysis in massive/ high risk PE

3.5 Thrombosis and Cancer

Venous thrombosis and thromboembolism is a known complication for patients with cancer (which may be undiagnosed at the time). These patients have a substantial risk of recurrent VTE but also bleeding complications.
NICE currently recommends that patients thought to have an unprovoked DVT/PE should receive a physical examination and their medical history reviewed (looking for previous investigations such as imaging). Further investigations for cancer in this group is not advised unless they have relevant signs/symptoms (This is because available evidence doesn't appear to indicate any additional benefit).
These patients should however still have their baseline bloods reviewed as usual (e.g. full blood count, renal/hepatic function and clotting).

Management option for cancer patients (both pre-existing and newly diagnosed) found to have a thromboembolism has expanded in recent times, with the use of DOACs now incorporated into NICE guidelines and considered 1st line in certain patients. The use of DOACs for this indication would be off-label *but* considered appropriate given the increasing evidence base supporting their use. Please note: Dabigatran is currently **not** recommended in this patient group as there is still a lack of evidence available to support its use.

For most patient a DOAC (Apixaban, Edoxaban or Rivaroxaban) can be considered as an appropriate first line option, however when deciding on the most suitable choice of therapy a number of important factors must be considered, including: the site of the cancer, the patients bleeding risk, interactions with medication/chemotherapy, appropriate routes of administration, co-morbidities (e.g. significant renal/hepatic impairment), extremes of body weight, abnormal blood results and patient preference.
The following points can be utilised to help guide the prescribers decision making process and identify where some options may be more favourable than others (but also see the BNF for additional cautions/contraindications):

- **Enteral absorption is likely to be a problem:** e.g. issues with nausea/vomiting (certain chemotherapy regimens are known to be particularly emetogenic) and/or previous surgery of the GI tract which is likely to reduce absorption.

  - *A therapeutic dose of LMWH (Enoxaparin) may be preferable.*

- **The patient has a phobia/preference to avoid needles:**

  - *A DOAC which doesn't require prior administration of a parenteral anticoagulant may be preferable (Apixaban or Rivaroxaban).*

- **The patient has a strong preference for once daily administration as opposed to multiple-daily dosing:**

  - *Consider the use of Edoxaban (or Rivaroxaban – which initially requires 21 days of twice daily dosing before reducing to once daily).*

- **The patient has a high risk of bleeding and/or a Gastrointestinal (GI) / Genitourinary (GU) Cancer?**
  (The incidence of bleeding was greater in patients with these types of cancers who took Edoxaban and Rivaroxaban. Apixaban didn't appear to have a greater incidence of bleeding, but further evidence is required to support its use).

  - *A therapeutic dose of LMWH (Enoxaparin) may be preferable*

- **There are significant interactions with the patients current medication and/or chemotherapy which exclude the use of DOACs:**

  - *A therapeutic dose of LMWH (Enoxaparin) may be preferable.*

- **The patient is <50kg or >120Kg:**
  (Regular monitoring of therapy is advised in these groups to ensure appropriate anticoagulation/minimise bleeding risk)

  - *Consider therapeutic dose LMWH (Enoxaparin) <u>with</u> monitoring of Anti-Factor Xa activity.*

- **The patient has significant hepatic impairment:**

  - *See BNF for accepted thresholds with each DOAC and identify a suitable option.*

  - *Consider therapeutic dose LMWH (Enoxaparin) if the use of a DOAC is contraindicated because of the above.*

- **The patient has a CrCl <15mL/min:**

  - *Consider IV Unfractionated Heparin overlapped with Warfarin until INR therapeutic for two consecutive doses, then Warfarin alone.*

    <u>(NOTE: Warfarin has a significant amount of drug interactions/contraindications)</u>

If there is still uncertainty regarding the most appropriate choice of anticoagulation, consult Haematology for further guidance

<u>Duration of therapy</u>

Cancer patient with a proven thromboembolism should receive anticoagulation for at least six months and then continued until the cancer is in remission.
Patient unable to tolerate the initial anticoagulant within this six-month period should be reviewed for a suitable alternative.

The continued use of anticoagulation beyond this period should be decided on an individual basis weighing up the risk/benefits (e.g. risk of bleeding vs risk of re-occurrence) and patient preference.

As with the management of thromboembolism in the non-cancer patients, ensure that those discontinuing anticoagulation after 6 months are provided with relevant resources and educated on the potential signs/symptoms of re-occurrence.

3.6 Guidelines for the Management of patients receiving low molecular weight heparin (LMWH)

Heparin is the most widely used parenteral anticoagulant. It is available as unfractionated heparin (UFH) and low molecular weight heparins (LMWHs).

Different heparins are not bioequivalent and should not be interchanged during treatment without the authority of the prescriber (BNF). Enoxaparin is the LMWH of choice within the trust.

Advantages of LMWHs include ease of administration (in comparison to IV UFH), no need for monitoring in most cases, fewer side effects and possibly improved efficacy. LMWH's are characterized by higher bioavailability and longer half-life, and do not routinely require laboratory monitoring (Hirsh & Levine 1992). For patients within the Worcestershire Acute Hospital Trust, LMWH is the drug of choice where inpatients are receiving venous thromboembolism prophylaxis or treatment for DVT or PE. LMWHs are also used in the management of myocardial infarction and unstable angina (although UFH and/or Fondaparinux are preferred in our trust) and in the management of venous thromboembolism in pregnancy.

Treatment dose Enoxaparin (Inhixa™) is given on a weight-adjusted basis of either 1.5mg/kg by subcutaneous injection once daily or 1.0mg/kg by subcutaneous injection twice daily

When patients are commenced on Warfarin, they are concomitantly given daily LMWH for a minimum of 5 days, until the INR is >2.0 for 2 days.
At least 5 days of LMWH is also required prior to the initiation of Dabigatran/Edoxaban for the treatment of VTE

To ensure consistency of approach within primary and secondary health care the LMWH of choice in Worcestershire for the treatment of DVT & PE is enoxaparin (Inhixa™).

3.6.1 Cautions/Contraindications of Heparins (UFH and LMWH)

- Active bleeding
- Active peptic ulcer disease
- Known bleeding disorder (e.g. haemophilia)
- Thrombocytopenia (including heparin induced thrombocytopenia). LMWHs are usually avoided if platelet count $<75x10^9$/L (except in certain circumstances – if platelet count less than this refer to Haematology for further guidance).
- Severe renal disease with LMWHs: In CKD 4 and 5, a CrCl <30mL/min or where a patient is suspected to have this degree of renal impairment.
- Hepatic failure
- Recent cerebral haemorrhage
- Recent eye/neurosurgery
- Uncontrolled severe hypertension
- Acute bacterial endocarditis
- Known allergy to unfractionated or low molecular weight heparin
- Religious considerations

See also latest British National Formulary (BNF)

3.6.2 Prescribing LMWH

Weigh patient and document weight on patient drug chart, admission sheet and anticoagulant/warfarin chart if warfarin is prescribed.

The patient's weight must be established in kilograms (kg) at the start of therapy and, where applicable, during treatment. The weight must be accurately recorded. Renal function must be considered to reduce the risk of adverse effects from LMWH's in renal impaired patients.

Blood tests:

- Full blood count (FBC), INR, Liver function tests (LFTs)
- Renal function - urea & electrolytes (U&Es)
- Check for history of bleeding risk, acute peptic symptoms or other contraindications
- Check if patient is on drugs that may prolong bleeding time or affect platelet function (e.g. aspirin, NSAIDs, clopidogrel)

NB Delays in obtaining blood results should not delay initiation of the first dose but every effort must be made to base subsequent dosing on these results

Renal function should also be assessed prior to treatment. The renal function test should not delay the first dose of treatment but every effort should be made to base subsequent dosing on these results. Patients with an CrCl of <30ml/min will require dose adjustment. In these patients, seek specialist advice before prescribing LMWH.

3.6.3 Administering LMWH

All staff caring for patients and administering LMWH should have the necessary training and competencies to ensure safe practice. Any gaps in competencies must be addressed by their line manager.

All staff involved in training patients to self-administer subcutaneous LMWH injections should have the necessary training/experience and competency to provide the teaching and training to the patient. They must ensure that the patient is observed and safe to take on the responsibility of injections.

3.6.3 The procedure

Wash hands and area to inject

Inject into the S/C tissue of the anterolateral or posterolateral abdominal wall (this should be at least 5 centimetres away from the belly button). Alternate each administration between the left and the right side.

Do not expel the air bubble in the syringe. Vertically introduce the whole length of the needle into the thickness of the skin held between thumb and forefinger

Hold the skin throughout the procedure

Do not rub the injection site

The used needle should be disposed of in a sharps bin. When patients are discharged on LMWH they must be provided with a sharps box. The sharps boxes can be provided from ward stock and also the manufacturers of Enoxaparin (Techdow Pharma Ltd) will also supply sharps boxes on request. The sharps boxes can then be disposed of through a community pharmacy and if necessary more sharps boxes obtained on prescription from their GP.

3.6.4 Side effects

Side effects of LMWH include bleeding, thrombocytopenia (low platelets), osteoporosis, hyperkalaemia, injection site reactions, and allergic reactions
(including urticaria, angioedema and anaphylaxis).

3.6.5 Monitoring Requirements

Anti-Factor Xa Levels

Anti-Factor Xa levels may be considered in the following patient groups as there could be a risk of overdosing/underdosing:

- Those with a CrCl of 15-30mL/min
- Patients >120Kg
- Patients <50Kg

Levels should be taken 4 hours after the day 3 dose of LMWH. When the result is known, reference ranges are presented on ICE OrderComms which can help identify the need for any adjustments (Haematology may be contacted for further guidance on interpreting results).
If there is a need to adjust the dose, repeat Xa level should not be taken for at least another 3 days after this adjustment (to allow for steady state).

Platelet Count

The risk of antibody-mediated heparin-induced thrombocytopenia also exists with LMWH's. Should thrombocytopenia occur, it usually appears between the 5th and 21st day following the beginning of LMWH treatment. Therefore, it is recommended that the platelet counts be measured before the initiation of therapy with LMWH.
No routine measurement of platelet counts are required for patients on LMWH, however in line with trust guidelines, if platelet count is less than 75 X 10^9/L refer to haematology for guidance.

3.6.6 Heparin Induced Thrombocytopenia (HIT)

HIT is an uncommon but potentially life threatening complication; it is less likely to occur with LMWH. HIT should be considered under the following circumstances:

- Fall in platelet count of 50% or more from baseline, occurring 4-14 days after heparin commenced (N.B. may occur earlier if patients have received heparin within the past 100 days)
- Arterial or venous thrombosis occurring while patient on heparin
- Acute systemic reaction to IV bolus of heparin
- Skin lesions at heparin injection site

Refer to known patient allergies prior to prescribing

Where the patient has been admitted in the past 100 days to hospital and given heparin they have increased risk of HIT. HIT is rare after 14 days of treatment. If suspected, do not give further doses of LMWH until treatment discussed with Haematologist.

3.6.7 Haemorrhage

As with other anticoagulants, bleeding may occur at any site (see BNF for Adverse Effects). If bleeding occurs, the origin of the haemorrhage should be investigated and appropriate treatment instituted.

4.0 MONITORING TOOL

An audit following the described management will be carried out by the DVT/Anticoagulation Nurse at least annually using the standards within this guideline and the findings reported to the Haematology Directorate which will monitor progress against any action plans.

STANDARDS	%	CLINICAL EXCEPTIONS
All patients on treatment dose LMWH will have a weight documented	100	None
All suspected DVT diagnoses will follow the algorithm	75	None
All suspected PE diagnoses will follow the algorithm	75	None
All DVT's suitable for anticoagulation will be treated as per the policy	90	None
All PE's suitable for anticoagulation will be managed as per the policy	90	None
All patients are informed of the result of investigations within 2 hours	90	None

The monitoring will be performed by a retrospective review of patient notes. This will determine if the correct pathway is followed. Timing of requests will be found from the notes and the audit trails on WinPath and ICE OrderComms.

5.0 CONTRIBUTION LIST

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Circulated to the following Divisional Medical Directors for comment and circulation to their Directorates

Name	Division

Circulated to the chair of the following Committee's / Groups for comments

Name	Committee / Group

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Appendix 1 – DVT Information Sheets

Worcestershire NHS
Acute Hospitals NHS Trust

DVT Information Sheet 1 – Suspected Deep Vein Thrombosis

You have shown signs that you might have a blood clot in the leg, a deep vein thrombosis (DVT). To confirm this we are awaiting an ultrasound scan of your leg. The scan should be in the next couple of days but until then we feel you can go home.

While at home there are a few precautions you must take and certain things to look out for:

- The leg could become painful and it may be okay to take painkillers like paracetamol and codeine but you must not use aspirin or non-steroidal anti-inflammatory drugs (NSAIDs) e.g. ibuprofen, diclofenac, indomethacin (Unless advised to do so by an appropriate healthcare professional).
- Try to undertake light physical activity such as walking (unless advised otherwise), as this can help prevent further clot related problems.
- If the leg becomes either more painful, more swollen, blue in colour or cold then you must contact the hospital immediately.
- If you develop any bleeding or bruising you must contact the hospital immediately.
- If you develop chest pain, shortness of breath or spit with blood in it you must attend A&E immediately.

Your follow-up is:

- Attend_____

  at_____am/pm on the _____/_____/20___

- Please telephone_____

  at_____am/pm on the _____/_____/20___

Your emergency contact is:

_____

DVT Information Sheet 2 – Deep Vein Thrombosis

You have been found to have a blood clot in your leg (deep vein thrombosis). About 1 in 1000 people each year get a DVT. The blood clot in the leg slows down the blood flow leading to pain, swelling and potential colour change. Most DVTs are picked up because of leg swelling or pain but occasionally found when scans are done for other reasons. DVTs may be 'provoked' where something has caused it for example pregnancy, the oral contraceptive pill, operations, immobility and cancer, or 'unprovoked' where no obvious cause is found.

To stop the clot getting bigger or spreading you have been started on a drug to thin the blood. The blood clot will slowly dissolve over the next few weeks to months which should improve the pain and swelling. Once the blood thinning treatment is finished and even when on treatment there is a chance of the blood clot getting worse or coming back therefore if the symptoms get worse or return then you must contact medical services.

You will be given a drug to thin the blood. It is important that you read the information that comes with the drugs which will discuss possible side-effects. The main side-effect we worry about is bleeding.

You should contact your GP if:

- You notice any bruising where you cannot remember knocking yourself or bleeding.
- Notice blood when you pass urine or move your bowel.

You should attend A&E if:

- You have the bruising or bleeding mentioned above and feel weak, dizzy or lightheaded.
- You bang your head and you have a headache or feel unwell.
- You cough up blood, get short of breath or have chest pain.
- You vomit and there is blood in the vomit.
- You develop weakness, slurred speech or you lose feeling in your face or arm or leg.

The length of treatment will be decided by your GP but will depend if it is a provoked or unprovoked DVT, other medical problems and if how well you got on with the blood thinning drugs. It might be worth making an

appointment in about a week's time with your GP so you can talk things through. If you attend an outpatient appointment or come into hospital it is important that you tell the doctor or nurse looking after you that you have had a DVT in the past. If you think you are pregnant it is important to see your doctor as soon as possible, this is especially important if you are still on an oral blood thinner.

First degree relatives (brothers, sisters, parents and children) are also at increased risk of DVTs if you have had an unprovoked DVT. They should also tell nurses or doctors if they come to hospital. Any female first degree relatives should avoid oestrogen containing contraceptive pills or hormone replacement therapy.

DVT Information Sheet 3 – No deep vein thrombosis

It was thought that you may have had a blood clot in your leg (deep vein thrombosis (DVT)). The tests that we have performed have not shown any evidence of a DVT. The hospital staff looking after you should have told you why they think your leg is how it is and may have given some treatment or arranged further tests. It is now okay for you to go home but we would like you to take the following precautions:

- The leg could become painful and it may be okay to take painkillers like paracetamol and codeine. Unless advised to do so by an appropriate healthcare professional, you must not use aspirin or non-steroidal anti-inflammatory drugs (NSAIDs) (e.g. ibuprofen, diclofenac, indomethacin) for at least 24 hours if you have been given an injection of heparin or any of the following: Apixaban, Dabigatran, Edoxaban or Rivaroxaban.
- If the leg is no better after a week then you should attend your GP.
- If the leg becomes either more painful, more swollen, blue in colour or cold then you must contact your GP or out of hours GP service.
- If you develop chest pain, shortness of breath or spit with blood in it you must attend A&E immediately.

Appendix 2 – PE information sheets

Worcestershire NHS
Acute Hospitals NHS Trust

PE Information Sheet 1 – Suspected Pulmonary Embolism

You have shown signs that you might have a blood clot in your lung, a pulmonary embolism (PE). To confirm this we are awaiting a scan of your lung. The scan should be in the next couple of days but until then we feel you can go home.

While at home there are a few precautions you must take and certain things to look out for:

- Your chest could become painful and it may be okay to take painkillers like paracetamol and codeine but you must not use aspirin or non-steroidal anti-inflammatory drugs (NSAID) e.g. ibuprofen, diclofenac, indomethacin (Unless advised to do so by an appropriate healthcare professional).
- Try to rest and not do too much walking or significant physical activity.
- If your legs become either painful, swollen, blue in colour or cold then you must contact the hospital immediately.
- If you develop any bleeding or bruising you must contact the hospital immediately.
- If you develop worsening or new chest pain, worsening or new shortness of breath or spit with blood in it you must attend A&E immediately.

Your follow-up is:

- Attend_____

  at_____am/pm on the _____/_____/20___

- Please telephone_____

  at_____am/pm on the _____/_____/20___

Your emergency contact is:

_____

Worcestershire Acute Hospitals NHS Trust

Worcestershire NHS
Acute Hospitals NHS Trust

PE Information Sheet 2 – Pulmonary embolism

You have been found to have a blood clot in your lung (pulmonary embolism (PE)). About 1 in 3000 people each year get a PE. The blood clot in the lung slows down the blood flow leading to pain, shortness of breath and occasionally spit with blood in it. Most PEs are picked up because of shortness of breath or pain but occasionally found when scans are done for other reasons. PEs may be 'provoked' where something has caused it for example pregnancy, the oral contraceptive pill, operations, immobility and cancer, or 'unprovoked' where no obvious cause is found.

To stop the clot getting bigger or spreading you have been started on a drug to thin the blood. The blood clot will slowly dissolve over the next few weeks to months which should improve the pain and shortness of breath. Once the blood thinning treatment is finished and even when on treatment there is a chance of the blood clot getting worse or coming back therefore if the symptoms get worse or return then you must contact medical services.

You will be given a drug to thin the blood. It is important that you read the information that comes with the drugs which will discuss possible side-effects. The main side-effect we worry about is bleeding.

It is important that you read the information that comes with the drugs which will discuss possible side-effects. The main side-effect we worry about is bleeding.

You should contact your GP if:

- You notice any bruising where you cannot remember knocking yourself or bleeding.
- Notice blood when you pass urine or move your bowel.

You should attend A&E if:

- You have the bruising or bleeding mentioned above and feel weak, dizzy or lightheaded.
- You bang your head and you have a headache or feel unwell.
- You have new or worsening chest pain, shortness of breath or blood in your spit.
- You vomit and there is blood in the vomit.

- You develop weakness, slurred speech or you lose feeling in your face or arm or leg.

The length of treatment will be decided by your GP but will depend if it is a provoked or unprovoked PE, other medical problems and if how well you got on with the blood thinning drugs. It might be worth making an appointment in about a week's time with your GP so you can talk things through. If you attend an outpatient appointment or come into hospital it is important that you tell the doctor or nurse looking after you that you have had a PE in the past. If you think you are pregnant it is important to see your doctor as soon as possible, this is especially important if you are still on an oral blood thinner.

First degree relatives (brothers, sisters, parents and children) are also at increased risk of PEs if you have had an unprovoked PE. They should also tell nurses or doctors if they come to hospital. Any female first degree relatives should avoid oestrogen containing contraceptive pills or hormone replacement therapy.

Worcestershire Acute Hospitals NHS Trust

Worcestershire NHS
Acute Hospitals NHS Trust

PE Information Sheet 3 – No pulmonary embolism

It was thought that you may have had a blood clot in your lung (pulmonary embolism (PE)). The tests that we have performed have not shown any evidence of a PE. The hospital staff looking after you should have told you why they think you are unwell and may have given some treatment or arranged further tests. It is now okay for you to go home but we would like you to take the following precautions:

- The chest could become painful and it may be okay to take painkillers like paracetamol and codeine. Unless advised to do so by an appropriate healthcare professional, you must not use aspirin or non-steroidal anti-inflammatory drugs (NSAID) (e.g. ibuprofen, diclofenac, indomethacin) for at least 24 hours if you have been given an injection of heparin or any of the following: Apixaban, Dabigatran, Edoxaban or Rivaroxaban.
- If your problems are no better after a week then you should attend your GP.
- If your leg(s) becomes painful, swollen, blue in colour or cold then you must contact your GP or out of hours GP service.
- If you have new or worsening chest pain, shortness of breath or blood in your spit you must attend A&E immediately.

Appendix 3

Protocol for thrombolysis in massive / high risk PE

- *If massive / high risk PE is suspected ensure that the patient receives an immediate review from a senior clinician.*

- If thrombolysis is deemed appropriate for the patient, do not allow supportive measures to delay the following as the condition is life threatening:

1) Administer a STAT dose of 10,000 units Unfractionated Heparin IV.

This should be followed with a continuous infusion (to be prescribed on the Adult Intravenous Heparin Treatment Chart and adjusted as per APTT ratio).

(If a patient has received a LMWH (e.g. Enoxaparin) prior to this, administration of UFH should be delayed until 8 hours following the last dose of LMWH. Continue to administer Thrombolysis)

XX HOLD UNFRACTIONATED HEPARIN INFUSION JUST PRIOR TO GIVING ALTEPLASE XX

2) Give an initial 10 mg IV bolus of Alteplase over 1-2 minutes, followed by a 90 mg IV infusion over 2 hours (a maximum total dose of 1.5 mg/kg should be used in patients <65 kg)

3) After completion of the Alteplase infusion restart Unfractionated Heparin and adjust as necessary (aiming for an APTT ratio of between 1.5 – 2.5).

Continue for at least 24 hours, before switching to an alternative anticoagulant if appropriate to do so (this may be when the patient is stable, with a heart rate less than 100bpm, blood pressure greater than 100mm/Hg and O_2 Saturation greater than 92% on air).

(See the end of the protocol for further information regarding the preparation and administration of Alteplase and Unfractionated Heparin)

REMEMBER TO:

- *Correct hypotension to prevent RV failure (this should be undertaken cautiously as aggressive volume expansion could worsen RV function)*

- *Ensure early respiratory support (aim for an oxygen saturation of 94% to 98%, although adjust to 88% to 92% in patients at risk of hypercapnic respiratory failure)*

If cardiac arrest/peri-arrest has occurred as a result of the PE:

A 50mg bolus dose of Alteplase, given over 1 to 2 minutes, may be considered as an alternative approach. Administration of a repeat dose after 15 minutes may be given if an expected response is not observed.
Unfractionated Heparin should be initiated following thrombolysis (as above).

Standard advanced life support should commence alongside this as normal

(Note: This is an off label regimen, but recommended by BTS guidelines. Tenecteplase can be used in place of Alteplase in these patients – see doing information below).

Preparation and Administration

- To prepare the Unfractionated Heparin: Use a 50ml syringe to draw up 40mls of 1000 units/ml strength Heparin Sodium (this will provide a 40,000 units in 40mL preparation).
  Administer as per trust Adult Intravenous Heparin Treatment Chart.

- To prepare the Alteplase: Reconstitute each vial of Alteplase 50mg with the accompanying 50mL Water for Injection (this will provide a 1mL/mL preparation). Use 2 vials to provide the required dose.
  Administer as per the table below

WEIGHT	ALTEPLASE rt-PA		
Estimate of patients weight (kg)	IV Bolus dose over 1-2 minutes	IV Infusion dose over 2 hours	IV Infusion over 2 hours (mLs/hr)
50 kg	10mg	65mg	**33mls/hr**
55 kg	10mg	70mg	**35mls/hr**
60 kg	10mg	80mg	**40mls/hr**
65 kg	10mg	90mg	**45mls/hr**
70 kg	10mg	90mg	**45mls/hr**
75 kg	10mg	90mg	**45mls/hr**
≥ 80 kg	10mg	90mg	**45mls/hr**

- To prepare the Tenecteplase: Slowly reconstitute a vial of Tenecteplase 50mg with the 10mL of Water for Injection provided (this will provide a 5mL/mL preparation). Transfer the appropriate volume of reconstituted solution into a syringe (based on the patient's weight).
  Administer as a bolus over approximately 10 seconds.
  Dosing is as per below

WEIGHT	TENECTEPLASE	
Estimate of patients weight (kg)	IV Bolus dose over ~10 seconds	Volume of 5mg/mL preparation to administer
<60 kg	30mg	6mL
60-69 kg	35mg	7mL
70-79 kg	40mg	8mL
80-89 kg	45mg	9mL
≥90 kg	50mg	10mL

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	x	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Keith Hinton	**Clinical team lead Pharmacist**	**keith.hinton1@nhs.net**
Date assessment completed	**09.01.2023**		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:** Guideline for the Management of Venous Thromboembolism
What is the aim, purpose and/or intended outcomes of this Activity?	As per title

Who will be affected by the development & implementation of this activity?	X X ❑ ❑	Service User Patient Carers Visitors	X ❑ ❑ ❑	Staff Communities Other _____
Is this:	X Review of an existing activity ❑ New activity ❑ Planning to withdraw or reduce a service, activity or presence?			
What information and evidence have you reviewed to help inform this assessment? (Please name sources, eg demographic information for patients / services / staff groups affected, complaints etc.	See references			
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	See contribution list. Including Haematology Governance meeting Trust Thrombosis Committee			
Summary of relevant findings				

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age		X		
Disability		X		
Gender Reassignment		X		
Marriage & Civil Partnerships		X		
Pregnancy & Maternity		X		
Race including Traveling Communities		X		
Religion & Belief		X		

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Sex		X		
Sexual Orientation		X		
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)		x		
Health Inequalities (any preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)		x		

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
		.		
How will you monitor these actions?				
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)				

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.
1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc, and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	Keith Hinton
Date signed	09/01/2023
Comments:	
Signature of person the Leader Person for this activity	
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval